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Factors Impacting Body Mass Index of Hispanic Youth in a Weight Loss Program

Elizabeth Maria Hartman
Walden University

Walden University

College of Health Sciences

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Elizabeth Hartman

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Review Committee
Dr. Nicoletta Alexander, Committee Chairperson, Public Health Faculty
Dr. James Rohrer, Committee Member, Public Health Faculty
Dr. Ji Shen, University Reviewer, Public Health Faculty

Chief Academic Officer
Eric Riedel, Ph.D.

Walden University
2015

Abstract

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Dissertation Submitted in Partial Dissertation

of the Requirements for the Degree of

Doctor of Philosophy

Public Health

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Abstract

Youth obesity prevalence rates in the United States are trending down; however, for Hispanic youth, rates are increasing despite efforts toward a reduction. The purpose of this study was to evaluate the impact of a culturally focused intervention program on weight reduction of Hispanic youth age 2 to 19 through examination of body mass index (BMI) percentile outcomes comparing age, gender, distance to program, time in program, and season of enrollment. Review of literature supports ecological and cultural approaches requiring behavior modification tailored to family and community as successful in decreasing youth obesity. However, researchers have yet to establish how various variables impact intervention outcomes making it difficult to determine what aspects of the cultural approach is effective. The epidemiology triangle and the social cognitive theory approach were used to relate to findings. Use of retrospective clinical archival participant data dating from November 7, 2008 to February 23, 2015 was analyzed through the use of various statistical applications. The analyses of this study indicated that only one age variable had significant results. The category for age 8 to12 had a significantly higher change in BMI than the other groups ($p < .05$) . This research has the potential to contribute to social change since it reveals that interventions tailored for the 8-12 age group may significantly improve the effectiveness of the program in reducing BMI percentile, thus decreasing obesity rates and associated disease along with morbidity and mortality. This knowledge can benefit educators, community collaborative efforts, practitioners, and other researchers.

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Dedication

I dedicate this paper to my parents who immigrated to the United States and worked hard to provide their children with a better life than they had. They taught me the values of doing things the right way and putting pride into what you do and you accomplish. I very much thank them for this and wish they were alive so I could celebrate this accomplishment with them. I desire to deeply acknowledge my husband who has supported me through this process and encouraged me to keep going when I no longer felt I could continue on. I also desire to acknowledge my lifelong friend who has been my editor in this process. I could not have accomplished with without her help and encouragement. Lastly, I continued on in this venture even when things got difficult in the memory of my departed first husband who always desired to complete a PhD; believing that part of this process also celebrates his spirit that has never died in my heart.

Acknowledgments

I desire to express that I am eternally grateful to all who continued to support and encourage me during the process of my dissertation journey. I especially thank my faculty chair, advisor, and mentor, Dr. Nicoletta Alexander. She was an inspiration and encouraged me to continue in this process when I felt I no longer could. She way always ready to provide guidance and pointers toward the correct direction with regard to this dissertation process. She also was very understanding, and I could never have accomplished this without her on my side. I also desire to thank Dr. James Rohrer for his patience, guidance, and support when he stepped in to be my methods committee member which I am very grateful for. Dr. Rohrer is a fountain of knowledge.

Lastly, and very importantly, I desire to express my thanks to Dr. William Muinois and his staff for allowing me to use their retrospective information regarding interventions they provided to their patients. He and his staff went out of their way to provide data and cooperation. Without data there is no research.

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Chapter 1: Introduction to the Study

Introduction

Despite efforts that have been put forth by the federal and local government, public health organizations, education institutions, and healthcare providers, the percentage of children and adolescents becoming overweight or obese continues to increase (American Heart Association, [AHA], 2010). Recent statistics suggest that 12.5 million (17%) children and adolescents aged 1 to 19-years-old in the United States are considered overweight or obese (Centers for Disease Control and Prevention [CDC], 2014). These statistics have tripled over the last 3 decades, suggesting that the prevalence of obesity has reached epidemic status (Ogden, Carroll, Kit, & Flegal, 2012).

The Institute of Medicine's [IOM], (2004) report on obesity in America highlights that ethnic minorities and lower income groups are at the greatest risk of being overweight and obese. This report further reveals that risk factors for diverse populations involving obesity and physical activity are limited and based on standards that were developed for the general population that do not address cultural and environmental factors. Experts in public health believe for interventions to succeed, it is imperative that they specifically address the needs of individual populations and link interventions to those groups rather than the overall population (Bruss et al., 2010; Dehghan, Akhtar-Danesh, & Merchant, 2005; Galindo, Prada, Shinogle, & Kirk, 2011; Lopez & Hynes, 2006).

In this study, I examined and evaluated the impact of an overweight and obesity program through comparing results based on gender, age, distance to the clinic, time

spent in the program, and season enrolled in the program that is culturally and ethnically focused toward the 2 to 19 year-old Hispanic youth population conducted by pediatric Gastroenterology Associates (PGA) located in Miami, Florida (FL). Consequences of overweight and obesity were addressed along with the use of effective interventions that reduce overweight and obesity in the study population to improve health, thereby contributing to positive social change. In this chapter, I introduced and briefly summarize research literature related to the phenomena of overweight and obesity, and, I specifically examined the higher trends and prevalence of such among Hispanic youth aged 2 to 19. The research problem, the focus of the study, and the rational of the study design are summarized. The epidemiology triangle and social cognitive theory, which serves as the conceptual framework, is introduced (CDC, 2013; Glanz, Lewis, & Rimer, 2002; Nelson & Williams, 2007). The influences of culture, race, and ethnicity are briefly examined and discussed as they pertain to the Hispanic population.

Background

Trends, Prevalence, and Definitions of Obesity

Childhood and adolescence. A trend of increasing weight in the United States was first observed after the Second World War; however, this trend has become more notable since the 1970s. Child and adolescent obesity rates have increased 300% in the last 30 years, as evidenced by cross-sectional surveys conducted by the National Health and Nutrition Examination Survey I (NHANES 1) 19971-1974, NHANES II 1976-1980, the Hispanic Health and Nutrition Examination Survey (HHANES) 1982-1984, and NHANES III 1988-1994 (CDC, 2012; Ogden, Carroll, Curtin, Lamb, & Flegal, 2010;

Ogden et al., 2006; Ogden & Flegal, 2010; Ogden et al, 2002). In 1980, 7% of children aged 6-to-11 were obese; this increased to approximately 16.9% in 2007 as defined by BMI (Odgen et al., 2012). In 2011-2012, 8.4% of 2-to-5year-olds had increased obesity rates compared to 17.7% of 6 to 11 year-olds and 20.5% of 12 to 19 year-olds, indicating a rise in the prevalence of obesity for children and adolescents (CDC, 2014). The CDC growth charts developed in the year 2000 were used as the reference for these calculations. Interpretation and values that were used have not changed; however, an expert committee on this topic agreed that terminology for the 85th and 95th percentile values for BMI-for-age should be changed to "overweight" and BMI-for-age at or above the 95th percentile to "obesity" (CDC, 2009; Odgen & Flegal, 2010). Figure 1 supports the conclusion that childhood and adolescent overweight and obesity is a major public health c

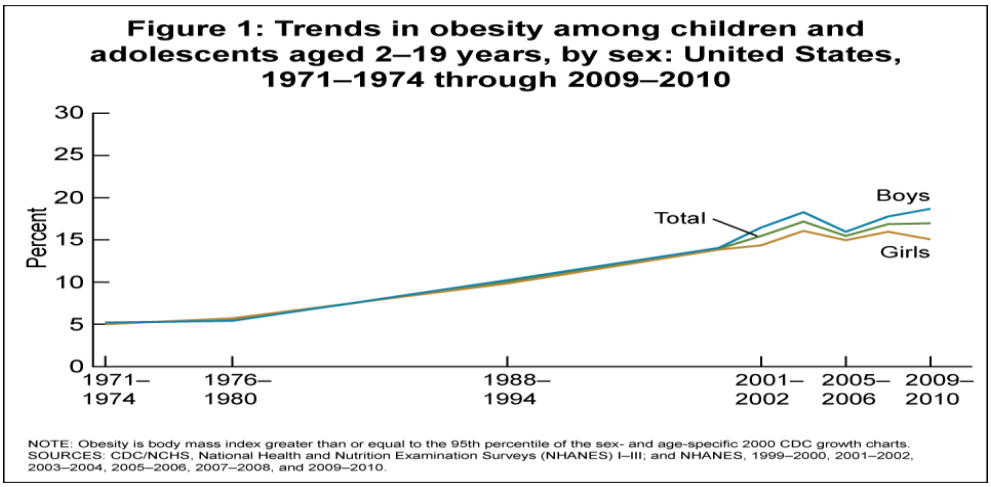

Figure 1. Trends in obesity among children and adolescens: United States, 1971-2010. CDC, 2010

Examining the Hispanic population. The epidemic for youths aged 1 to 19 who

are overweight or obese is not an isolated issue and has affected all cultues and ethnic groups and both genders (Harris, Perreira, & Dohoon., 2009). However, when examining various data sources, it becomes evident that some groups are at higher risk and are more affected than other groups by the pervasiveness of obesity. Evidence of this is found when examining NHANES results conducted from yeas 1999-2000, 2001-2002, 2005-2006, and 2009-2010 regarding disparities in the prevalence of overweight amojng children and adolescents in the United States. The rates ofobesity amont the Hispanic/Latino population have consistently continued to rise (Hedley et al., 2004); Kumanyika & Grier, 2006; Mullen & Shield, 2004; United States Department of health and Human Services [DHHS], 2012; Ogden et al., 2010). The Hispanic/Latino population consisting of Mexican, Puerto Rican, Cuban, spanish-speaking Central American, and/or other Spanish speaking cultures represent the largest ethnic group at 16.7% of the total population in the United States (United States Department of Commerce [USDC], 2012). Researchers Odgen et al., (2010) provided a deatiled breakdown advising that 14.2% of Hispanic children aged 2 to 5 and 25.5% aged 6 to 11 are obese as compared to 9.1% of non-Hispanic children aged 2 to 5 and 195 aged 6 to11. Approximately 23.1% of Hispanic children aged 6 to 19 are obese compared to 14.6% of non-Hispanic children for the years 2009 to 2010 (Child Stats.gov, 2012).

Overweight, obesity, and morbid obesity. The CDC in the year 2000 established the use of BMI percentile as an accurate screening tool for children and adolescents aged 2 to 19 using height and weight based on age and gender-specific percentile since a child's body composition changes due to growth at various ages and

differs significantly due to gender (CDC, 2012; Kuczmarski et al., 2000). The CDC categorizes as overweight any child or adolescent at or above the 85th percentile , but lower than the 95th percentile. Any child or adolescent at or above the 95th percentile for individuals of the same age and gender is classified as obese (CDC, 2012). Infants, children, and adolescents are expected to grow at a rate that is considered healthy for them. For example, an infant is expected to triple in weight during its first year of life (Perry, Hockenbert, Lowdermilk, & Wilson, 2010). Percentile growth chars are graphic representations that were developed by organizations such as the CDC and the WHO to assist pediatricians in monitoring a child's normal expected height and growth. A percentile is a statistical term representing the child's growth parameter over a period of time, which then enables an examination of the growth curve of that child (Flegal, Takak, & Ogden, 2006). For example, if a child falls in the 20th percentile for his or weight on the growth cart that means 20% of the weight values are lower than that of the child, not 20% of the children (CDC, 2012).

The phenomenon of overweight and obesity is comprised of a multitude of complex factors that involve race and ethnicity as well as behavioral, environmental, physiological, biological, psychological, social, and genetic components (Caprio et al., 2008; Clarke, O'Malley, Johnson, Schulenbert, & Lantx, 2009; Healthy People 2010, 2013). Obesity in children and adolescents is defined not as an absolute number but in relation to a historical normal group, such that obesity is a BMI greater than the 95th percentile. Therefore, there is no morbidly obese category for children (Sweeting, 2008). In the phenomenon of morbid obesity, some obese individuals develop an unhealthy

dependency on food that results in binge and overeating habits (Ackard, Neumark-Sztainer, Story, & Perry, 2003).

Influences That Contribute to Overweight and Obesity

Culture. The influence of acculturation is a significant factor when examining various reasons that Hispanic youth are overweight or obese (Kumanyika et al., 2008). Acculturation is defined as taking on some of the habits of the culture that an individual has transitioned into as his or her own. Researchers of acculturation for Hispanics concluded that the introduction of salads and cooked vegetables, which are thought to be healthy, have actually become unhealthy as a diet change because they introduced increased fats in the form of salad dressings, margarine, and butter (Aldrich & Variyam, 2000; Kemp, 2010; Ohio State university Extension, 2010). This new diet for this population has also established an increase in high-sugar drinks replacing traditional fruit-based beverages. Lastly, there is a decrease in consumption of inexpensive healthy sources of complex carbohydrates such as beans and rice and an increase in meats that have saturated fats (Kemp, 2010).

Influences of race and ethnicity. Expanding on factors of race and ethnicity involves examining specific inherent characteristics that individuals have in common. The term race has historically been used to classify a population by its genetic traits based on phenotypes such as skin, hair, and eye color, along with other notable distinguishing features. Ethnicity focuses on cultural and social characteristics instead of the historical biological base used in race (Caprio et al., 2008). Therefore, ancestry, history, religious beliefs, common language, religious practices, values, and dietary

preferences are significant factors to consider when constructing interventions to counter overweight and obesity in various populations. Even though previously in this study race and ethnicity were defined as biological, they are also considered to be social constructs that have been linked as major contributors to the issues of overweight and obesity that will be explored in depth in the literature review of this study (Kumanyika et al., 2003; Lee, 2006; Nevarez, Lafeur, Schwarete, Rodin, & Samuels, 2013).

The consequential root of overweight or obesity is not in the individual but the overriding environmental influences that affect the individual (Jeffrey, 1998). The present day demands of a fast paced culture is a main contributor to the environmental changes that have promoted the need to use vehicles as transportation, increase in television viewing, use of computers and iPods to conduct activities of daily living, and increased fast food intake (Hill & Peters, 1998). In addition, neighborhoods that are not populated by Hispanics have two-thirds more access to affordable supermarkets that provide healthy food items (Powell, Slater, Mirtcheva, Yanjun, & Chaloupka, 2007). Moreover, Hispanic youth spend less time engaged in physical activity and more time viewing television compared to other populations (Delva, Johnston, & O'Malley, 2007; Ridout, Foehr, & Roberts, 2005). Furthermore, barriers such as lack of transportation, concerns regarding neighborhood safety, and cost of health food are significant contributors to overweight and obesity in the Mexican American population (Duke, Huhman, & Heitzler, 2003; Hofferth & Curtin, 2005). This supports that environmental factors contribute to behavioral factors, and thus significantly contribute to overweight and obesity.

Even though genetics will not be considered in this research, it should be noted that Whitake and Orzol (2006) examined Blacks and Hispanics who had a very similar familial ethnic background, education level, income, and access to food. Even though these factors were comparable for both groups, the Hispanic group had higher rates of obesity. Researchers have suggested, therefore, a link might exist between genetics and possible influences of cultural factors involving energy balance that surround how the Hispanic population nourishes and spends time with their young children (Whitaker & Orzol, 2006).

Consequences of Obesity

There is a definite link between trends in the Hispanic population of overweight and obesity and higher risk of developing secondary complications such diabetes and congestive heart disease (Martorell, 2005; Mainous III, Diaz, & Geesey, 2008; Roger et al., 2011). Researchers Narayan, Boyle, Thompson, Sorensen, and Williamson, (2003), using data from the National Health Survey (1984-2000), advised that the lifetime probability of being diagnosed with diabetes was 87% higher for Mexicans, which is significant since they comprise 63% of the Hispanic population in the United States. Hispanic boys born in the year 2000 have a 45.4% risk and girls a 52.5% risk of being diagnosed with diabetes. The risk for non-Hispanic boys is 26.7% and girls are 31.2% (Narayan et al., 2003). Obese children and adolescents have been linked to notable increases in cancer, stroke, orthopedic problems, asthma, and diseases of the liver (Narayan et al., 2003; Rane & O'Laughlen, 2011). If Hispanic children remain overweight or obese when they reach adolescence, it is predicted that they have an 80%

risk of remaining such into adulthood (Olshansky et al., 2005). The long-term consequences are coupled to increased rates of high blood pressure and high cholesterol that contribute to higher risk of heart disease, arthritis, and poor status of general health (Caprio et al., 2008; DHHS, 2012; Eckel, Daniels, Jacobs, & Robertson, 2005; IOM, 2004; DHHS, 2012).

Child and adolescent overweight and obesity are often the root of psychosocial effect that are linked to the stigma of being considered fat. However, when culture and ethnicity are involved, this may not always be the case, especially in the Hispanic population and in the Mexican subgroup (Latner & Stunkard, 2003). Various cultural attitudes exist within the female Hispanic/Latino population with regard to body image. Cubans and Caribbeans prefer a leaner body image compared to Mexicans and Central Americans. However, all subgroups prefer a baby who has greater body fat than what is recommended as healthy (Cachelin, Monreal, & Juarez, 2006; Snooks & Hall, 2003). The comparison of social perceptions of antifat attitudes, conducted by Crandall and Martinez (1996) among United States and Mexican students, suggested that Mexican attitudes are more accepting and less concerned with their own weight in contrast to American concern regarding body image. Hispanic acculturation affects psychosocial attitudes toward positive views of the American diet that are higher in portions and fat, promoting an increase in overweight and obesity in this population (Caprio et al., 2008).

Economic impact of childhood obesity. The overweight and obesity epidemic brings with it a future economic burden of triple digit figures that reaches up to billions of dollars in an already struggling health care system. This stems from direct and indirect

losses associated with morbidity and mortality that are direct consequences of overweight and obesity (Lightwood et al., 2009). Since many individuals who struggle with overweight and obesity are linked to a lower economic status, this places a greater burden on public health. In conducting a review of literature, it is apparent that controversy exists regarding mortality rates and obesity (Allison, Fontaine, Manson, Stevens, & Van Itallie, 1999; Flegal, Williamson, Paumk, & Rosenber, 2004; Fontaine, Redden, Wang, Westfall, & Allison, 2003; Hlaing, Kim & Davatos, 2009).

Gap in Knowledge and Need for Study

There is an epidemic of overweight and obesity for years 1998-2012 involving the Hispanic child population. Researchers have examined the risk factors surrounding overweight and obesity along with use of BMI percentile as a measure for various interventions (Johnson, Tyler, McFarlin, Poston, Haddock, & Reeves, 2007; Revista de Saude Public, 2012). Focus has also been concentrated on understanding ecological and cultural approaches that acknowledge the requirement of interventions tailored to family and community (Sander-Thompson et al., 2007; Wilson, 2009). My review of this literature notes there is success in decreasing obesity in youth when cultural interventions are incorporated into behavior modification for this population. However, a gap exists in evaluating the impact of the interventions, making it difficult to determine if cultural and ethnic sensitivity is an effective approach.

The high rate of obesity in the Hispanic youth population is continuing or surpassing obesity in all other populations, especially for the 1 to 19 year-old group. The 1 to 19 year-old group represents 28% of the 52 million Hispanics in the United States.

This becomes a critical issue, especially since the Hispanic population is projected to increase to twice its size by 2050 (USDC, 2012). These issues are further addressed and explored in more detailed discussion in Chapter 2.

Problem Statement

The epidemic of childhood overweight and obesity is not an isolated issue, and has affected all racial and ethnic groups, both genders, and all age groups (Anderson & Whitaker, 2009; Dehghan et al., 2005; Harris et al., 2009; Kumanyika & Grier, 2006). However, when examining the data, it becomes evident that some groups are at higher risk, and are more affected than other groups, by the pervasiveness of overweight and obesity. Evidence of this is found when examining the NHANES results from the years 1988-2010, regarding disparities in the prevalence of overweight and obesity among children in the United States (Child Stats.gov., 2012). The obese rate for Hispanic youth 2009-2010 aged 6 to 19 is 23.1% compared to 14.6% of non-Hispanic youth with the highest continued increase of 25.5% in the 6 to 12 age group. While the rate for the 6 to 19 year group is at a slight decrease from the 2007-2008 rate of 24.4% it still represents that rates in the Hispanic youth population are significantly higher as compared to non-Hispanic rates that are trending down (Child Stats.gov., 2012: Odgen, et al., 2010). The present Hispanic population in the United States of 52 million represents 20.1% of the total population and of this percentage the 1 to 19 year-old group comprises 28%. The present Hispanic population is expected to double by 2050 and if overweight and obesity prevalence trends continue in the child population the epidemic will increase the

percentage of already established serious health implications that create economic burden (USDC, 2012).

Despite the efforts that have been put forth by federal and local government, public health entities, educational entities, and health care providers, the percentage of youth in the Hispanic population especially in the 1 to 19 age group continues to increase. Common cultural norms in the Hispanic population has a great influence on dietary and exercise habits that may contribute to overweight and obesity (Child Stats. gov, 2012; Kumanyiuka, et al., 2008; Odgen, et al, 2012). In various interventions that include ecological and cultural approaches and use of BMI percentile to define intervention outcomes, a gap exists in the evaluation methods that address the cultural and ethnic sensitive interventions. The gap exists in the knowledge with regard to how covariates are affected by the interventions.

Purpose of the Study

The purpose of this quantitative, retrospective cohort research study was to evaluate how an intervention program that includes culturally focused interventions impact the weight reduction of Hispanic youth through use of BMI percentiles comparing gender, age groups, distance to program location, time in program, and season of enrollment. The specific focus of this study was based on change in BMI percentile. Outcomes, based on CDC BMI percentiles change , after culturally and ethnically sensitive overweight and obesity interventions, among Hispanic children ages 2 to 19, vary with age, gender, time, distance to clinic, and season of enrollment in the program (Sweeting, 2008; Wang & Beydoun, 2007). Therefore, the goal of the study was to examine associations that may

mitigate the impact of overweight and obesity by the inclusion of culture and ethnicity as part of an evaluation of how interventions impact lifestyle modification. The independent variables in this study are youth's age, youth's gender, time in program, distance to clinic, and season enrolled in program intervention sessions. The dependent variable is the change in BMI percentile from enrollment to post intervention for independent variables.

Research Questions and Hypotheses

RQ1: Is there a statistically significant difference in the CDC BMI percentile outcomes associated with age for Hispanic youth aged 2 to 19 years post a culturally sensitive overweight or obesity intervention program? This hypothesis will be tested using an analysis of variance (ANOVA) to adjust for possible effects of covariates.

Ho1: There is no statistically significant difference in the CDC BMI percentile outcomes associated with age for Hispanic youth aged 2 to 19 years post a culturally sensitive overweight or obesity intervention program.

H_A1: There is a statistically significant difference in the CDC BMI percentile outcomes associated with age for Hispanic youth aged 2 to 19 years post a culturally sensitive overweight or obesity intervention program.

RQ2: Is there a statistically significant difference in the CDC BMI percentile outcomes associated with the gender for Hispanic youth aged 2 to 19 years post a culturally sensitive overweight or obesity intervention program? This hypothesis will be tested using an independent sample *t*-test analysis to adjust for possible effects of covariates.

H_o2: There is no statistically significant difference in the CDC BMI percentile outcomes associated with gender for Hispanic youth aged 2 to 19 years post a culturally sensitive overweight or obesity intervention program.

H_A2: There is a statistically significant difference in the CDC BMI percentile outcomes associated with the gender for Hispanic youth aged 2 to 19 years post a culturally sensitive overweight or obesity intervention program.

RQ3: Is there a statistically significant difference in the CDC BMI percentile outcomes associated with the amount of time Hispanic youth aged 2 to 19 years spent in a culturally sensitive overweight or obesity intervention program. This hypothesis will be tested using linear regression analysis to adjust for possible effects of covariates?

H_03: There is no statistically significant difference in the CDC BMI percentile outcomes associated with the amount of time Hispanic youth aged 2 to 19 years spent in a culturally sensitive overweight or obesity intervention program.

H_A3:: There is a statistically significant difference in the CDC BMI percentile outcomes associated with the amount of time Hispanic youth aged 2 to 19 years spent in a culturally sensitive overweight or obesity intervention program.

RQ4: Is there a statistically significant difference in the CDC BMI percentile outcomes associated with the season of program enrollment for Hispanic youth age 2 to 19 years in a culturally sensitive overweight or obesity intervention program? This hypothesis will be tested using ANOVA analysis to adjust for possible effects of covariates?

Ho4*:* There is no statistically significant difference in the CDC BMI percentile outcomes associated with the season of program enrollment for Hispanic youth age 2 to 19years in a culturally sensitive overweight or obesity intervention program.

HA4: There is a statistically significant difference in the CDC BMI percentile outcomes associated with the season of program enrollment for Hispanic youth age 2 to 19 years in a culturally sensitive overweight or obesity intervention program.

RQ5: Is there a statistically significant difference in the CDC BMI percentile outcomes associated with the distance to the clinic for Hispanic youth age 2 to 19 years in a culturally sensitive overweight or obesity intervention program? This is measured by distance within Dade county Florida or outside. This hypothesis will be tested using an independent sample *t* test to adjust for possible effects of covariates?

Ho5: There is no statistically significant difference in the CDC BMI percentile outcomes associated with the distance to the clinic for Hispanic youth age 2 to19 years in a culturally sensitive overweight or obesity intervention program.

HA5: There is a statistically significant difference in the CDC BMI percentile outcomes associated with the distance to the clinic for Hispanic youth age 2 to 19 years in a culturally sensitive overweight or obesity intervention program.

A more detailed discussion of the research questions, hypotheses, and associated statistical analyses is included in Chapter 3.

Theoretical Framework for the Study

Descriptive epidemiologic studies require that the thought process of the occurrence of theory is linked to a measurable outcome. The epidemiology triangle and the social cognitive theory (SCT) served as the framework for this study. The epidemiology triangle is a common model that scientists have developed to study health problems using the basic premise that disease does not occur randomly and has a pattern. This pattern can be described through one of three categories: person, place, and time. This serves to illustrate and evaluate the relationships between the individual regarding disease, their risk, and their environment. The goal is to help allocate resources, plan programs, and develop hypotheses that serve to be preventive or therapeutic in nature (CDC, 2013; Nelson & Williams, 2007). Heart disease, hypertension, and diabetes are the leading causes of deaths in the Hispanic population. This model served to explore how cultural influences affect the factors related to overweight and obesity in the Hispanic male and female population age 2 to 19. A better understanding of how culture influences dietary habits during childhood may provide an opportunity to increase the use of culturally sensitive interventions and therefore decrease the risk of overweight and obesity.

Reasons that individuals are overweight and/or obese and continue to remain so is that they have developed lifestyle patterns based on a multitude of factors (Koplan, Liverman, & Kraak, 2005). To implement behavioral interventions and reverse these patterns necessitates that individuals understand how their behavior and attitudes impact their health and disease risk (Kumanyika et al., 2008). Successful achievement of this

process requires an in-depth investigation into the components at the root of observed attitudes and behaviors. Once these developed lifestyle patterns are recognized an intervention process supporting teaching goals to modify these patterns can be established (Meyers & Sweeney, 2008).

SCT addresses methods that promote health behavioral change and psychosocial issues that influence health behaviors (Glanz et al., 2002). The present Hispanic culture incorporates a diet high in fats, sodium, and carbohydrates that result in higher occurrences of heart disease, hypertension, and kidney failure (Morales, Lara, Kington, Valdez, & Escarce, 2007). This theory is an excellent tool that can be used to educate and modify youth and their parents on how culture and their environment play a large influence on their dietary habits. This framework assesses whether the child and parent has altered their predispositioned cultural attitudes and behaviors after interventions taking place based on research questions. One of the other key factors that involve SCT is whether the individual is capable of altering his or her predispositioned attitude and behavior (Whitlock, Orleans, Pender, & Allan, 2002). These concepts are further explored in more detailed analysis in Chapter 2.

Nature of the Study

This is a quantitative retrospective cohort study that relates to healthy behavior change based on culturally and ethnically sensitive interventions for the 2 to 19 year-old Hispanic population. This design was chosen because it allows for gathering of data to provide statistical analysis of the comparison impact of interventions conducted in the past and then compared within the cohort. The independent variables for this research

are youth age at intervention, gender, length of time spent in the program, distance to clinic, and season enrolled in program. The dependent variable is change in BMI percentile from start to post intervention. The independent variable influences healthy behavior that should affect the youth as evidenced by change in the dependent variable of change in BMI percentile.

The data for my study were obtained from PGA. This organization has a clinic located in Miami, Florida. Data were collected from 1,467 male and female Hispanic youth aged 2 to 19 who attended the overweight and obesity intervention program. These are outpatient visits conducted by a medical specialist in the field of gastroenterology. Topics included healthy eating, becoming more physically active, and ethnically and culturally sensitive interventions. Archival data were the basis to determine whether health behavior change occurred due to participation in culturally and ethnically based interventions. SPSS version 21.0 Windows (IBM, 2012) was used to conduct analyses of descriptive statistics. This is further addressed in Chapter 3.

Operational Definitions

Throughout this investigation various terms and definitions have been used. To provide a clear understanding of these terms the following explanations are provided:

Acculturation: The process where members of one cultural group take as their own beliefs and behaviors of another group. This process usually flows in the direction of a minority group adopting habits and language patterns of the dominant group (Rice University, 2012).

Attitudes/behaviors: Influences and self-actions that have a significant role in determining the choices that individuals make toward their health outcome and effects on their morbidity and mortality (Jordan, 1998).

Body Mass Index (BMI): A ratio of a person's body weight in kilograms to the square of a person's height that is calculated as an indirect measure of that person's body fat. BMI is used as an assessment and classification of overweight and obesity (Schult, Feinendegen, Zaum, Shreeve, & Pierson, 2010).

Culture: Beliefs, attitudes, values, and behaviors that surround the family structure. Culture also integrates socioeconomic status, religion, ethnicity, and race. It should be noted that not all of these factors establish culture but many influence the end result and comprise various components noted above (Flores, 2000).

Epidemiology triangle: A conceptual framework that employs descriptive epidemiology used to describe disease in terms of personal characteristics and behavior of those at risk, and the place and timing of occurrence (Nelson & Williams, 2007).

Epidemic: Any condition that is occurring more frequently and extensively than is expected in a community, population, nationally, or in a worldwide setting (IOM, 2004).

Hispanic/Latino population: Consists of Mexican, Puerto Rican, Cuban, Spanish-speaking Central American, and/or other Spanish speaking cultures residing in the United States (USDC, 2012).

Life course perspective: A view of human development that incorporates the Importance of context, time, process, and meaning of family life (Mutchler & Burr,

2011).

Mild obesity: A condition where a person has an excess amount of body fat that is 20 to 40% over what would be considered recommended healthy weight as determined by BMI (IOM, 2004).

Morbid obesity: A condition where an individual weight is defined as 100 pounds or more above ideal weight based on BMI (Sweeting, 2008).

Obesigenic: An environment that discourages physical activity and encourages overconsumption of calories thereby contributing to obesity (Bouchard, 2007, 2009).

Obesity: A condition where an excess amount of body fat exceeds in proportion to lean body mass. According to the CDC obesity in children and youth is ranked according to BMI and is equal to or greater than the 95th percentile of CDC BMI charts (IOM, 2004).

Overweight: A condition that includes an excessive amount of body weight that is 10% or more of what would be considered recommended healthy weight as determined by BMI. An adult person with a BMI of 25 to 29.9 falls into the overweight category (Gray & Fujioka, 1991).

Social cognitive theory: This theory surrounds the understanding of cognitive, emotional, and behavioral aspects to promote behavioral change (Glanz, et al., 2002).

Sociocultural variables: These are the environmental conditions that play a part in adaptive and healthy behavior and wellbeing or just the opposite. The opposite is maladaptive behavior, mental disorders and social pathology (Psychology Dictionary, 2011).

Assumptions

The study population consisted of Hispanic youth age 2 to 19 who attended the PGA overweight and obesity intervention program that incorporated cultural sensitive interventions to promote healthy lifestyles. I assume that the sample is representative of this population. For this research, I used archival data, and I assume that the data collected from the participants prior to intervention were at an appropriate grade level so that participants understood the questions and provided truthful information. I also assume that the archival data have been retrieved correctly.

Scope and Delimitations

This quantitative study evaluated 1,467, 2 to 19 year-old Hispanic youth who attended the PGA overweight and obesity program in Miami, Florida between November7, 2008 to February 23, 2015. The focus of the PGA overweight and obesity program is to promote healthy lifestyles through including culturally and ethnically sensitive interventions with the aim of promoting awareness and change. These interventions provide education geared toward the 2 to 19 year-olds of the Hispanic population so they can acquire and maintain certain healthy behaviors to decrease their rates of overweight and obesity which are associated with higher rates of morbidity and mortality (Glanz, et al., 2002).

The SCT directly correlates and elucidates how this population acquires and maintains certain behaviors (Glanz, et al., 2002). This specific focus was chosen to determine if cultural sensitive interventions impact and promote change habits of those youth make sustainable healthy lifestyle choices with regard to food and exercise. The

archival data provided BMI percentile changes occurred after the intervention sessions. A time frame that the participant attends the intervention program may not be conducive to producing significant results. It is also important to note that differences in instructional approach and environmental differences might exist and influence outcomes. Participants may have different learning styles and information presented may not have been presented in the style that was most appropriate to promote the child or parents to make changes geared toward healthier lifestyles. Lastly, I did not have control of external variables such as the diet, exercise, and home environment.

Limitations

This study centered on a target population of Hispanic male and female aged 2 to 19, who visited PGA to obtain overweight and obesity interventions that included cultural and ethnic sensitivity. Given this situation, the general conclusions of the study are therefore limited to a specific targeted group and may not accurately represent this population as a whole. The study also is limited to Hispanics who reside in the Miami metropolitan area and participated in the PGA program. Therefore, this may limit the results with regard to being generalized to a different acculturation and assimilation process from other areas in the United States creating a weakness, and therefore contain biases.

Limitations in the study design result from validity issues. Limitations related to validity normally are associated in most research studies with survey accuracy, which depends upon recall abilities. In this study, the information does not involve such, and rather was provided through archival data source of overweight and obesity intervention conducted by PGA. This involved internal validity since I was not present when the

initial physical and assessment occurred prior to invention. A threat to construct validity could exist, if PGA personnel did not have properly calibrated scales when weighing intervention participants or variations among height measurements taken by the staff would affect the accuracy of the results. Limitations also exist in external validity due to the choice of the targeted population.

Significance of the Study

This study is significant for a variety of groups that include youth that are of the Hispanic population, educators, legislators, parents, as well as the society at large. The knowledge gained from this study can help validate the comparison of measures that involve age, gender, distance, time in program, and season enrolled with regard to impact or lack of that involve culturally and ethnically sensitive approaches to changing lifestyles toward healthy habits that will decrease overweight and obesity levels in the 2 to 19 year-old Hispanic population. Interventions aimed at goals of social change through examination of change in lifestyle habits in the Hispanic youth population. This decreases the prevalence rates of overweight and obesity in this population that will decrease the associated morbidity and mortality rates.

Summary Statement

In this chapter I have provided an introduction and background on overweight and obesity and why it is a national health concern in the United States (Ogden et al., 2012). Historical focus concentrated on the causation of overweight and obesity which centered on attributes of diet, genetics, and environmental influences suggesting that increased caloric intake and lack of exercise are the major factors that have increased the

prevalence of obesity comparing the Caucasian and Black population. Research conducted by NHANES and HHANES for years 2007 to 2010 included the Hispanic population which revealed a higher prevalence rate of overweight and obesity as compared to non-Hispanic populations. This added research promotes investigation into obtaining information from literature that supports that cultural and ethnic norms may also strongly influence the attitudes and behaviors that populations have toward overweight and obesity (Caprio et al., 2008; Healthy People, 2010, 2013). This section introduced that the Hispanic population has a higher prevalence of overweight and obesity for years 2007 to 2010 as compared to the non-Hispanic population as evidenced by NHANES and HHANES which is the focus of this study.

Chapter 2 includes an in-depth review of literature conducted on overweight and obesity. Discussion also includes review of recent literature of intervention studies, effects thereof, choice of measures, and statistical analysis. In this review examines relative themes and issues of various factors that influence trends of overweight and obesity among the Hispanic child population. I also introduce the epidemiology triangle and social cognitive theory that serve as the conceptual framework for the research. The literature addresses how the conceptual framework is connected to attitudes, behaviors, and the environment that influence overweight and obesity which contribute to an increase in risk factors that correlate to higher ratios of associated chronic disease in the Hispanic population.

In Chapter 3, I describe the details of the research methodology that will be used to examine the research questions. Discussion surrounds the quantitative study design

and research methods, including study description, ethical protections, and data analysis.

Chapter 4 concentrates on the study findings and how results relate to the research questions and the study hypotheses, the research tools used, procedures followed, as well as a description of data calculated, and data retrieved. Chapter 5, outlines the explanation of findings, the implications for social change, recommendations for actions, and study topics for further investigation.

Chapter 2: Literature Review

Introduction

Childhood Obesity Problem and Purpose of the Study

Childhood obesity, defined as the excess weight during the growth years, is a concern for several reasons. First, it has become linked to a wide range of health problems previously seen in adults, not children. Second, it is considered a major risk for maintaining overweight and obesity during adult life. Lastly, a correlation exists between childhood obesity and risk factors in adulthood linked to chronic diseases, including cardiovascular disease, Type 2 diabetes, and hypertension (Baker, Olsen, & Sorensen, 2007; CDC, 2008, 2008). The purpose of this study was to explore and evaluate the impact of interventions that include culturally and ethnically focused attributes along with diet and exercise for 2 to 19 year-old Hispanic youth change lifestyle behavior.

Synopsis of Current Literature to Establish Relevance of the Problem

The prevalence of overweight and obesity has increased over the last 3 decades in the United States reaching epidemic levels affecting all age groups, both genders, and all racial and ethnic groups (Anderson & Whitaker, 2009; Harris et al., 2009; Kumanyika & Grier, 2006; Ogden et al., 2010). Some groups are at a higher risk, and are more affected than other groups, by the pervasiveness of overweight and obesity (Anderson, Butcher, & Levine, 2003; CDC, 2010; Ogden et al., 2002; Ogden, et al., 2006; Odgen & Flegal, 2010). Specifically, in the United States, Hispanic youth ages 1 to 19 years- old have the highest overweight rates compared to all other children of this age group (Child Stats. Gov, 2012; Odgen & Flegal, 2010; Odgen et al., 2012). The majority of this Hispanic

overweight population is Mexican and at the greatest risk of obesity (USDC, 2012). The Hispanic population is the fastest growing population in the United States with two-thirds accounting of the Mexican subgroup. Therefore, the issue of overweight and obesity in this subgroup is very important because childhood overweight and obesity is linked to an 80% chance of remaining overweight or obese into adulthood (Olshansky et al., 2005).

Review of Major Sections of Chapter 2

In this chapter, I provide an overview of childhood obesity that includes the definition, the problem statement, and a brief synopsis of literature that establishes the relevance of the problem. I will then provide a description of the literature search strategy, the theoretical foundation, and the conceptual framework. Additionally, key concepts and variables that are believed to contribute to overweight and obesity, such as culture, acculturation, and socioeconomic factors. The increased pervasiveness of overweight and obesity that exists in the Hispanic population, psychosocial effects, and consequences of overweight and obesity will be further discussed in detail. Lastly, how culturally and ethnically sensitive interventions impact the promoting long term sustainable health behavior when comparing various variables for the study population will be discussed.

An examination of research has revealed that common cultural norms of various populations, along with assimilation, and acculturation, have a great influence on dietary habits that may contribute to the prevalence of overweight and obesity (Kumanyika, et al., 2008). Review of current literature reveals a gap that does not adequately compare the impact of outcomes with regard to gender, age, distance to program, time in program,

and season of enrollment for programs designed to include cultural and ethnic sensitive interventions. These comparisons are important to combat childhood associated consequences of childhood overweight and obesity that contribute to immediate and long-term effects. Childhood and adolescent disease rates associated with overweight and obesity have risen with prevalence of overweight and obesity (Raj & Kumar, 2010). In later life, the biological consequences of youth overweight and obesity can result in hypertension, osteoarthritis, heart disease, respiratory disease, and various cancers (Caprio et al., 2008). Possible psychosocial effects also may exist that stem from the stigma associated with overweight and obesity (Martorell, 2005; Mainous et al., 2008; Roger et al., 2011). This brings with it a future economic burden reaching triple digit figures requiring additional resources from an already struggling health care system (Lightwood et al., 2009).

Literature Search Strategy

I conducted a literature search using the following electronic databases: MEDLINE with full text, Cumulative Index in Nursing and Allied Health Literature (CINAHL), Ovid, EBSCO Host, Cochrane Database of Systemic Reviews, Thoreau Database, ProQuest Central, A SAGE Database Full-Text Collection, Health and Psychosocial Instruments (HaPI), Academic Search Complete, Dissertations at Walden University and other Universities, and Google Scholar. The following key search terms and combinations were used for the purpose of the literature search: *Hispanic child and adolescent overweight and obesity, NHANES and HHANES statistics, Mexican child and adolescent overweight and obesity, stigma of child and adolescent overweight and*

obesity, evaluation of/and childhood overweight and obesity interventions, long term related consequences of overweight and obesity in children and adolescents, chronic disease and obesity, acculturation and obesity, Hispanic paradox, BMI among children, BMI among adolescents, obesity epidemic among children, childhood overweight and obesity interventions, Latino/a childhood overweight and obesity. Articles for this review included research published in the English language that contained peer reviewed research studies. All the articles were obtained electronically through database sources named above. Research articles published from 1982 to present were analyzed. A total of 516 retrieved research articles were found and reviewed as possible sources and 164 were actually included in this study. This time frame was chosen because it reflects the sharp statistical rise in overweight and obesity that is considered the starting point of what has become an epidemic (CDC, 2012, 2014; Odgen, et al., 2006;Odgen et al., 2012; Odgen & Flegal, 2010).

Theoretical Foundation

Epidemiology Triangle

The epidemiology triangle will serve as the framework for this study linking the process of the occurrence to a measurable outcome. The epidemiology triangle is a very common model used in public health to evaluate and measure the distinct relationship between risk factors and disease in populations. The premise of epidemiology is based on two major components. First, disease occurring to humans does not happen randomly. Second, causal and perhaps preventable factors that are involved have a notable influence on the development of disease. Prevention of overweight and obesity from an

epidemiologic approach employs knowledge that disease does not result when the primary components of the epidemiology triangle (person, place, and time) are in equilibrium. This holistic approach involves an examination and consideration of behaviors such as the person's decision to overeat and not exercise, within a place with limited support and access to healthcare (CDC, 2013; Nelson & Williams, 2007). Epidemiologic studies are also useful because determination and implementation of interventions to control the prevalence of overweight and obesity need to be multifactorial in nature to be effective based on the complex causative patterns that involve this disease. The epidemiological approach is, therefore, beneficial because it permits the care provider to use the scientific method to view health outcomes. This is achieved through the evaluation and measure of the relationship between the risk factors and disease in the study population that is then applied toward the population as a whole (Nordsiek, 1964).

Researchers have used the epidemiology triangle as a basis to research the trends and prevalence of overweight and obesity among children and adolescents and apply interventions. The Sinai Urban Health Institute (2004) conducted a study on 1,700 households involving six contrasting neighborhoods located in Chicago, Illinois. Neighborhoods, whose children and adolescent population was predominately Caucasian, had an overweight rate of 23%, whereas the areas consisting of African American or Hispanic populations had an overweight rate that ranged from 58 to 68%. These higher findings were similar to results of annual screenings conducted on approximately 346,000 Arkansas public school students from 2003 to 2010 that revealed that the Hispanic

population had the highest overweight rate of 46% in 2003. That rate has since risen to 47% in 2010 (Arkansas Center for Health Improvement, 2011).

Social Cognitive Theory

SCT is a subcategory of the cognitive theory and is based on promoting health behavior changes that also address psychosocial issues known to influence health decisions and behaviors. This theory is a tool that can be used to educate individuals on how to modify their behavior and implement change (Glanz et al., 2002). The main component in deciding whether the individual is ready for change is determining if they have altered their predispositioned attitude and behavior which has also been linked to social pressure (Foreyt & Poston, 1998; Whitlock et al., 2002). Kumanyika, et al. (2008) suggest that in order to implement interventions to change behavior and attitudes, reverse patterns already established by the individual require the individuals understanding of how this impacts their health and disease risk. SCT has been used by researchers as a framework to design primary tools that have been instrumental in the development of interventions to educate and modify behavior that can reduce childhood overweight and obesity (Reever, 2008;Wansink, Painter, & North, 2005; West, DiLillo, Bursac, Gore, & Greene, 2007). Sharma, Wagner, and Wilkerson (2005-2006) used SCT to conduct their research on 159 fifth graders to obtain information to determine prediction of behaviors in upper elementary children to combat childhood obesity and design a primary prevention intervention that would reduce childhood obesity. Economos et al., (2008) in a large community-based study used SCT to yield test-retest reliability regarding

assessment measurements of young children to implement interventions toward successful reduction of overweight and obesity.

The Etiology and Pathophysiology of Obesity

Biological basis of homeostasis. An examination of the biological basis of how the human body regulates intake and storage of food is required to assess the root causes of overweight and obesity, the effectiveness of interventions, and the reliability of BMI as a measure of the effectiveness of these interventions. Review of the evolutionary perspective discloses that it has seemed likely to researchers that the ability to survive and reproduce in environments with limited access to food provided a strong selection bias that favors a regulatory system that is programmed toward an ability to survive. This system therefore defends against deficits of body fat and starvation rather than an accumulation of fat deposits since the need to protect against weight gain seems to have been a less pressing evolutionary concern, as an overabundant food supply was an uncommon threat to survival (Lev-Ran, 2001). The balance of overall body weight for individuals is determined by food intake and energy where expenditure is primarily controlled by the hypothalamus, along with other areas of the central nervous system.

The control of body weight and composition depends on an axis that has three interrelated and self-controlled components (Marti, Moreno-Aliga, Hebebrand, & Martinez, 2004). These components consist of food intake, nutrient turnover, thermogenesis, and body fat stores. Homeostatic responses are an important factor in energy balance that involves body fat stores that occur during periods of energy deficit when hunger is increased which then declines the metabolic rate. The homeostatic

responses are based on the adaptive feeding and metabolic responses that involve brain pathways directly linked to energy balance. Energy balance is the net difference between energy intake and expenditure. Both sides of the energy balance equation however, are involved with homeostatic responses to changes of body fat stores that during periods of energy deficit respond to increased hunger while decreasing metabolic rates. Pathways that stimulate food intake and promote weight gain are anabolic-effector pathways and those that promote the depletion of body fat are catabolic-effector pathways (Schwartz, Woods, Porte, Seeley, & Baskin, 2000).

When the environment provides abundant sources of food, the regulatory system does not guard against weight gain. Therefore, interventions need to be put into place to counter the over abundant intake of food. These theories are significant to this research. Issue of overweight and obesity involves the degree of adiposity which pivots on energy intake that tends to adjust itself to energy expenditure which is influenced by genetic as well as environmental conditions (Eckel et al., 2006). Therefore, overweight and obesity can be considered a consequence of body composition and regulation of food intake that can be influenced by external factors such as culture, environment, and education (Eckel et al., 2006; Flatt, 2012).

A cornerstone of the basis of homeostasis is that neuronal systems involved in energy homeostasis are preprogrammed in humans and therefore predisposed to generate a state of positive energy balance and weight gain unless input from adiposity signals is sufficient to constrain anabolic and activate catabolic pathways. The adaptive responses to resist weight gain during overfeeding are substantial. The biological system

controlling energy homeostasis evolved to protect against weight loss rather than weight gain and is referred to as the "absence of protection" model (Zheng & Berthoud, 2008).

The current obesity epidemic is seen as the consequence of exposing the population to an obesigenic environment. An alternative hypothesis, referred to as the "central resistance" model, is that the biological defense of body energy stores is capable of protecting against pathological weight gain but that genetic and acquired resistance to adiposity-regulating hormones occurs and undermines this biologic protection (Meyers, Leibel, Seeley, & Schwarz, 2010).

The "thrifty genotype" hypothesis states that gene variants were selected over the course of evolution that maximize survival in times of inadequate nutrient availability (Neel, 1999). The strength of this hypothesis is its ability to place the current obesity epidemic in evolutionary terms, such that once-adaptive gene variants are involved with pathological weight gain and expressed by individuals who live in an obesigenic environment, characterized by readily available, highly palatable, energy rich food, including minimal demand for physical activity. Central to the thrifty genotype hypothesis is the concept that changes of body energy stored in the form of fat are communicated to the central nervous system (CNS) via negative feedback signals (Neel, 1999). The thrifty genotype hypothesis has yet to be supported by the discovery of thrifty genes (Schwartz & Niswender, 2004). Other researchers have proposed a thrifty epigenotype hypothesis, involving deoxyribonucleic acid (DNA) sequence polymorphisms, epigenetic variations, and leptin as the gene for the acquisition of a thrift epigenotype (Stoger, 2008).

The role of various models and hypotheses in obesity. The absence of protection model is based on the theory that neuronal systems involved in energy homeostasis are genetically programmed in humans to generate a state of positive energy balance and weight gain unless input for adiposity signals is sufficient to constrain anabolic receptors which then activate catabolic pathways (Carrascosa, Ros, Andres, Fernandez-Aguilo, & Arribus, 2009). This biological system that controls energy homeostasis evolved to protect against weight loss rather than weight gain and therefore, contain substantial adaptive responses to resist weight loss during overfeeding (Zheng & Berthoud, 2008).

An alternative hypothesis, referred to as the central resistance model views that the biological defense of body energy stores are capable of protecting against pathological weight gain however, genetic and acquired resistance to adiposity-regulating hormones occurs and undermine this biologic protection (Meyers et al., 2010). The thrifty genotype hypothesis takes the position that gene variants in the human body occurred over the course of evolution to maximize survival in times of inadequate nutrient availability (Bouchard, 2007). Central to the thrifty genotype hypothesis is the concept that changes in body energy stored in the form of fat are communicated to the central nervous system (CNS) through a negative feedback signal response (Neel, 1999). Bagby (2004) discussed how an asymmetric intrauterine growth restriction (IUGR) produces the thrifty genotype. Several research studies conclude there is an inter-generational impact with increased cardiovascular disease risk is associated with IUGR

through a follow up study of a larger Helsinki study and determined that death from coronary heart disease was associated with low birth weight resulting from IUGR.

Ong, Ahmed, Emmett, Preece, and Dunger (2000) performed a prospective cohort study in the United Kingdom on infants who were born underweight and exhibited catch-up growth between birth and two-years-old. They determined that at the age of five these children were at weights that were at increased levels when compared to children who were born at rates which were considered within the normal level. They concluded that mechanisms that signal and regulate infant growth impact birth weight and are associated with adult disease risk levels. Barker, Osmond, Forsen, Kajantie, and Eriksson (2005) examined whether low birth weights and post-natal growth are associated with coronary heart disease risk. They performed simultaneous regression analysis employing hazard ratios for a group of patients being followed in a longitudinal study in Helsinki. These researchers observed an association between low birth size, childhood growth patterns, and insulin resistance to occurrence of coronary events in adulthood.

It is important to note that the thrifty genotype hypothesis has not yet been supported by discovery of thrifty genes (Schwartz & Niswender, 2004). However, in response to this and various other research there is support for the thrifty epigenotype hypothesis, that involves DNA sequence polymorphous, epigenetic variations, insulin resistance, and leptin as the gene for the acquisition of a thrifty epigenotype (Stoger, 2008). Bouchard (2009) performed a review of research on obesity genes and summarized that initial research conducted in this area demonstrated a positive correlation to single genetic trait loci for obesity was supported by studies which were

greatly underpowered. This was also supported by Li, et al., (2009) whose research extended the initial investigations based on 8 single-nucleotide polymorphisms (SNPs) to 12 SNPs in a meta-analysis of studies replicating 9 studies that included 45,000 individuals. The conclusion of adding the 12 SNPs approximately increased the rate by only 3% toward the predictive obesity value beyond sex and age. However, the important associations between SNPs and waist size were not significant when waist was adjusted for BMI (Li, et al., 2009).

How homeostasis relates to this study of obesity. In conclusion, pertaining to this study, social and physical environments have a greater impact on the overweight and obesity epidemic rather than changes in frequency of genetic patterns. Ethnicity and culture can influence social and physical environments which contribute to the onset and rate of overweight and obesity. These models and theories are significant since the consequence of exposing individuals to an obesigenic environment could be driven by an energy imbalance that stores energy surplus as fat deposits. The strength of these hypotheses and models is the researcher's ability to place the current obesity epidemic in evolutionary terms, such that once adaptive gene variants are involved with pathological weight gain they become expressed by individuals in an obesigenic environment. The obesigenic environment includes various characteristics in the social and built environment and therefore, consideration of how a population's culture, ethnicity, sex, age, and education, influence the obesigenic environment. These findings indicate that there is a need for an in-depth examination into these variables to determine if individual differences exist that might explain why Hispanic youth aged 2 to 19 have a higher

overweight and obesity prevalence compared to all other populations characterized by readily available highly palatable, energy rich food, and a need for minimal physical activity(CDC,2012).

Literature Review Related to Key Concepts

Childhood Overweight and Obesity

Presently, the main health concern in the United for children is overweight and obesity which has become an epidemic based on rates of prevalence tripling in the last 30 years as evidenced by various research that is supported by NHANES 1, NHANES II, and HNANES. Childhood overweight and obesity in the United States is a major health concern because of the tripling of the prevalence rate in the last 30 years. This epidemic level of prevalence is evidenced by various research and NHANES and HNANES surveys (Anderson et al., 2003; CDC 2012; Crouch, O'Deam & Battusti, 2007; Ogden et al., 2010; Strauss & Pollack, 2001). Data from the NHANES survey conducted for 2009 to 2010, shown in Figure 2, revealed that youth age 2 to 19, have high prevalence of obesity as defined by BMI at or above the 95th percentile.

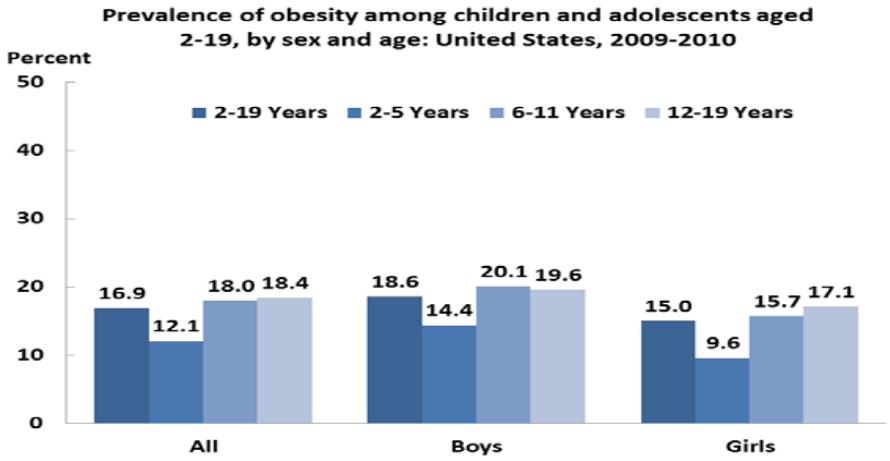

Figure 2. Prevalence of obesity among children and adolescents. National Health and Nutrition Examination Survey, 2009-2010.

Erikkson, Forsen, Tuomilehto, Osmond, & Barker (2003) studied adiposity rebound in a Helsinki longitudinal study and observed in the western countries that BMI decreases after 2 years of age and increases at about age 6. Erikkson and his fellow researchers defined adiposity rebound in their study as the BMI rebound between one and twelve years of age. They observed large differences in the incidence of type 2 adiposity rebound. This research links adiposity rebound to cultural influences. Closer examination of these rates reveal that this situation is even more concerning because severe childhood obesity which consists of a BMI that is equal to or greater than the 99th percentile for age and gender has also tripled in the last 25 years (CDC, 2009). In conclusion, BMI rebound is the observation of a trend that surrounds children becoming more active as they age. The rebound is the observation of that trending change that stems from influences of activity and dietary changes which might be influenced by various factors as pointed out Western influences as pointed out by research conducted by Erikkson and fellow researchers. These researchers have examined obesity and the

use of BMI, which is the dependent variable, along with highlighting the impact of the various independent variables utilized in this study.

Overweight and Obesity among Hispanic Youth

An imbalance exists in the prevalence of overweight and obesity for certain ethnic and racial groups placing them at a higher risk than others (Caprio et al., 2008; CDC, 2009; Whitaker & Oryol,2006). Addressing the issue of imbalance in the prevalence of overweight and obesity, there is an alarming increase in the Hispanic American childhood population. Examining data for young ages 6 to 19 year-old reveals that 17.7% of non-Hispanic Whites, 22% of non-Hispanic Blacks, and 22.5% of Mexican youth in this age group are considered overweight (AHA, 2010). Nationwide, this group of youth aged 6 to 19year-old have an approximate rate of 30.3% of being overweight and 15.3% are obese. In the Mexican childhood population generally 39.3% are overweight and 23.7% are obese (Odgen et al., 2010). Children born to Hispanic/Latino immigrants to the United States have a risk factor that makes them twice as likely to become overweight or obese compared to their foreign-born peers who did not immigrate to the United States as detailed in Figure 2 (Harris et al, 2009).

The rates of overweight and obesity have increased steadily for the last decade for Mexican children. These rates have surpassed the rates of African American females who had the highest rates for the previous two decades. This is significant because children that are overweight or obese have an 80% chance of remaining so into adulthood which increases associated risk factors of diabetes and heart disease (Ludwig, 2007). Recent research examining children aged 5 to 18 years-old provide the following

information: 70% of obese youth exhibited at least one of the following cardiovascular disease risk factor: 14% high blood glucose, 56% hypertension, 7% type 2 diabetes, and up to 54% low high density lipoprotein cholesterol levels (Emmerisk et al., 2012; Freedman, Zuguo, Srinivasan, Berenson, & Dietz, 2007).

These studies and statistics are important because they indicate that acculturation may play an important part in the overweight and obesity prevalence in the Hispanic population. This coupled to already existing cultural attitudes and beliefs, can create an environment that encourages and supports unhealthy nutrition in children, which then becomes a regular pattern throughout the life course perspective. This also contributes to increasing the risk factors for various disease and chronic disease that result in higher rates of morbidity and mortality for this population; along with increasing the public health burden. All of this information is pertinent to this study because it provides positive evidence that culture, beliefs, and environments are all factors that contribute to the epidemic of overweight and obesity in the Hispanic population. While studies have been conducted in these areas, a gap in the research exists in evaluating the efficacy of culturally-and-ethnically-sensitive interventions, post implementation. This further supports the need for this continued research which will help determine if culturally-and-ethnically-sensitive-interventions are effective or need to be amended to be more effective.

Economic Impact of Childhood Obesity

Ben-Shlomo and Kuh (2002), addressed the effects of the socioeconomic environment on later life health or a life course perspective of health. This model

recognizes that parental socioeconomic position affects childhood socioeconomic position by influencing access to various social and economic resources, especially in areas that involve opportunities for educational and other learning experiences. Adult socioeconomic circumstances in turn affect disease risk through increasing or inhibiting exposure to causal factors in later life. However, childhood socioeconomic environment affects exposures to contributing factors during gestation, infancy, childhood, and adolescence, which are part of long-term biological processes that are generally associated with various aspects of milestone development. Ben-Shlomo and Kuh (2002) therefore lead us to conclude that childhood socioeconomic environment shapes the development of behaviors that endure and have long-term effect on disease risk.

In summary, this life course model of health distinguishes between early life factors that affect long-term health because they add to the cumulative damage to biological system, act during critical periods of growth and development, or are part of social, biological, or psychological chains of risk. Childhood socioeconomic environment, parental socioeconomic position, and adult socioeconomic circumstances are all influencing health along the course of life and are effected by cultural attitudes and education. Research conducted for this study examines if interventions that include a better understanding of how cultural and ethnic attitudes that are part of the environment influence growth and development of children have a long lasting effect. This evaluation is an important consideration in addressing interventions that will decrease overweight and obesity in the Hispanic population.

Literature Review Related to Key Variables

BMI

BMI defined. Various measures can be used as a classification of weight and indicators of adiposity such as BMI, skinfold thickness (by use of calipers), underwater weighting, dual energy x-ray absorptiometry, bioelectrical impedance, and isotope dilution (Hu, 2008). BMI is not a measure of direct body fat. Rather, it is a correlation to direct measures of body fat comparing the ratio of weight to height squared against whose who are the same age and gender (CDC, 2009, 2012; Kuczmarski et al, 2000). Freedman and Sherry (2009) suggest that the degree of body fat determines the reliability of the BMI measure and is an appropriate tool.

Use of BMI to gauge overweight and obesity. When examining various literature, it is apparent that BMI percentile change as an indicator of body fat varies. Accuracy of its use depends on how much fat the child has and which cut off percentile point is used. General conclusions are that it serves best as an indicator for age at the 95th percentile revealing an excess adiposity for children that than require further evaluation (Freedman & Sherry, 2009). This emphasizes that BMI is a screening tool and not a diagnostic tool, and therefore, the focus needs to be on its ability to identify individuals at risk for health problems associated with excess weight for their height and weight (CDC, 2012).

Reclassification of BMI based on age. The quetelet index, now referred to as BMI, presently are the most common growth charts utilized in the United States and were

were first established in the early 19th century but, did not become popular until 1972 when obesity ratios in Western Societies started to escalate (Eknoyan, 2008). Controversy on defining acceptable ranges of body fat for children and adolescents existed due to significant growth changes that occur during age's 5 18 years (Barlow & Dietz, 1998; Dietz & Robinson, 1998). In 2000, the CDC revised the BMI charts originally created by the National Center for Health Statistics (NCHS) in 1977 to include body mass index for age based on data obtained from NHANES 1963 to 1994. This revision however, excluded information from NHANES III 1988-1994 for children 6 years or older because their sharp increase in body weight would have skewed the 86th to 95th percentile curves and resulted in a decreased identification of children and adolescents who would have been at risk for being overweight (Ogden et al., 2002). This created another need for revision that includes measures for youth aged 2 to 20 due to rising rates of obesity, anorexia, and bulimia in the last 3 decades for this age group. This revision categorizes any child or adolescent at or above the 85th percentile but, lower than the 95th percentile as overweight; and as obese any child or adolescent at or above the 95th for same age and gender (CDC, 2009; Dawson, 2002).

The new charts also reflect a better match to the distribution of birth weights because they are based on a cross-section of youth residing in the United States which corrects conflicts found in the 1977 NCHS charts that address weight-for-length, weight-for-stature, and length-for-age (Ogden et al., 2002). Use of the revised BMI charts has been established as the preferred method of measure by the World Health Organization and the CDC (Demerath et al., 2006; Field, Gillman, Rockett, & Colditz, 2003; Neovius,

Linne, Barkeling, & Rossner, 2004). Key elements to conducting assessments on infants and children regarding their physical growth must include measurements of weight, height (in length), skin fold thickness, arm and head circumference, and then be plotted on percentile charts and compared to the general population (Perry et al., 2010).

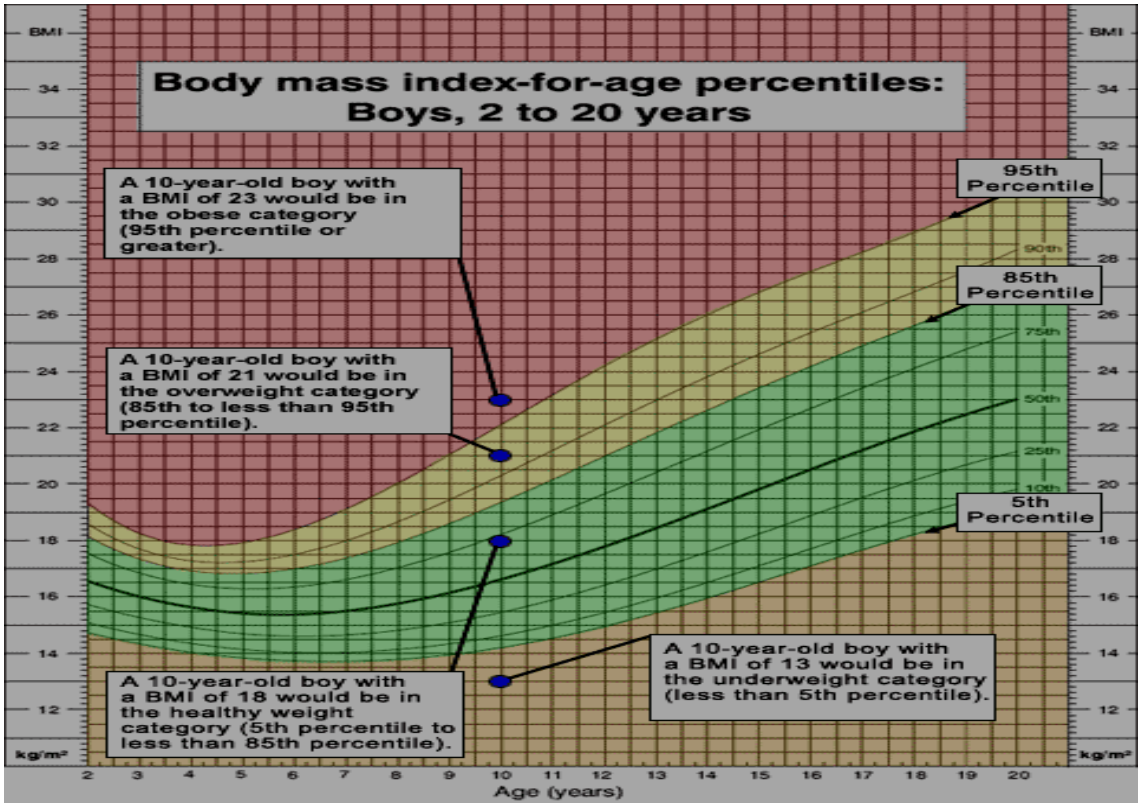

*Figure 3***.** Body mass percentiles: Boys, 2to 20 years of age. CDC, 2010

Consequences of Obesity

Chronic disease complications secondary to overweight and obesity. Hispanic children that are obese at adolescence have an 80% risk of remaining so into adulthood (DHHS, 2012; Olshansky et al., 2005). Various studies support increased associated risk factors and occurrences in trends of disease that have a direct link to the Hispanic

population having a higher prevalence of overweight and obesity (Martorell, 2005; Mainous et al., 2008; Roger et al., 2011). This trend was first established by data acquired from the National Health Survey 1984 to 2000 which revealed that the Hispanic sub-group of Mexicans had a lifetime probability of being diagnosed with diabetes that was 87% higher than the rest of the population (Narayan et al., 2003). The risk of becoming diabetic has been linked directly to obesity by recent research (Tirosh et al., 2011). Figure 4 provides data on the higher trends of diabetes for the Mexican population compared to other populations.

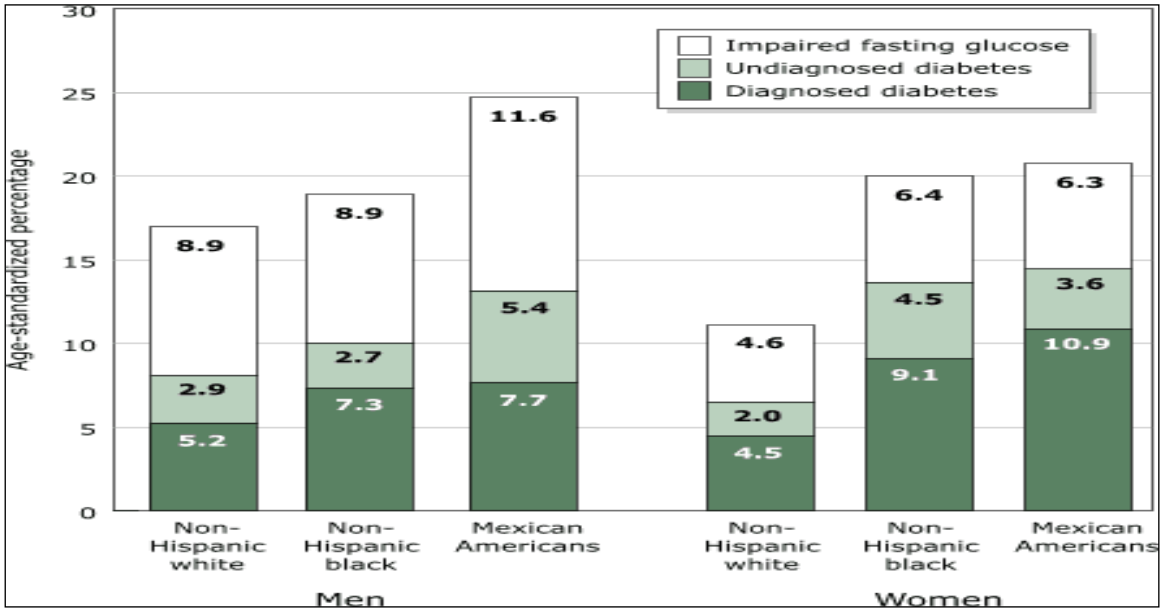

Figure 4. Comparison of diabetic trends. CDC, 2010.

Apnea, which is the cessation of breathing for over 20 seconds has also been linked to childhood obesity. This decrease in oxygenation is uncommon among young children and is found more routinely in children who are obese (Barlow & Dietz, 1998). The lack of oxygenation from apnea has been suggested to increase the incidence of learning and memory difficulties and therefore, is linked to poor scholarly

performance (Davis, Davis, Northington, Mol, & Kolar, 2002; Ievers-Landis & Redline, 2007; Ogden et al, 2006). Long-term consequences of overweight and obesity are coupled to increases in blood pressure and higher levels of cholesterol that contribute to hypertension, heart disease, and congestive heart failure (Caprio et al., 2008). For children 5 to 17 years- old, 70% of obese youth now exhibited at least one cardiovascular disease risk factor. These risk factors include high blood glucose (14%), hypertension (56%), type 2 diabetes (7%), and low HDL cholesterol levels (up to 54%) (Freedman et al., 2007).

These findings are significant since children are now exhibiting diseases that were previously associated as long-term consequences which suggest that overweight and obesity is affecting children and adolescents at a younger age creating a significant concern for public health intervention on the part of our youth. Individuals that are overweight or obese have been associated with increased incidence of orthopedic problems, asthma, cataracts, gallstones, diseases of the liver, infertility and pregnancy complications as depicted by Figure 5 (Narayan et al., 2003; Rane & O'Laughten, 2011).

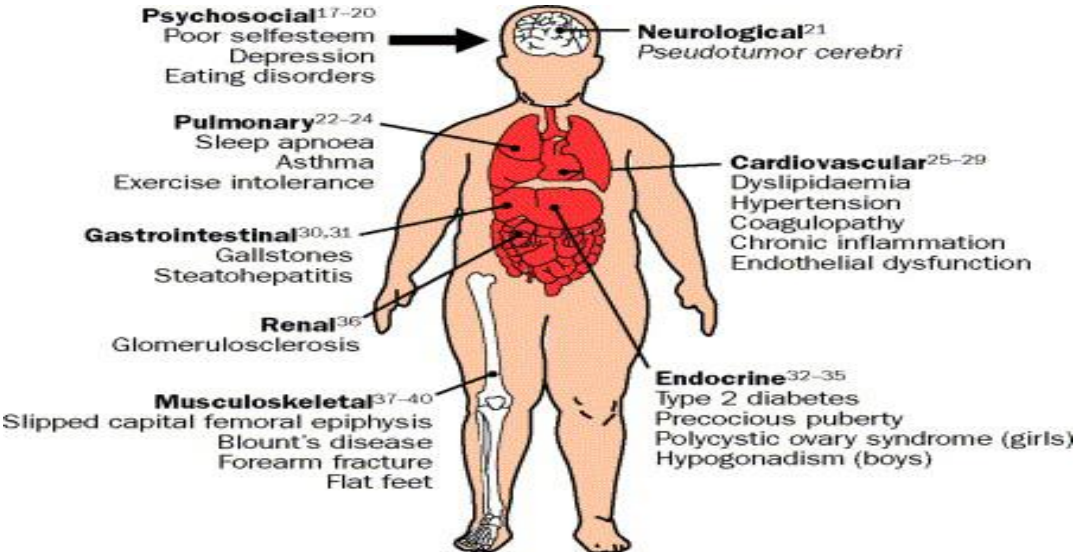

Figure 5. Consequences of obesity. Ebbeling, C. et al., Lancet, 2002

Culture

Researchers have explored the influence of sociocultural factors, which involve ethnic identity, consumption and dietary ethnic habits, cross-cultural significances of food, and family communication. Even though stress is a major contributor to obesity, other major contributors such as diet and physical activity habits are influenced by culture and environmental factors also disrupt homeostasis and therefore, play a major role in the increase of childhood obesity prevalence among various ethnic groups in the United States (Brady, Lindquist, & Herd, 2000; Goran, 2001; Martinez, 2000; Powdermaker, 1997). Research conducted by Levy and Petty (2008), support these previous findings. These researchers suggested that a chance relationship of variables that may contribute to obesity has not yet been established; and therefore the cause of obesity may be due to various variables that involve cultural aspects that incorporate physiological, nutritional influences, and communication.

Ravussin, Valencia, Esparza, Bennett, and Schulz (1994) performed a study that compared the physical and physiological characteristics of Pima Indians living in Maycoba, a part of northwestern Mexico in comparison to Arizona Pimas who share their genetic ancestry. A matched statistical analysis was performed since sex, age, and diabetic status have an impact on body weight and body composition. The results of the Mexican Pima were compared to data obtained from Arizona Pimas who matched as being full-blooded Pima. The prevalence of obesity and non-insulin-dependent diabetes mellitus (NIDDM) was significantly lower for the Mexican Pimas living a traditional lifestyle than the Arizona Pimas who presently live in an affluent environment (Ravussin et al., 1994). The Mexican Pimas were also shorter in height, had lower body mass indexes, and lower plasma total cholesterol levels.

Researchers have also examined how communication can be affected by cultural influences within the family and how it then impacts behaviors and attitudes (Brady et al., 2000; Bruss et al., 2010). Sociocultural variables have a great influence in the development of overweight and obesity particularly in various ethnic groups and the cause may be the influence of cultural perception that involve dietary practices. The significance of this research was investigating if cultural intervention approaches that involve diet and exercise are effective in reducing the incidence of overweight and obesity.

Influence of acculturation on the Hispanic population. Various research conducted between 1988 to2012 confers that the dietary habits of Hispanics compared to that of Caucasians consisted of the same or slightly less amounts of consumed calories

however, the total composition contained higher amounts of carbohydrates, protein, fiber, and less saturated fats (Acheampong & Haldeman, 2013; Ayala, Baquero, & Klinger, 2008; Benavides-Vaello, 2005; Curry, 2000; Lara, Gamboa, Kahramanian, Morales & Bautista, 2005; Perez-Escamilla & Putnik, 2007). According to Curry (2000), the traditional eating pattern of meals brought to the United States by the Hispanic immigrant population has been affected by acculturation. Based on these findings, it was suggested that Hispanics had a diet that was more in line with cholesterol and food pyramid guidelines than Caucasians.

The normal meal pattern of eating four or five times each day for the native Hispanic individual has changed due to immigration status to the United States; and now the pattern duplicates itself to that of the United States where meals are taken in three times a day. For example, the Mexican subgroup has a revised pattern for breakfast referred to as desayuno which now usually includes sweet rolls (pan dulce), tortillas and beans, and occasionally eggs. Lunch is considered the main meal of the day and is consumed between 1 p.m. and 3 p.m. Normally, this includes soup, a meat dish, rice, tortillas made from either a corn or flour base, and a dessert. Supper or the evening meal is referred to as cena which is a lighter meal based on a more European tradition eaten after 9 p.m. (Kemp, 2010).

Ayala et al., (2008) conducted a systematic review on the relationship between acculturation and diet among Latinos in the United States. Their methods utilized three approaches to the study that represent a comprehensive and systematize literature review of the topic that reflects a variety of methods in which acculturation and migration are

viewed and measured; this examination further included diets and dietary behaviors that involved food preparation and shopping preferences. The final sample of 54 articles was yielded through two independent reviews which then comprised five articles from national studies, 24 quantitative articles, and five qualitative in nature. Sixty-one percent of women who completed the interview process reported that they generally eat healthier in their country of origin because they perceived fresh foods to be more available. In the United States, researchers found that the study participants' diet consisted of reductions in seafood, bread, and corn products with increases in vegetables, pork, chicken, hamburgers, and pizza (Ayala et al., 2008) .

Perez-Escamilla & Putnik, (2007) examined acculturation influences in the Hispanic population through review of 33 diet, 22 physical activity, 96 alcohol, 76 smoking, 32 obesity, and 27 diabetes studies conducted between 1985 and May of 2006. This review of studies concluded that a significant limitation exists, because research was conducted on Mexicans, rather than a cross- representation of the Hispanic population. The results of this review, however, does imply that the impact of acculturation for the population suggests a preference toward dietary choices that favor decreases in breast-feeding and intake in fruits and vegetables, higher intake of drinks that contain less juice and more refined sugar, and higher intake of fats. The strength of this research is the observation of the impact of changes in dietary choices. This is significant since the Mexican American population is the fasting growing population in the United States; and therefore these findings do affect the well-being of a large portion of the Hispanic population. Further development and testing of theories involving this population is

required to provide significant data on how to approach the challenge to improve the understanding of how culture, acculturation, poverty, nutrition, socio-economic, and physical inactivity among this population impact the rising prevalence of obesity and diabetes.

These research studies in general provide strength in supporting that the present day culture of the Hispanic family has revised their meal intake pattern secondary to migration to the United States amending their eating patterns to now consume foods that are higher in saturated fats and portion size. The researchers of these studies focused on aspects of acculturation and dietary habits of the Hispanic population revealed that a decrease in consuming traditional inexpensive carbohydrates and proteins such as beans and rice have been replaced with meat and saturated fats which are consumed by Anglos, along with less vegetables using few low-fat products (Kemp, 2010; Ohio State University Extension, 2010). This new diet has also introduced and replaced the traditional fruit juice based beverages with high-sugar soft drinks (Kemp, 2010). This research also supports evidence of how the regulatory systems of humans are programmed toward defense against deficits of body fat. This eating pattern reflects a homeostatic response that decreases metabolic rates and promotes weight gain (Schwartz et al., 2000). Culture can influence diet and energy expenditure that may be an important part of the factors that contribute to overweight and obesity. Sociocultural variables have a great influence in the development of overweight and obesity, particularly in various ethnic groups, and the cause may be the influence of cultural perception that involves dietary practice. These cultural influences might also involve communication within the

family and how it then impacts their behaviors and attitudes (Brady et al., 2000; Bruss et al., 2010).

Significant to this study is that cultural preset image, along with acculturation in the Hispanic population, promotes a psychosocial attitude toward a greater percentage of body fat being acceptable and the present American diet that consists of larger portions and more saturated fats which contribute toward overweight and obesity (Caprio et al., 2008; Crandall and Martinez 1996; Foreyt & Poston, 1998). More research must be conducted in behavioral analysis to investigate whether various interventions that include cultural aspects are effective in long term weight management in the Hispanic population which supports research involved in this study. A literature matrix summarizing significant details of recent intervention studies is provided in table 1.

Table 1

Literature Matrix for Recent Intervention Studies

Research authors	Information on the sample size	Explanation of Design used to conduct research	Statistical details of study findings
Bruss et al., (2009)	*N=407*	CBPR randomized treatment/no treatment case controlled.	Mean BMI *z* – score change based on lessons Males = (0 = 0.07 ± 0.55) (5-8 = 0.0002 ± 0.43) *p* = 0.1927 Females = (0 = 0.20 ± 0.64 (5-8 = 0.0002 ± 0.43) *p*< 0.0001 Mother's ethnicity Pacific Islander (0= 0.16 ± 0.65) (5-8 = -0.03 ± 0.38) *p* < 0.0001 Asian (0= 0.16 ± 0.51) (5-8 = -0.05 ± 0.57) p= 0.0063 Father's ethnicity Pacific Islander (0= 0.12 ± 0.68) (5-8 = -0.02 ± 0.48) p = 0.0073 Asian (0= 0.14 ± 0.54) (5-8 = -0.07 ± 0.48) p= 0.0040
Economos et al. (2012)	*N* = 1178	CBPR non-randomized controlled trial intervention that included three communities over a 3 year time frame.	Mean BMI *z* – score change Intervention = -0.1005 *P* = 0.001 95% CI [-0.115, -0.0859] for control communities

(table continues)

Fitzgibbon et al. (2011)	*N* = 618	Health promotion intervention program through Archdiocese of Chicago for children using random design with control group	BMI change Two Year Follow up Mean increase in BMI Intervention Group 0.46 kg/m-2 Control Group 0.70 kg/m-2 *P* = 0.34 BMI (z-score) change Mean increase in BMI Intervention Group 0.13 kg/m-2 Control Group 0.00 kg/m-2 *P* = 0.34 Adjusting for baseline age and baseline BMI or BMI z score did not substantially change these results.
Golden, S.D. & Earp, J. L. (2012)	*N* = 52 (1989 - 1998) *N* = 105 (1999 – 2008)	Review of 157 articles for interventions addressing health behavior whose primary focus were nutrition initiatives and evaluation of intervention success using various approach levels	Results based on social ecological levels 95% of articles included individual level activities 67% interpersonal activities 39% institutional activities 20% community activities 6% policy level activities
Hollar et al. (2010)	*N* = 3,769 (50.2% Hispanic)	Quasi-experimental controlled pilot study involving control and non-control	BMI (z-score) change Two Year results Intervention Group p = .0013 Control Group *p* = .011

(tablecontinues)

Johnston et al. (2010)	*N* = 60	Adolescent school – based randomized, controlled trial study	BMI z score change F = 14.39; p < 0.001 for year 1 F = 29.27; p < 0.001 for year 2
Jouret et al. (2009)	*N* = 79	Kindergarten random assignment health promotion intervention program for a 2 year period. Tested two strategies for weight reduction	BMI For underprivileged area Strategy 1 = *p* = 0.001 95% CI [0.07,0.51] Strategy 2 = *p* = 0.026 95 % CI [0.13, 0.88] For not underprivileged area Strategy 1 = p = 0.554 95% CI [0.59,2.70] Strategy 2 = p = 0.454 95% CI [0.36, 1.57]
Kubicky, Dunne, Nandi-Mushi, & De Luca, 2012)	*N* = 61	Retrospective review of long term effects of non-intensive weight management program for children and adolescents	BMI z-score Based on duration of follow-up period of 47.3 ± 11.1 months Initial visit = 2.49 ± 0.4 Last visit = 2.33 ± 0.4 *P* < 0.03
Rush et a., (2011)	*N* = 3,352	Longitudinal randomized controlled study	BMI 2-year mean change 5-7 –year olds Intervention = 0.59 Control = 0.79 *P* = 0.96 95% CL [-0.06, 0.06} 10 -12 year olds Intervention = 0.81

(tablecontinues)

			Control = 0.76 P = 0.29 95% CL [-0.04, 0.13]
Savoye, et al. (2011)	*N* = 209	Randomized trial controlled lifestyle intervention program	BMI z score change at 24 months for the intervention versus control group BMI z score -0.16 95% CL [-0.23, -0.09] BMI -2.8 kg/m-2 Percent body fat -4.2% Total body fat mass -5.8 kg
Spiegel, S. A & Foulk, D. (2006)	*N* = 1013	Multidisciplinary school based intervention and comparison groups	BMI change Both analyses groups demonstrated a significant correlation at the 0.01 level between the intervention and a reduced BMI. Student's t test results mean for the comparison group : 0.5210; SD = 1.01610, SE = 0.04643 For the intervention group: 0.1610; SD = 0.89446, SE = 0.03871
Waters et al, (2011)	*N*= 27,946	Meta-analysis of 55 studies from 1985 to 1999	BMI based on adiposity difference for children in the intervention group (0.15kg/m-2). 95% CI [0.21, 0.09] BMI intervention effects by age

	subgroups 0-5 years : (-0.26kg/m-2) 95% CI [0.53, 0.00] 6-12 years : (-0.15kg/m-2) Based on 95% CI[0.23, -0.08] 13-18 years : (-0.09kg/m-2) 95% CI [0.20, 0.03]

R**eview of Recent Intervention Studies**

Various intervention approaches that have been developed as prevention strategies to counter the epidemic of overweight and obesity were detailed in the information that follows. While various studies exist, my review focused on the most significant information available based on peered review journal research that have committee experts who have assessed findings on the prevention, assessment, and treatment of child and adolescent obesity interventions.

Bruss et al., (2010) conducted Project Familia Giva Marianas (PFGM) a cognitive behavioral community-based participatory lifestyle intervention to evaluate the effectiveness of a cultural based intervention approach to decrease rising rates of overweight and obesity in the Commonwealth of the Northern Mariana Island. This study design was based on sociocultural value difference and practices among ethnic groups toward interventions that engaged individuals and the community to develop, implement, and evaluate public health interventions in a manner that is sensitive to cultural diversity of participants. The research aimed at developing and evaluating the effectiveness of the intervention based on the primary measure of BMI z-score for

children 8-years of age. The program was offered at 12 schools during the 2005-2007 school years. Six schools offered the randomized/no treatment intervention to group 1 and the other 6 provided the intervention for group 2. Participants (N = 407; Group 1: n =228; Group 2: n =179). Children were then placed into three groups based on the number of lessons attended by the parents (0, 1-4, 5-8). Results supported that both genders in the program experienced a BMI z-score change. However, females that had parents who completed 5to 8 lessons had a statistically significant change ($p < 0.0001$). Further, for both ethnic groups, caregivers completed 5-8 lessons. Results supported a significant change compared to those who attended 0 lessons (Mothers: Pacific Island $p < 0.0001$; Asian $p = 0.0063$; Fathers: Pacific Island $p = 0.0073$; Asian $p= 0.0040$). Integration of multidisciplinary and multimethod approaches were more effective because they address the various complicated components involved in overweight and obesity. This is a significant study since it supports that flexible frameworks that identify aspects that are culturally unique need to be implemented for intervention programs to provide lasting results (Bruss et al., 2010).

A CBPR study conducted by Economos et al., (2012) employed a collaborative partnership design using two socio-demographically matched communities that had a designated control group and one intervention community. Participants (N = 1178, n = 631 intervention and n = 1065 control) from grades 1 to 3 that attended public elementary schools in their respective community. The collaborative effort involved children, parents, teachers, school food service providers, various city departments, healthcare providers and, before and after school programs to develop and influence the

participating child's day that incorporate healthy life actions. This study was comprehensive in nature since it included and examined 1) Baseline pre-intervention demographic characteristics by community, 2) Selected behavioral characteristics of children at baseline by community, and 3) Selected characteristics of the family at baseline by community.

This study is statistically significant based on the impact of the intervention on change in BMI z scores for the intervention and control groups. The mean change in the BMI z score for the intervention group was -0.1307, $p = 0.02$, 95% CI [-0.1836, -0.0778] compared to the Control group 1 -0.1048, $p = 0.02$, 95% [CI, -0.1541, -0.0555] compared with Control group 2. Researchers advised that after controls were pooled, the average change in BMI z score was -0.1005 for the intervention group compared with the control group, $p = 0.001$, 95% CI [-0.1151, -0.0859].

A study conducted by Fitzgibbon et al. (2011) was a faith based group-randomized sample intervention /control study conducted over a 14 week time frame based on BMI change for black preschool children located in Chicago, Illinois that received teacher delivered weight control intervention. The study utilized 18 schools based on providing an 80% power based on a difference between groups of 0.35 standard deviations within site for assigned intervention and control group at random. The design called for 35 students per site (N= 618 participants). Research measures were collected pre and post intervention and then follow-up years 1 and 2 post intervention. The results note that no significant differences occurred between the intervention and controls post 1 and 2 years intervention. Further, study results advise that retention rates were 97% at 14

weeks, 86% at year 1, and 85% at year 2 providing creditable results to the outcome. At one year, follow up results designated that their post-intervention changes in BMI and BMI z scores were trivial and not statistically significant in difference between children in the intervention versus the control group (0.11 versus o.13 kg/m-2; $p = 0.89$ for BMI; 0.07 versus 0.05; $p = 0.85$ for BMI z score). For the 2 year follow-up, the mean increase in BMI was 0.46 kg/m-2 for the intervention group and 0.70 kg/m-2 for control; $p = 0.34$ which indicated no substantial change for the 1 year results.

Review of results suggests that various items may have led to the null study findings. First, this study did not incorporate parental involvement and previous study results have indicated the importance of involving parents of Latino children stressing the importance of the family environment in pediatric obesity intervention efforts (Andersen & Wold, 1992; Moore et al. 1991; Sallis et al., 1993;). Secondly, the study also did not address parent's perceived view of their child with respect to being overweight or obese. Various studies conducted have indicated the necessary component of Latino mothers recognizing and acknowledging that their child is overweight or obese to increase the success level of the intervention (Ariza, Chen, Binns, & KauferChristoffel, 2004; Killion, Hughes, Wendt, Pease, & Nicklas, 2006; Rosas et al., 2010). This supports that parental involvement is a necessary component in successful interventions regarding overweight and obesity intervention for the Hispanic population.

Research conducted by Golden and Earp (2012) focused on reviewing $N = 157$ articles that conducted interventions applied to health promotion programs for the past 20 years. While 132 various interventions address 21 behaviors in eight different

environments, the primary focus for one-third was nutrition and physical activity for one quarter. The most common intervention settings were schools and communities found in more than one-third of reviewed articles. SCT was the most prevalent support theory used to guide applied interventions. Researchers reveal that the use of bivariate analysis is represented in 60% of the review articles that focused on nutrition and 48% that included physical activity. For all other topics the inclusion of such was less than 33%.

Further, interventions that employed a family based focus had rates of interpersonal level activities at 93% which were higher than any other setting. More than 50% of interventions in the school and workplace setting included institutional level activities compared to 22% in health care based and 26% of community based intervention settings. However, researchers also revealed that 52% of school-based, 48% of family based, and 40% of community based interventions had included activities using three or more levels which is considered statistically significant.

These findings are significant since over 20 years ago research recognized individuals are part of a larger social interactive environment that needs to address these various levels to support change in health intervention outcomes (Brofenbrenner, 1977; McLeroy, Bibeau, Steckler, and Glanz, 1988; Stokols, 1992). Stokols (1996) suggests that the limitation of resources might be a factor in the development of programs containing multiple target levels of change and therefore require practitioners to prioritize interventions. The outcome of the article review conducted by Golden and Earp (2012) suggests that much of what was introduced and supported over 20 years ago has basically not been heeded. However, as suggested by Stokols (1996) it is difficult and probably

unrealistic for any single intervention to focus on more than two target levels of intervention activities. The primary conclusion of this research analysis concludes that in order to achieve lasting effects of interventions health educators need to address more structural levels that influence behavior on a social ecological level.

The Healthier Options for Public School Children (HOPS) Program conducted by Hollar et al. (2010), was a multi-level and mutli-agency collaboration conducting a quasi-experimental controlled pilot study, involving four intervention and one control elementary schools. This research surrounded culturally proficient diet and physical activity interventions where parents also participated by completing weekly assignments. The control group was not assigned any interventions. Participants (N = 3,769; Intervention schools n = 3,032; Non-Intervention n= 737; [50.2% Hispanic, 33.4% Caucasian, 8.0% Black, and 8.4% multi-ethnic]; M age = 8; 51% female). The rationale for their study was to review 1 and 2 year follow-up post-intervention to see if results were long lasting. Change based on decrease in BMI percentiles for year one were for the intervention group -1.46 (16.3) and the control group -0.95 (23.3). For year two, the change for the intervention group was -1.73 (13.6) and the control group was -0.47 - 12.1). While researchers documented high retention rates for the relatively mobile low-acculturated population they conducted their research at post 2 year intervention. They note that summer results were less healthy with only girls experiencing stable rates of decrease. The strength of this pilot research is a large sample size, diversity of sample, and a relatively long time frame. Limitations involve researchers not being able to control the eating and exercise habits of the participants outside of the school setting.

Further, a concern that positive intervention effects were lost during summer. They believe that more research efforts should be conducted in how differences in rates of obesity between under-served and non-underserved populations are affected by culturally based attitudes are related to food decisions, leisure time activities, and parents role models regarding weight control.

A program study for Mexican-American children examining 2 year results launched by Johnston et al. (2010) compared the effective interventions of self-help versus school-based maintenance. This study employed a randomized, controlled trial lifestyle based weight maintenance program for Mexican American children attending a charter school in Houston, Texas. The study recruited 181 children mean age 12.3 that were self-identified as Mexican American. The final sample was $N = 60$ children; $n = 40$ in the intervention led and $n = 20$ in the self-help; 55% males; 47% females. The objective of the study was to investigate long-term maintenance of weight loss based on such results being limited in previous research that has been conducted. Children enrolled in the intervention were provided classes conducted during the last period of the school day while those in the control group attended study hall.

Results at 6 months demonstrated significant reduction in BMI z-scores in the control group compared to the self-help group. Further repeated measures revealed that children in the intervention group had a significant reduction in their overall BMI z-scores compared to those in the self-help control group. ($F = 14.39$; $p < 0.001$ for year 1; $F = 29.27$; $p = > 0.001$ for year 2). These intervention results are important to weight management programs focused on the Mexican American child population based on

significant improvements in BMI z-scores results. Further the results revealed a 90% participant completion rate at the 2-year assessment with a total of 79% of children having reductions in BMI z-scores at 1 year, and a vast majority maintained such at the end of 2 years. The study acknowledges that a limitation does exist regarding the statistical power of the study since only 60 participants were enrolled and therefore more research needs to be conducted to provide substance to these outcomes.

The research study objective conducted by Jouret et al. (2009), focused on reducing overweight and obesity in two kindergarten based interventions that involved underprivileged and not privileged children in a preschool setting. This intervention study was designed to evaluate two strategies that focused on the reduction of overweight and obesity in preschool children. The basis study (EPIPOI-1) was important because it provided screening that identified overweight or at risk for such children and follow up by physicians. The next component of this research (EPIPOI-2) strengthens the initial approach including an educational addition. The program followed (n = 449) children in EPIOI-1 and (n = 591) in EPIPOI-2 with the control being (n = 304) followed for a 2 year period for underprivileged area. The EPIPOI-2 group also included parents and teachers who were provided basic information on healthy eating habits and activity to promote sustainable healthy practices. Follow up was conducted by their physicians to determine achieved progress in weight reduction. The study randomly placed kindergarten children in one of the two intervention strategies while following the basis form of an education program. The results of the intervention were based on BMI z-score and compared to reference data from children of the same age from kindergartens that were not involved in

any intervention. The intervention effect at the end of the study based on school area were 0.18 for EPIPOI-1; $p < 0.001$, 95% CI [0.07,-0.51]for under privileged area compared to the not underprivileged area EPIPOI-1 = 1.26; $p = 0.554$, 95% CI [0.59, 2.70] and EPIPOI-2 = 0.34; $p = 0.026$, 95% CI [0.13-0.88] for under privileged area compared to the not underprivileged area of 0.76; $p = 0.454$, 95% CI [0.36, 1.57].

Research was conducted by Kubicky, Dunne, Nandi-Munshi, & De Luca (2012) using retrospective analysis to review the long-term effects of a non-intensive program based on lack of published information for this type of program. The focus was a subset of obese children and adolescents who attended a non-intensive weight program and ongoing periodic follow-up visits. ($N = 61$; Female = 39; age range M = 11.1 $\pm$ 2.6 years; African American = 25; Hispanic = 26, Caucasian = 7; Asian = 2, Other = 1). Evaluation was based on changes of BMI z-scores, glycemic measures, and lipid profiles at the end of a 4- year follow-up time frame. The initial program was conducted between 2001 and 2008 at St. Christopher's Hospital for Children. The follow-up period consisted of 47.3 $\pm$ 11.1 months with number of outpatient visits per year (OV/yr) was 2.9 $\pm$ 0.9. Outcome evaluation was significant since children had a decrease in their initial visit BMI z-score compared to their last visit (2.49 $\pm$ 0.4/ 2.33 $\pm$ 0.4; $p > 0.03$).

Researchers acknowledge the limitations to their study since a lack of control group and small sample size existed. They also reveal that a bias selection may exist since a small number of children that were evaluated at the start of the program were followed for more than 2 years. In conclusion they suggest that a non-tensive treatment approach weight management program may have significant effects that are long lasting

however, prospective studies using larger population samples and comparison control groups need to be conducted to support these findings.

Rush et al. (2011) conducted the Project Energize intervention study in New Zealand from 2004 to 2006. The research involved a longitudinal randomized controlled study involving 124 schools for 5to 7 and 10 to 12 year-old children. The study encompassed (N = 492 intervention group and 434 to the control group/ 200 to the intervention and 226 to the control group). The study sample consisted of Maori and New Zealand European children from the Waikato Region. The item unique to this study was the introduction of an "energizer" who was a trained physical activity/nutrition change agent and assigned to each school involved in the program. The energizers were available to provide health-eating initiatives and establish an individualized plan for each school's need toward success.

The results evidenced a decrease in percent body fat that was lower in the 5to 7 year-olds who attended the intervention (BMI SDS 0.59/ %BF SDS 0.65, p = 0.96) compared to the control group (BMI SDS 0.60/ %BF SDS 0.79, p = 0.03). However, it is difficult to state this is actually the case when taking the measure of increased muscle into account due to growth for this age group. With regard to the 10 to 12 year sample there were no significant effects involving percent of body fat by treatment or ethnicity (BMI SDS 0.81 / % BF 0.76, p = 0.29 for intervention group and BMI SDS 1.10/ % BF 1.06, p = 0.69 for control group). The researchers state that this may be explained by the group being in age life stage that is not associated with an increase in body fat, which

may be especially the case for girls in pubertal changes. (BMI SDS 0.81 / % BF 0.76, p = 0.29 for intervention group and BMI SDS 1.10/ % BF 1.06, p = 0.69 for control group).

The strengths of the study are represented by its longitudinal design, randomization by school, matching of schools by size, rural location, and sample size. The limitation of the study surrounds issues of over and under sampling bias stemming from the desire of the study to include subsets of children. At the start of the program there was an initial 50% response. Then 2 years into the program 20% of the 5to 7 age group and 43% of the 10 to12 age group were lost to follow up making retention a challenge. This was contributed to the nature of the community being very mobile with children moving between and out of schools. This resulted in absolute numbers, especially for the Maori children falling below a required number for significance and lack of power and accounting for lack of an effect for the Maori subgroup analysis. The researchers concluded that even though minor outcomes occurred further research involving obesity interventions where various cultures are present should be continued.

A randomized trial weight management program conducted by Savoye et al. (2011) examined the efforts long-term for a diverse ethnic obese population. (N = 209; age range = 8 to16 years; Baseline BMI $\leq 95^{th}$ percentile). At 24 months the treatment effects from a family based approach that included nutrition, exercise, and behavior modification were sustained in the intervention group for total body weight (BMI z change = -0.16-2.8kg/m-2; BMI change = -2.8kb/m-2; percent body fat = -4.2%). This is a significant finding since little evidence has been documented in successful long-term lasting treatment programs in ethnic minorities and inner-city impoverished populations.

A research study conducted by Spiegel & Foulk (2006) employed the "Wellness, Academics & You" (WAY) a multidisciplinary school based initiative to reduce weight on post BMI change based on consumption of increased fruits, vegetables, and physical activity. The study sample (N = 1013) consisted of fourth and fifth grade students from 16 schools in four states. Random selection was used to put interventions and comparison classes into place to reduce bias. Measures included participants being selected and assigned to a treatment group and a workshop was created for intervention teachers held at local sites to facilitate participation levels.

The WAY program was carried out by the intervention instructors based on the workshop classes they attended geared toward their individual and school curriculum schedule based on 7 modules. The student is introduced to the 7 modules by the intervention instructors throughout the school year by attending sessions that range from 20 minutes to 1 hour. The modules provide the student an engagement in multidisciplinary activities to help build and accomplish change toward longer lasting positive health behavior lifestyle attitudes and beliefs.

Result findings revealed a significant decrease in measured BMI. Reduction was evidenced in the intervention group through use of t test and Pearson correlations. The *t*-test mean for the comparison group was 0.5210 (N = 479; SD = 1.01610, SE = 0.04643) as compared to the intervention group (N = 534, SD = 0.89446, SE = 0.03871). These results support that he correlation change based on post-data measures were significant at the two-tailed 0.01 level. Researchers conclude that while the program demonstrated the capacity to promote positive change in BMI through increased consumption of fruits,

vegetables, and physical activity the evaluation cored a very limited time period and therefore, additional research is recommended to determine the long-term results in maintaining healthy lifestyle habits in the population.

Waters et al. (2011) conducted a meta-analysis based on standardized (BMI z-score) score data to evaluate outcome measures grouped by adiposity, physical activity-related behaviors, or diet-related behaviors. The (BMI z-score) employed subgrouping analysis categorized by age groups 0 to 5, 6 to 12, and 13 to18 years. The aim was to provide an evaluation and update on the effectiveness of previously conducted childhood obesity prevention intervention research based on the effectiveness of change in BMI. The secondary rationale of the research was to review and recognize what programs and strategies worked, why, and at what cost that lead to improved health outcomes. The review included 37 studies with the majority of the studies involving a target age group of children 6 to 12 years. Total participants (N = 27,946 children) which demonstrated an overall standardized mean difference in adiposity as measured by BMI of -0.15kg/m2, 95% Cl [-0.21, -0.09]. The reviewers note that heterogeneity existed in all three age groups and could not be explained by random occurrence, duration, or setting to the intervention. Of the 37 studies, eight advised that no evidence existed to support adverse effects or outcomes that involved unhealthy diet practices, increase health inequalities, or underweight. The authors' overall conclusion support that creditable beneficial evidence exists for obesity prevention programs based on BMI, especially for children in the 6 to12 year age group. Since no positive explanation regarding the found heterogeneity and small bias the findings need to be interpreted carefully. They further concluded

design studies and evaluations need improvement through identifying how effective intervention components are based on longer term outcomes providing strength to health education and care systems to achieve sustainable impact.

Summary and Conclusions

Overweight and obesity trends have continued to increase over the last three decades and have reached epidemic levels (Odgen & Flegal, 2010). The Hispanic ethnic group, especially the subgroup of Mexicans, are more affected than others (Sinai Urban Health Institute, 2004). Hispanic children aged 2 to19 have the highest prevalence of overweight and obesity in the United States based on BMI (CDC, 2012). This is a significant factor and concern to public health because the Hispanic population is young and has fast growth, due to immigration and higher birth rates (DHHS, 2012: Foreyt, 1998). Cultural differences may contribute to various racial and ethnic disparities in health and health care and therefore, understanding these differences and how they affect intervention approaches will aid in design of public health interventions to reduce the prevalence of overweight and obesity in this population (Dixon, Pena, & Taversa, 2012).

Acculturation may have a significant effect on this population since review of literature supports that traditional eating patterns are affected by acculturation revising their dietary pattern which now incorporates the American style (Ayala et al., 2008; Kemp, 2010). These are significant findings that support culture impacts sociocultural variables influencing the development of overweight and obesity in this population. Overweight and obesity increase risk factors of secondary associated disease (Raj & Kumar, 2010; Newman, 2009). These factors are also linked to psychosocial effects

associated with the stigma of being considered fat which may not relate to the Hispanic population because of a difference in cultural views that prefer a heavier body image. This significantly adds to the economic burden taxing a health care system (Lightwood et al., 2009; Roger et al., 2011; Steward, Cutler, & Rosen, 2009).

There seems to be a deficit on effectiveness post intervention and appropriate evaluation of such interventions to determine if they are effective. Interventions that can reduce or eliminate overweight and obesity in this age group and population then promote social change and in turn a decreased burden to public health. These social changes have implications for the development of both health and socioeconomic status in later life for future generations. These influences may be partially offset by government programs and/or insurance. However, the policy makers must be concerned with social determinants of health that is affected by culture on many levels, as well as socioeconomic solutions to move children and their families out of poverty. Socioeconomic status effects childhood health and then in turn indirectly affects childhood health; which in the end affects childhood health impacting the future health of generations to come. These interrelationships suggest that to effectively protect children and their health requires interventions to adult health or at least the adults that are parents. The health issues are inter-generational and the solutions must be inter-generational as well.

The specific focus of this study was to evaluate and compare the impact of gender, age, distance to program, time in program, and season of enrollment post culturally and ethnically sensitive overweight and obesity interventions among Hispanic

youth ages 2 to19 based on CDC BMI percentiles change. In this chapter, I have provided a review of the literature that examines relative themes and issues of various factors that influence trends of obesity among the Hispanic population that has a higher prevalence of overweight and obesity; especially for youth aged 2 to 19-years compared to other ethnic groups. This review provides information that reveals and supports that cultural and ethnic norms strongly influence the attitudes and behaviors of the Hispanic population which in turn contributes to risk factors that correlate to higher ratios of overweight and obesity epidemic in this population. In Chapter 3 I will describe the details of the research methodology that will be used to examine the gap as described in this summary and conclusion. This will provide a more detailed discussion of the study description, design, variables, ethical protections, and data analysis.

Chapter 3: Research Method

Introduction

In this chapter, I describe the research study methodology that is used to test my hypotheses. The intent and goal of this study was to evaluate and compare the outcomes measures of various independent variables that effect Hispanic youth ages 2to 19 based on the impact of the dependent CDC BMI percentile variable. The intervention is a program for youth that includes cultural and ethnic attributes to change lifestyle behavior and include healthy eating, physical activity, and decreasing screen time. Results are based on pre and post CDC BMI percentile change measures through use of the BMI percentile change measures based on impact of intervention that vary with the age of the youth, gender, time in program, distance to program, and season enrolled in the cultural and ethnically sensitive intervention program.

Preview of Major Sections of this Chapter

In this chapter, I focus on the research methods and begin by detailing the study variables as appropriate to support this study. The chapter continues to identify the research design and its connection to the research questions that were used to test the hypotheses. I explain why this design choice is consistent with research designs that focus on advancing knowledge necessary to decrease the prevalence in overweight and obesity in the 2 to 19 year Hispanic youth population. The independent and dependent study variables are concisely stated and explained. The methodology was described in sufficient depth defining the population, sampling and sampling procedures, procedures used to obtain data and archival data, and constructs of instrumentation. The data

analysis plan is presented including detailed employed software and analysis that involve statistical tests used to test the hypothesis. Internal and external existing threats are explored as appropriate to the study and addressed. Lastly, the Institutional Review Board (IRB) process is described, including all relevant ethical concerns relating to data collection. This chapter ends with a conclusion that summarizes the methodology employed in this study.

Research Design and Rationale

Discussion of Study Research Variables

Research variables are based upon the study goals that examine associations that may mitigate the impact of the inclusion of ethnicity and culture as part of an intervention in lifestyle modification. Each of these will be further discussed in the instrumentation and operationalization in the constructs section of this paper.

Independent variables. The independent variables are youth's age at intervention, youth's gender, time in the program, distance to clinic, and season of enrollment.

Dependent variable. BMI percentile change measures post intervention is the dependent variable. The dependent variable is the change in BMI percentile that is measured as the difference between pre - and post- intervention.

Research Design and Connection to the Research Questions

In this study, I employ a quantitative, retrospective cohort research design. The intent of this study is to evaluate and compare the impact of the independent variable post intervention through change in BMI percentile that resulted from overweight and

obesity culturally and ethnically based interventions for the 2 to 19-old Hispanic youth population. Retrospective studies examine exposures that have already occurred and provide information based on these occurrence (Friis & Sellers, 2014). For example, in this research study, PGA will have already obtained pre and post BMI percentile that can be compared to the child's age, gender, time in the program, distance to clinic, and season of enrollment into the program. This particular design supports previous research efforts by gathering past data that provide a concrete statistical analysis for ongoing research to implement effective interventions toward decreasing the prevalence of overweight and obesity in the study subject population. In this study, I link research questions to the focused attributes that effect change in the population. Based on information from Creswell (2003) the research questions and variables used in this study support a quantitative research design. The independent and dependent variables for this research study focus on detailed information necessary to evaluate the effectiveness of this type of intervention involving the study group.

Methodology

Population

The target population is male and female Hispanic youths, between 2 to 19 years old who are overweight or obese. The population resides in Miami, FL. Services for the population were provided by PGA during the period of November 7, 2008 to February 23, 2015. The size of the study population is a total of 1467 Hispanic youth.

Sampling and Sampling Procedures

The sampling strategy for this study is purposive homogeneous sampling**.**

Purposive sampling is a selective, judgmental, or subjective sampling, not based on probability sampling technique (Laerd, 2012). This technique's goal is to focus on particular characteristics of a population being studied to best answer the research question. Homogeneous sampling is a type of purposive sampling technique where the sampling units share the same or very similar characteristics or traits (Laerd, 2012). I believe this is the best sampling method to evaluate the impact of an intervention with regard to various attributes in a community, where the participants have similar/homogeneous characteristics.

Study Sample

The sample was obtained from PGA through retrieval of archival data that provides pre and post BMI measures for all children who started and/or completed their cultural and ethnic sensitive overweight and obesity intervention program between November 7, 2008 and February 23, 2015. The sampling frame inclusion and exclusion criteria for this study consisted of all who have participated in the overweight and obesity program for the above mentioned time frame.

Sample Size and Power Analysis

The sample size of 1,467 participants is considered to be adequate by guideline standards that recommend that the number be at least 10 cases per the number of independent variables (Nunnally, 1978). According to Rudestam and Newton (2007), the procedure to decide the number of participants that are appropriate for research sample size is conducted through a power analysis. The power analysis also includes information on justification for effect of size, alpha level, and power level. This is

important to avoid a Type II error that would occur when the null hypothesis is rejected. However, according to Rudestam and Newton, (2007) power historically has been difficult to conduct, and therefore doctoral students and their committees rely on general rules of thumb to determine the proper number of participants that will provide power to the research study. In this study, I employed a sample size power analysis in G*Power 3.1.7 (Faul, Erdfelder, Buchner, & Lang, 2013). Hierarchical linear modeling creates a linear model that is interpreted similarly to a linear regression. The linear regression analysis of change from baseline BMI to outcome BMI, ANOVA, and independent t test will examine age, gender, time spent in program, distance to clinic, and season of program enrollment will be employed. Through use of medium effect size, a power of .80, and seven predictors, (when seasons have been dummy-coded), the required sample size needed to be at least 103 participants. The 1467 participants will achieve empirical validity for the hierarchical linear model (Faul et al., 2013). With the1,467 participants, the expected power for this study was greater than .99.

Using Archival Data

Procedures for Recruitment, Participation, and Data Collection

Because this research study is based on the collection and analysis of archival data, there was no need for recruitment, participant debriefing, and follow up procedures. The purpose of this research study was to obtain pre and post BMI percentile intervention information. Based on participant information retrieved from PGA that offer the overweight and obesity program, archival program data outcomes were analyzed. To obtain the archived data a letter requesting permission was provided to PGA. This will

be presented to the Walden University Institutional Review Board (IRB) toward approval. Once IRB approval is obtained the process of obtaining the archival data was acquired. When IRB approval was obtained I contacted Dr. Muinos who heads the overweight and obesity program at PGA to start the retrieval process.

Participants initially are seen by PGA through referral method from their primary pediatric physician. This is based on BMI that places the youth at an overweight or obese status. Through collaboration with clinical personnel, clinical records that contain the outpatient visits dates, participant pre and post BMI percentiles, age of youth, gender of the youth, location of child as measured by within Dade county, FL or outside were provided to me. The office manager through use of electronic medical records ran the list of all primary pediatric referrals that were color coded in red, indicating new patients from November 7, 2008 to February 23, 2015. Next, each patient's name was separately entered into the Health Information System to obtain their specific detailed record of visits during the intervention period. I was advised then a nurse at PGA would blacken out all personal patient information for each patient. The end product contained outpatient visit dates, pre and post BMI percentiles, age of youth, gender of the youth, location of child. Once the retrieval of this information was completed, I received it and kept it in a safe place.

Operationalization of the Variables

Dependent Variable

BMI. The primary dependent variable is change in BMI percentile. This variable is BMI and is considered a ratio scale level variable. The ratio scale level is considered

the appropriate measure since a ratio scale is a numeric variable that has defined units of measure and a possible real zero point (Osborn, 2008). Changes in pre- and post- BMI percentile were assessed for participants who were involved in the overweight and obesity program intervention. Procedures for recruitment, participation, and data collection were addressed in a previous section and provide how the BMI measure was obtained from participants. The pre- and post- BMI percentile of the participant time spent in the program were provided to me by PGA.

Independent Variables

The independent variables are youth's age at intervention, child's gender, time in the program, season of program enrollment, and distance to the clinic.

Youth's age at intervention. To assess Research Question I that addresses the child's age at intervention, a hierarchal linear model was constructed that modeled changes in BMI over time for the groups that were divided into age 2to 6 years, 7 to 12 years, and 13 to 19years. Changes in BMI percentile were assessed pre- and post-intervention differences between the three age groups and were described in the narrative as well as visually represented as confidence intervals through use of figures and line graphs.

The independent variable of age group, is used as a nominal dichotomous grouping variable. Time is used as another independent variable, which was considered an interval level variable, as measured by the number of weeks that have passed from the baseline measurement. An alpha level of a =.050 was used to determine significance. The interaction of age group and time was assessed and used to determine significance.

The interaction of age group and time was assessed to determine if there were differences in BMI percentile across time for each age group.

Youth's gender. To access Research Question 2 that addresses the child's gender at interventions, a hierarchal linear model was constructed modeled changes in BMI percentile over time for the three groups consisting of males and females. Changes in BMI percentile will be assessed over time and differences between the two genders for the described age ranges of 2 to 6, 7 to 12, and 13 to19 are described in the narrative, as well as visually represented through use of figures and line graphs.

For this question the independent variable is considered as gender, and it was used as a nominal dichotomous grouping variable. Time was used another independent variable, which was considered an interval level variable, as measured by the number of weeks that have passed since a baseline in measurement. An alpha level of $a = .050$ was used to determine significance. The interaction of gender and time was assessed to determine if there were differences in BMI percentile across time for either gender.

Length of time in the program. To assess Research Question 3 that addresses the impact of the interventions, a hierarchal linear model was constructed. This model addresses changes in BMI percentile over time by participation in intervention based on date and year of entry and completion for the described age ranges of 2 to 6, 7 to 12 and 13 to19. The prescribed time period must occur within the time frame of November 7, 2008 to February 23, 2015 for participant outpatient overweight and obesity program visits. This is described in narrative, as well as visually represented as confidence intervals through figures, and was considered a nominal scale level variable.

Time was used as another independent variable, which was considered an interval level variable, as comparatively measured pre- and post- intervention period . An alpha level of a = .050 was used to determine significance. The interaction between participation and time will be assessed to determine if there were differences in BMI percentile across time for youths who participated in more intervention visits.

Season of program enrollment. To assess Research Question 4 that addresses the impact of the interventions a hierarchal linear model was constructed. This model addressed changes in BMI percentile over time by participation in intervention based on month/season of program enrollment for the described age ranges of 2 to 6, 7 to12, and 13 to19. The prescribed time period occurred within the time frame of November 7, 2008 to February 23, 2015 for participant outpatient overweight and obesity program visits. This was described in narrative, as well as visually represented as confidence intervals through figures, and be considered a nominal scale level variable. Time was used as another independent variable, which was considered an interval level variable, as comparatively measured pre- and post- intervention period . An alpha level of a = .050 was used to determine significance. The interaction between participation and time was assessed to determine if there were differences in BMI percentile across time for youths who participated in more intervention visits.

Distance to clinic. To assess Research Question 5 that addresses the impact of interventions, a hierarchal linear model was constructed. This model addressed changes in BMI percentile over time by participation in intervention based on distance to the clinic site for the described age ranges of 2 to 6, 7 to 12- and 13 to19. Distance to the

clinic site was measured by two categories consisting of within Dade County, FL or outside. This was described in narrative, as well as visually represented as confidence intervals through figures, and be considered a nominal scale level variable. For this question the independent variable is considered as gender, and it was used as a nominal dichotomous grouping variable. Time was used as another independent variable, which was considered an interval level variable, as measured by the number of weeks that have passed since a baseline in measurement. An alpha level of $a = .050$ was used to determine significance. The interaction of gender and time was assessed to determine if there were differences in BMI percentile across time for either gender.

Data Analysis Plan

SPSS version 21.0 for Windows (IBM, 2012) will be employed to conduct SPPS version 21.0 for Windows (IBM, 2012) will be employed to conduct analyses of descriptive statistics. Frequencies and percentages will be calculated to describe continuous (ratio) data, such as BMI (Howell, 2010). Line graphs will be employed to assist in an understanding of how independent variables affect change in BMI.

Preanalysis Data Screening

Data will be screened for missing data, outliers, or extreme cases. Descriptive statistics and frequency distributions will be conducted to determine that responses are within possible range of values and that the data was not distorted by outliers. The presence of outliers will be assessed by the examination of standardized residuals. Standardized values will be created for each subscale score and cases will be examined

for values that fall above 3.29 an values that fall below -3.29, indicating an outlier, and these participants will be removed (Tabachnick & Fidell, 2012).

Research Questions and Hypotheses

RQ1: Is there a statistically significant difference in the CDC BMI percentile outcomes associated with age for Hispanic youth aged 2 to 19 years post a culturally sensitive overweight or obesity intervention program? This hypothesis will be tested using an analysis of variance (ANOVA) to adjust for possible effects of covariates.

Ho1: There is no statistically significant difference in the CDC BMI percentile outcomes associated with age for Hispanic youth aged 2 to 19 years post a culturally sensitive overweight or obesity intervention program.

HA1*:* There is a statistically significant difference in the CDC BMI percentile outcomes associated with age for Hispanic youth aged 2 to 19 years post a culturally sensitive overweight or obesity intervention program.

Prior to analysis, the assumptions of the ANOVA model were assessed. In preliminary analysis, the assumption of normality was assessed with a Shaprio-Wilk test. This type of test is preferred to test if the assumption of normality is met. If the 95% confidence intervals do not share common values, as indicated by a *p* of lesser value than the assigned alpha of .050, the null hypothesis was not rejected. If a significant significance was found between age, the data is not normally distributed. Figures displaying confidence intervals, created though ggplot2, were visually examined and presented to determine which age had a greater change in BMI percentile.

RQ2: Is there a statistically significant difference in the CDC BMI percentile outcomes associated with the gender for Hispanic youth aged 2 to 19 years post a culturally sensitive overweight or obesity intervention program? This hypothesis will be tested using an independent sample *t*-test analysis to adjust for possible effects of covariates.

H_o2: There is no statistically significant difference in the CDC BMI percentile outcomes associated with gender for Hispanic youth aged 2 to 19 years post a culturally sensitive overweight or obesity intervention program.

H_A2: There is a statistically significant difference in the CDC BMI percentile outcomes associated with the gender for Hispanic youth aged 2 to 19 years post a culturally sensitive overweight or obesity intervention program.

Prior to analysis, the assumptions of the normality were assessed using a Shapiro-Wilk test. The model assumes that the data within the dependent variable is normally distributed as sample size increases according to the central limit theorem (CLT). If the 95% confidence intervals do not share common values, as indicated by a *p* of lesser value than the assigned alpha of .050, the null hypothesis was not rejected. If a significant difference was found between genders, the figure displaying confidence intervals, created though ggplot2, were visually examined and presented to determine which gender had a greater change in BMI.

RQ3: Is there a statistically significant difference in the CDC BMI percentile outcomes associated with the amount of time Hispanic youth aged 2 to 19 years spent in a culturally sensitive overweight or obesity intervention program.. This hypothesis will

be tested using linear regression analysis to adjust for possible effects of covariates?

$H_0$3: There is no statistically significant difference in the CDC BMI percentile outcomes associated with the amount of time Hispanic youth aged 2 to 19 years spent in a culturally sensitive overweight or obesity intervention program.

H_A3:: There is a statistically significant difference in the CDC BMI percentile outcomes associated with the amount of time Hispanic youth aged 2 to 19 years spent in a culturally sensitive overweight or obesity intervention program.

Prior to analysis, the assumptions of the linear model were assessed. The linear model assumes that the data within the dependent variable is normally distributed, and that data points vary similarly along the regression line, or are homoscedastic. Normality was visually assessed using a normal P-P plot, and homoscedasticity was visually assessed using a residuals scatterplot. If the 95% confidence intervals do not have common values, as indicated by a *p* of lesser value than the assigned alpha of .050, the null hypothesis was not rejected. If significant difference were found between length of time of participation, the figure displaying confidence intervals, created through ggplot2, was visually examined and presented to determine which group had a larger change in BMI than the other.

RQ4: Is there a statistically significant difference in the CDC BMI percentile outcomes associated with the season of program enrollment for Hispanic youth age 2 to 19 years in a culturally sensitive overweight or obesity intervention program? This hypothesis will be tested using ANOVA analysis to adjust for possible effects of covariates?

Ho4: There is no statistically significant difference in the CDC BMI percentile outcomes associated with the season of program enrollment for Hispanic youth age 2 to 19years in a culturally sensitive overweight or obesity intervention program.

HA4: There is a statistically significant difference in the CDC BMI percentile outcomes associated with the season of program enrollment for Hispanic youth age 2 to 19 years in a culturally sensitive overweight or obesity intervention program.

Prior to analysis, the assumptions of the ANOVA model were assessed. In preliminary analysis, the assumption of normality was assessed with a Shaprio-Wilk test. This type of test is preferred to test if the assumption of normality is met. If the 95% confidence intervals do not share common values, as indicated by a *p* of lesser value than the assigned alpha of .050, the null hypothesis was not rejected. If significant difference is found between season enrolled in the program, the figure displaying confidence intervals, created through ggplot2, were visually examined and presented to determine which group had a larger change in body mass index than the other.

RQ5: Is there a statistically significant difference in the CDC BMI percentile outcomes associated with the distance to the clinic for Hispanic youth age 2 to 19 years in a culturally sensitive overweight or obesity intervention program? This is measured by distance within Dade county Florida or outside. This hypothesis will be tested using an independent sample *t* test to adjust for possible effects of covariates?

Ho5: There is no statistically significant difference in the CDC BMI percentile outcomes associated with the distance to the clinic for Hispanic youth age 2to19 years in a culturally sensitive overweight or obesity intervention program.

HA5: There is a statistically significant difference in the CDC BMI percentile outcomes associated with the distance to the clinic for Hispanic youth age 2 to 19 years in a culturally sensitive overweight or obesity intervention program.

Prior to analysis, the assumptions of the normality were assessed using a Shapiro-Wilk test. The model assumes that the data within the dependent variable is normally distributed as sample size increases according to the CLT. If the 95% confidence intervals do not share common values, as indicated by a *p* of lesser value than the assigned alpha of .050, the null hypothesis was not rejected. If a significant difference was found between genders, the figure displaying confidence Intervals, created through ggplot2, were visually examined and presented to determine which gender had a greater change in BMI.

Threats to Validity

This evaluation centered on a target population of Hispanic male and female youth aged 2 to 19 who visited the PGA on a referral basis. Threats to validity normally involve survey accuracy which depends upon recall abilities of the persons involved in the study. In this study, the information does not involve such, and rather is provided through clinical records kept by the initial source of intervention conducted by PGA. Therefore, this involved potential threats to internal validity since I was not present when the initial physical and assessment occurred prior to intervention. Further, when researching

information that surrounds reliability, Triola (2004) suggests that reliability is based upon the consistency that occurs and is valid for how well the data information is measured at standards that they are supposed to be measured. Therefore, a threat to construct validity could exist, if PGA personnel did not have properly calibrated scales when weighing intervention participants or variations among height measurements taken by the staff would affect the accuracy of the results. This research was s specific to a targeted group. It therefore provides limited general conclusions or external validity, which may not apply to the population as a whole, due to varied acculturation and assimilation processes in other areas of the United States.

Ethical Procedures

I acquired permission via a letter of permission to use archival data as the source for research conducted. This study is a secondary data analysis study based on it being retrospective in nature. In my research, no participants are contacted post intervention. All information was archival data that is anonymous which eliminates concerns surrounding IRB approval regarding protection of children. I acquired any acquired approvals through the normal channels per university policy. Ethical concerns in acquiring information have been previously discussed and presented in this chapter. Information for this research has been treated in a confidential manner and kept as confidential data in secured, locked data storage files in my home. I will be the only individual that has access to this information until it is destroyed which will be upon completion of dissertation and the degree of PhD is provided to me. The IRB approval number for this study is 02-13-15-0046756.

Summary

Chapter 3 presented and discussed the research methodology for evaluation of an overweight and obesity program that incorporates culturally and ethnically sensitive interventions. This study used a retrospective cohort research design for the Hispanic 2 to19 year youth population having a sample size of n =1467 participants. Research data was retrieved in archival fashion and provided by the original source PGA. The dependent variable is change in BMI percentile, and the independent variables are age of child, gender of child, time in program, distance to clinic, and season of enrollment in program. Data was analyzed using descriptive statistics, through employed use of multicomp program software and hierarchal linear model. This chapter also describes threats to validity and ethical considerations. Chapter 4 presents and describes the details of the research results that were used to examine the data associated with the research questions.

Chapter 4: Results

Introduction

Purpose of the Study

In this quantitative study evaluated and compared the impact of gender, age group, distance to program, time in program, and season of enrollment post culturally sensitive overweight and obesity interventions provided to Hispanic youth ages 2 to 19. This was accomplished by retrospectively measuring the change in the dependent variable BMI percentile prior to and post intervention by the impact of the independent variables.

Research Questions and Hypotheses

RQ1: Is there a statistically significant difference in the CDC BMI percentile outcomes associated with age for Hispanic youth aged 2 to 19 years post a culturally sensitive overweight or obesity intervention program? This hypothesis will be tested using an analysis of variance (ANOVA) to adjust for possible effects of covariates.

Ho1: There is no statistically significant difference in the CDC BMI percentile outcomes associated with age for Hispanic youth aged 2 to 19 years post a culturally sensitive overweight or obesity intervention program.

H_A1: There is a statistically significant difference in the CDC BMI percentile outcomes associated with age for Hispanic youth aged 2 to 19 years post a culturally sensitive overweight or obesity intervention program.

RQ2: Is there a statistically significant difference in the CDC BMI percentile outcomes associated with the gender for Hispanic youth aged 2 to 19 years post a

culturally sensitive overweight or obesity intervention program? This hypothesis will be tested using an independent sample *t*-test analysis to adjust for possible effects of covariates.

Ho2: There is no statistically significant difference in the CDC BMI percentile outcomes associated with gender for Hispanic youth aged 2 to 19 years post a culturally sensitive overweight or obesity intervention program.

HA2: There is a statistically significant difference in the CDC BMI percentile outcomes associated with the gender for Hispanic youth aged 2 to 19 years post a culturally sensitive overweight or obesity intervention program.

RQ3: Is there a statistically significant difference in the CDC BMI percentile outcomes associated with the amount of time Hispanic youth aged 2 to 19 years spent in a culturally sensitive overweight or obesity intervention program. This hypothesis will be tested using linear regression analysis to adjust for possible effects of covariates?

H03: There is no statistically significant difference in the CDC BMI percentile outcomes associated with the amount of time Hispanic youth aged 2 to 19 years spent in a culturally sensitive overweight or obesity intervention program.

HA3:.There is a statistically significant difference in the CDC BMI percentile outcomes associated with the amount of time Hispanic youth aged 2 to 19 years spent in a culturally sensitive overweight or obesity intervention program.

RQ4: Is there a statistically significant difference in the CDC BMI percentile outcomes associated with the season of program enrollment for Hispanic youth age 2 to 19 years in a culturally sensitive overweight or obesity intervention program? This

hypothesis will be tested using ANOVA analysis to adjust for possible effects of covariates?

Ho4*:* There is no statistically significant difference in the CDC BMI percentile outcomes associated with the season of program enrollment for Hispanic youth age 2 to 19years in a culturally sensitive overweight or obesity intervention program.

HA4: There is a statistically significant difference in the CDC BMI percentile outcomes associated with the season of program enrollment for Hispanic youth age 2 to 19 years in a culturally sensitive overweight or obesity intervention program.

RQ5: Is there a statistically significant difference in the CDC BMI percentile outcomes associated with the distance to the clinic for Hispanic youth age 2 to 19 years in a culturally sensitive overweight or obesity intervention program? This is measured by distance within Dade county Florida or outside. This hypothesis will be tested using an independent sample *t* test to adjust for possible effects of covariates?

Ho5: There is no statistically significant difference in the CDC BMI percentile outcomes associated with the distance to the clinic for Hispanic youth age 2 to19 years in a culturally sensitive overweight or obesity intervention program.

HA5: There is a statistically significant difference in the CDC BMI percentile outcomes associated with the distance to the clinic for Hispanic youth age 2 to 19 years in a culturally sensitive overweight or obesity intervention program.

Preview of the Organization of Chapter 4

This chapter has a focus on delineation of the study findings and how results relate to the research questions. This chapter will also address the study hypotheses, research tools used, procedures employed, along with providing a detailed description of the data calculations, and retrieval of data.

Data Collection

I was provided the retrospective data by the PGA Clinic in Miami, FL for Hispanic youth 2 to 19 years old who attended the clinic for culturally sensitive overweight or obesity program intervention from November 7, 2008 to February 23, 2015. The total sample of participants who attended the PGA Clinic intervention program was 1,467 with 803 male youth participants and 664 female youth participants. The deindentified data were transcribed and transferred onto a Microsoft Excel file and given to me on a flash drive on March 1, 2015. No discrepancies in data collection from the plan presented in Chapter 3 occurred.

Results

Descriptive statistics were used to describe and report the main characteristics of the variables with regard to study results. This was accomplished through use of an independent *t* test, analysis of variance (ANOVA), and linear regression. Use of the independent *t* test was used to determine results regarding gender and distance to the clinic. These are the best choices since I was dealing with nominal variables. The one-way ANOVA has one independent variable that has two or more levels which is the case in this research study for age and season. A simple linear regression was conducted for

amount of time spent in program and distance to clinic since the independent variable(s) are at the nominal level. This was accomplished through use of Statistics Solutions (2014) Pro version v1.15.092.16 for data analysis and narrative interpretation.

Data Management

Prior to the analyses, the data were screened for missing values and outliers. Stevens (2009) defined univariate outliers as values greater than $\pm$ 3.29 standard deviations from the mean. Univariate outliers were examined and removed from weeks in the program (16 values removed from the variable) and change in BMI (33 values removed).

Frequencies and Percentages

The majority of participants fell into the category of 13-19 for age (n =974, 67%) with that majority presented as male (n=800, 55%). The most frequent response for season was summer (n =377, 26%). Frequencies and percentage for nominal variables are presented in Table 2.

Table 2

Frequencies and Percentages for Nominal Variables

Variables	*n*	%
Age		
13-19	974	67
2-7	63	4
8-12	424	29
Gender		
Female	661	45
Male	800	55
Season		
Fall	369	25
Spring	361	25
Summer	377	26
Winter	351	24

Note. Due to rounding error, percentage may not add up to 100.

Means and Standard Deviations

The number of weeks within the program ranged from 1.00 to 292.00, with an average of 43.94 *(SD* =63.82). The percentile change in BMI ranged from -18.14 to 19.80, with an average of -0.43 (*SD* = 2.81). Means and standard deviations for continuous variables are present in Table 3.

Table 3

Means and Standard Deviations for Continuous Variables

Variable	*M*	*SD*
Weeks	43.94	63.82
Change in BMI	-0.43	2.81

The following are the research questions and results for this study:

Research Question 1

RQ1: Is there a statistically significant difference in the CDC BMI percentile outcomes associated with age for Hispanic youth aged 2 to 19 years post a culturally sensitive overweight or obesity intervention program? .

Ho1: There is no statistically significant difference in the CDC BMI percentile outcomes associated with age for Hispanic youth aged 2 to 19 years post a culturally sensitive overweight or obesity intervention program.

HA1*:* There is a statistically significant difference in the CDC BMI percentile outcomes associated with age for Hispanic youth aged 2 to 19 years post a culturally sensitive overweight or obesity intervention program.

To examine Research Question 1and associated hypotheses, a one-factor analysis of variance (ANOVA) was conducted to determine whether there were significant differences in change in BMI between the different age categories. In preliminary analysis, the assumption of normality was assessed with a Shaprio-Wilk test. This type of test is preferred to test if the assumption of normality is met (Munro, 2005). If statistical significance is found, the date is not normally distributed.

The results of the test were significant, revealing a *p* value of < .001. which does not support the assumption. However, Howell (2010) suggested that the ANOVA is robust despite violations of normality in cases of large sample sizes (>50). The assumption of equality of variance was assessed through use of Levene's test. Results of this test were not significant, $p = .568$, indicating the assumption was not violated. The results of the ANOVA were significant, $F\ (1,425) = 6.66$, $p = .001$, partial $\eta^2 = .01$,

suggesting that the differences in change in BMI between different age categories are unlikely due to chance alone. A partial η^2 of .01 suggests a small difference between groups.

Tukey post hoc pairwise comparison were conducted to assess the group differences. The category for ages 8-12 had a significantly higher change in BMI percentile changes than the other groups. The difference for compared to the 13 to 19 age category was 1.586, $p < .001$ and for the 2 to7 age category 1.271, p .278. Results of the ANOVA are presented in Table 4. The tukey pairwise comparisons for change in BMI by age categories is presented in Table 5. Means and standard deviations are also presented in Table 6. This information is followed by Figure 6 which displays the change in BMI percentile by age.

Table 4

Results of ANOVA for Change in BMI by Age

Source	*SS*	*df*	*MS*	*F*	*p*	Partial η^2
Age	744	2	372	9.80	< .001	.01
Error	55,374	1458	38			

Table 5

Tukey Pairwise Comparisons for Change in BMI by Age

Age Group	*Difference*	*Lower 95%*	*Upper 95%*	*p*
2-7 &13-19	*0.315*	*-1.565*	*2.19*	*.918*
8-12 & 13-19	*1.586*	*0.744*	*2.43*	*<.001**
8-12 &2-7	*1.271*	*-0.681*	*3.22*	*.278*

Note. *p*-values adjusted for multiple tests. *C.L.* = Confidence Limit

Table 6

Means and Standard Deviations for Change in BMI by Age

Age	*M*	*SD*	*n*
2-7	-0.559	5.62	63
8-12	0.712	7.53	424
13-19	-0.874	5.50	974

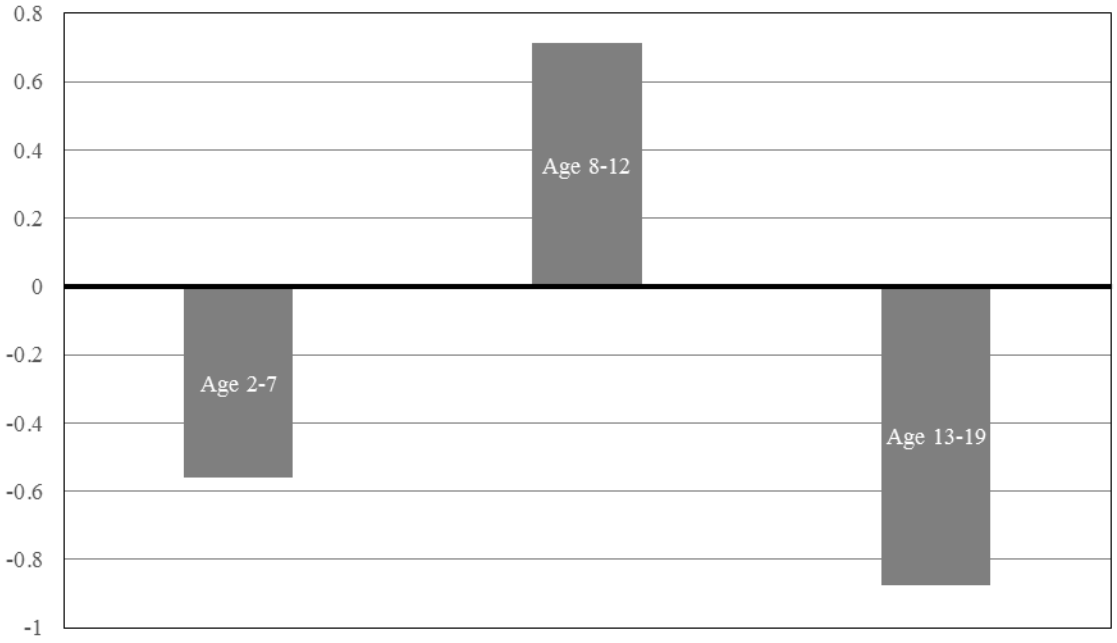

Figure 6. Change in BMI mean by age.

Research Question 2

RQ2: Is there a statistically significant difference in the CDC BMI percentile outcomes associated with the gender for Hispanic youth aged 2 to 19 years post a culturally sensitive overweight or obesity intervention program? This hypothesis will be tested using an independent sample *t*-test analysis to adjust for possible effects of covariates.

H_o2: There is no statistically significant difference in the CDC BMI percentile outcomes associated with gender for Hispanic youth aged 2 to 19 years post a culturally sensitive overweight or obesity intervention program.

H_A2: There is a statistically significant difference in the CDC BMI percentile outcomes associated with the gender for Hispanic youth aged 2 to 19 years post a culturally sensitive overweight or obesity intervention program.

To examine this research question, an independent sample *t*-test was conducted to assess if there were differences in change in BMI by gender. Prior to the analysis, the assumption of normality was assessed using a Shapiro-Wilk test. The results of the test was significant, $p < .001$, violating the assumption of normality. However, Howell (2010) suggests that the *t*-test is robust despite violations of normality. Additionally, the mean of any random variable will be approximately normally distributed as sample size increases according to the CLT (Munro, 2005). Since the sample size is very large in this study, violations from normality should have little effect on the result. The assumption of equality of variance was assessed using Levene's test. The result of the test was not significant, $p = .327$, indicating that the assumption of equal variances was not violated.

The results of the independent sample *t*-test were not significant, $t(1457) = 0.02$ $p = .692$, suggesting that there was not a difference in change in BMI by gender. Results of the independent sample *t*-test are present in Table 7. Figure 7 displays the averages of change in BMI by gender.

Table 7

Results of Independent Sample t-test for Change in BMI by Gender

				Male		Female	
Variable	*t*(1457)	*p*	Cohen's *d*	*M*	*SD*	*M*	*SD*
Change In BMI	0.40	.692	0.02	-0.46	6.77	-0.33	5.43

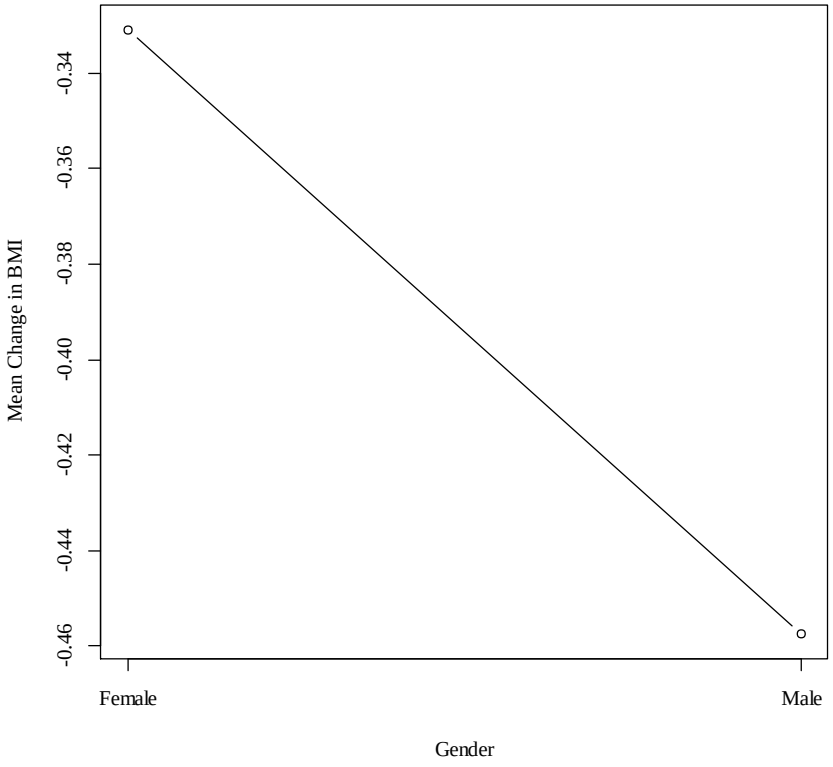

Figure 7. Change in BMI mean by gender

Research Question 3

RQ3: Is there a statistically significant difference in the CDC BMI percentile outcomes associated with the amount of time Hispanic youth aged 2 to 19 years spent in a culturally sensitive overweight or obesity intervention program. This hypothesis will be tested using linear regression analysis to adjust for possible effects of covariates?

$H_0$3: There is no statistically significant difference in the CDC BMI percentile outcomes associated with the amount of time Hispanic youth aged 2 to 19 years spent in a culturally sensitive overweight or obesity intervention program.

H_A3:.There is a statistically significant difference in the CDC BMI percentile outcomes associated with the amount of time Hispanic youth aged 2 to 19 years spent in a culturally sensitive overweight or obesity intervention program.

To examine this research question, a simple linear regression was conducted to assess if the amount of time spent in the intervention program predicts a change in BMI. The results of the linear regression were not significant, $B = 0.00$, $p = 0.188$, suggesting there was no difference in change in BMI by weeks. The results of the regression are summarized in table 8. Figure 8 shows the scatterplot between weeks and change in BMI.

Table 8

Results of Linear Regression for Change in BMI by Weeks

	B	*SE*	*t*	*p*
Weeks	0.00	0.00	1.32	0.188

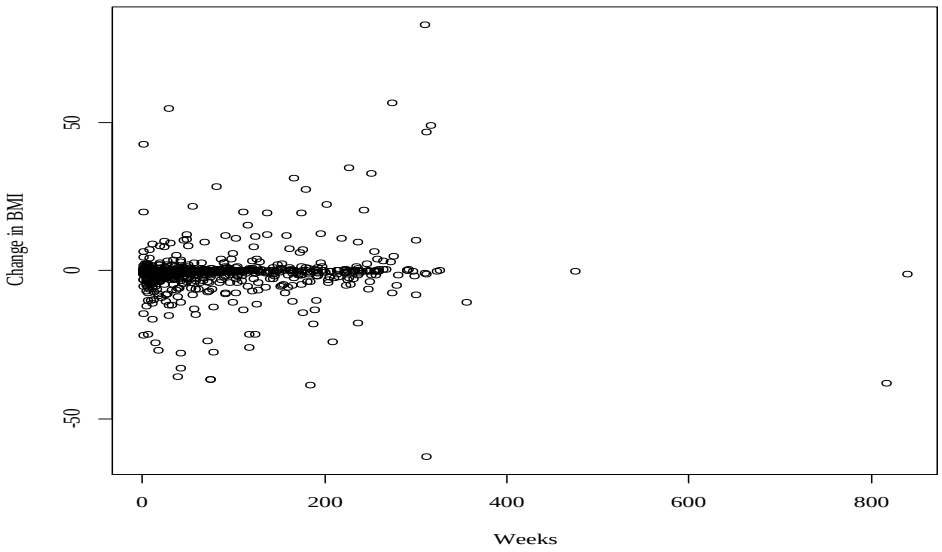

Figure 8. Matrix between weeks and change in BMI

Research Question 4

RQ4: Is there a statistically significant difference in the CDC BMI percentile outcomes associated with the season of program enrollment for Hispanic youth age 2 to 19 years in a culturally sensitive overweight or obesity intervention program? This hypothesis will be tested using ANOVA analysis to adjust for possible effects of covariates?

Ho4*:* There is no statistically significant difference in the CDC BMI percentile outcomes associated with the season of program enrollment for Hispanic youth age 2 to 19years in a culturally sensitive overweight or obesity intervention program.

HA4: There is a statistically significant difference in the CDC BMI percentile outcomes associated with the season of program enrollment for Hispanic youth

age 2 to 19 years in a culturally sensitive overweight or obesity intervention program.

To examine this research question, an analysis of variance using ANOVA was conducted to assess if there were differences in change in BMI percentiles by season. Because season was only measured in four distinct categories instead of a continuous variable, the use of multiple linear regression was not an appropriate analysis and thus the ANOVA was conducted instead. In preliminary analysis, the assumption of normality was assessed though use of a Shaprio-Wilk test. The results of the test were significant, $p < .001$, which violates the assumption. However, Howell (2010) suggest that the ANOVA is robust despite violations of normality in cases of large sample sizes (>50). The assumption of equality of variance was assessed with levene's test. Results of the test were not significant, $p = .5552$, indicating the assumption was met. The results of the ANOVA were not significant, $F(3, 1421) = 0.50$, $p = .679$, partial $\eta^2 = .00$, suggesting there was no difference in change in BMI percentile by season. Results of the ANOVA are presented in Table 9. Means and standard deviations are presented in Table 10. Figure 9 shows change in BMI percentile means by season.

Table 9

Results of ANOVA for Change in BMI Percentile by Season

Source	*SS*	*df*	*MS*	*F*	*p*	Partial η^2
Season	12.02	3	4.01	0.50	.679	.00
Error	11,275.80	1421	7.94			

Table 10

Means and Standard Deviations for Change in BMI Percentile by Season

Season	*M*	*SD*	*n*
Fall	-0.52	2.60	359
Spring	-0.42	2.93	355
Summer	-0.48	2.63	368
Winter	-0.28	3.09	343

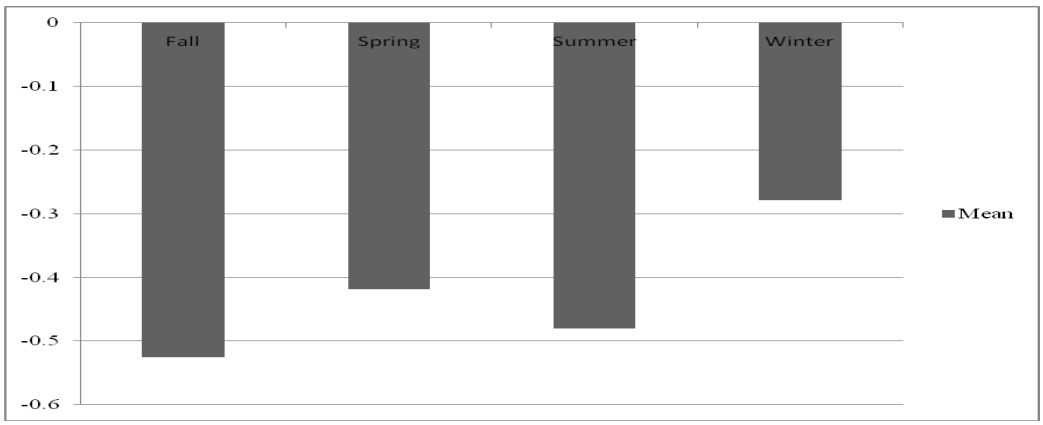

Figure 9. Change in BMI percentile mean by season

Research Question 5

RQ5: Is there a statistically significant difference in the CDC BMI percentile outcomes associated with the distance to the clinic for Hispanic youth age 2 to 19 years in a culturally sensitive overweight or obesity intervention program? This is measured by distance within Dade county Florida or outside. This hypothesis will be tested using an independent sample *t* test to adjust for possible effects of covariates?

Ho5: There is no statistically significant difference in the CDC BMI percentile outcomes associated with the distance to the clinic for Hispanic youth age 2 to19 years in a culturally sensitive overweight or obesity intervention program.

HA5: There is a statistically significant difference in the CDC BMI percentile outcomes associated with the distance to the clinic for Hispanic youth age 2 to 19 years in a culturally sensitive overweight or obesity intervention program.

To address research question 5, an independent sample *t*-test was conducted to assess if there were differences in change in BMI by location which was inside or outside of Dade County, FL. Prior to the analysis, the assumption of normality was assessed using a Shapiro-Wilk test. The result of the test was significant, $p < .001$, violating the assumption of normality. However, Howell (2010) suggested that the *t*-test is robust despite violations of normality. Additionally, the mean of any random variable will be approximately normally distributed as sample size increases according to C LT. Since the sample size is very large in this study, violations from normality should have little effect on the result. The assumption of equality of variance was assessed using Levene's test. The result of the test was significant, $p < ,001$, violating the assumption of equality of variance. The Welch t-statistic was used, which does not assume equality of variance (Howell, 2010).

The results of the independent sample *t*-test were not significant, $t\ (877) = 0.21$, $p = .822$, suggesting that there was not a difference in change in BMI by location. Results of the independent sample *t*-test are presented in Table 11 Figure 10 displays the averages of change in BMI by location.

Table 11

Independent Sample t-Test for Change in BMI by Location

				Inside		Outside	
Variable	*t*(887)	*p*	Cohen's *d*	*M*	*SD*	*M*	*SD*
ChangeInBMI	0.21	.822	0.01	-0.36	8.25	-0.43	3.72

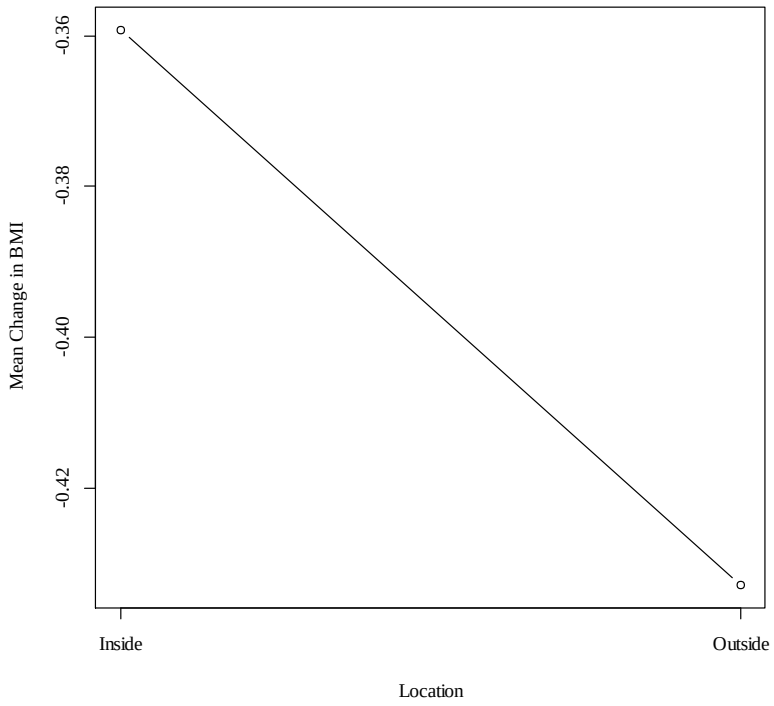

Figure 10. Change in BMI mean by location

Summary Statement

In this investigative quantitative study, I performed a retrospective analysis of medical record data supplied by PGA with the intention of examining associations of gender, youth age, distance to clinic, time in program, and season of enrollment impact on post BMI percentiles for overweight and obesity interventions that include culture

sensitivity. The results for the first hypothesis based on Tukey post hoc pairwise comparison revealed that there is a statistically significant higher difference in the CDC BMI percentile outcomes associated with Hispanic youth age 8 to12 years post a culturally sensitive overweight or obesity intervention program. The results satisfied the requirements when accounting for other variables suggesting there was a difference in change in BMI percentiles by age as confirmed by the assumption of homoscedasticity assessed with the residuals scatterplot .

The second hypothesis revealed that there is no statistically significant difference in the CDC BMI percentile outcomes associated with the gender for Hispanic youth aged 2 to 19 years post a culturally sensitive overweight or obesity intervention program, and did not satisfy the requirements when accounting for other variables. These results suggested that there was no difference in change in BMI percentile by gender. The third hypothesis results revealed that there is no statistically significant difference in the CDC BMI percentile outcomes associated with the amount of time in weeks that Hispanic youth aged 2 to 19 years spent in a culturally sensitive overweight or obesity intervention program and did not satisfy the requirements when accounting for other variables. The fourth hypothesis ANOVA results revealed that there is no statistically significant difference in the CDC BMI percentile outcomes associated with the season of program enrollment for Hispanic youth age 2to19 years in a culturally sensitive overweight or obesity intervention program and did not satisfy the requirements when accounting for other variables. The fifth hypothesis, based on an independent sample *t*-test revealed that there is no statistically significant difference in the CDC BMI percentile outcomes

associated with the distance to the clinic for Hispanic youth age 2 to 19 years in a culturally sensitive overweight or obesity intervention program did not satisfy the requirements when accounting for other variables. The results reveal no significant correlation between change in BMI percentile and location to the clinic.

In the chapter 5 of this dissertation I summarized key findings and compared the results with what I presented in the peer-reviewed literature described in chapter 2. Limitations of the study, recommendations for future research, and implications for social change are presented. The chapter concludes with applicable remarks to finalize this study.

In this chapter I will also provide prescriptive material presenting a synopsis interpretation of the study findings. The chapter also compared obtained results with previous research conclusions that were presented in the chapter 2 peer reviewed literature. Limitations of the study, recommendations for future research, implications for social change, and closing remarks conclude the chapter.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

The goal of this study was to examine and evaluate associations that may mitigate the impact of overweight and obesity intervention outcomes that included culture sensitivity. This study was chosen because it had the possibility of providing results that could extend to expand and develop future programs with health care partners and advocacy groups to reduce overweight and obesity in the Hispanic youth population. This could also influence overweight and obesity policies and modifications that promote positive social change for this targeted population.

The purpose of this study was to explore and compare the impact of gender, age group, distance to clinic, time in program, and season of enrollment for interventions that included culturally and ethnically focused attributes along with diet and exercise for the 2 to-19 year-old Hispanic youth population. The nature of this quantitative retrospective cohort study relates to healthy behavior change based on culturally and ethnically sensitive interventions for the 2 to 19 year old Hispanic youth population. This design supported gathering of retrospective data that provides statistical analysis allowing for comparison of the impact of the independent variables upon the dependent variable of BMI percentile change.

This retrospective research study was employed to analyze covariate factors and determine how they influenced the dependent variable. A review of key findings revealed that the majorities of the participants were 13 to 19 years of age and belonged to

the male gender category. The most frequent season of enrollment was summer. The average number of weeks of enrollment in the program was 43.94.

Interpretation of Findings

The goal of this chapter was to synthesize and discuss the results in light of the study's research questions, literature review, and conceptual framework. In addition, the statistical analysis using the regression model in this study and associated statistical analytical comparative processes that were conducted to assess group differences for each research question were examined. The various models that were employed in this study evaluated and assessed the change impact that the independent variables of age, gender, time in program, distance to clinic, and season of enrollment had on the dependent variable of BMI percentile outcomes.

Summary of this Study's Findings by Hypothesis

The first hypothesis of this study did satisfy the requirements when accounting for other variables suggesting there was a difference in change in BMI percentiles by age. The analysis of the ANOVA revealed differences in change in BMI by age that were significant for the group 8 to 12 compared to the other age categories. The second hypothesis did not satisfy the requirements when accounting for other variables. The results of the ANOVA for change in BMI suggest that there was no significant difference in change in BMI percentile by gender. The third hypothesis examining the time spent in a culturally sensitive overweight or obesity program did not satisfy the requirements when accounting for other variables. The fourth hypothesis also did not satisfy the requirements when accounting for other variables. The results of the ANOVA were not

significant for change in BMI percentile by season. Finally, the fifth hypothesis did not satisfy the requirements when accounting for other variables. The results reveal no significant correlation between change in BMI percentile and location to the clinic through use of *t*-testing analysis.

Comparison and Synthesis to other Research Studies

Bruss et al., (2010) conducted research on both genders who attended a cognitive behavioral community-based participatory lifestyle intervention program offered in the school setting. Intervention information was provided to one of the participation groups through randomization. The Bruss research best relates to addressing the results of Question 2 and 3 of this research study regarding gender as respects interventions that are culturally sensitive. The parents were present and required to complete a minimum of five lessons on how to promote lifestyle change. Bruss et al,'s research was conducted in a community school setting rather than in a clinic as this study research did and had only (n = 407) children who were 8 years old. The research conducted in this dissertation had an age group of 2to 19 and even though parents were in attendance at the clinic when the youth were provided the intervention they were not required to participate as parents needed to in the Bruss research focus. Bruss et al.'s research results are important when compared to this research study because they bring to light that perhaps along with providing culturally sensitive interventions a supportive aspect might be to actively involve parents as part of the weight reduction process. Therefore, the explanation for most of the participants' success in the Bruss study can be contributed to parental participation since research in this study did not reveal a change in BMI percentile by age

or gender. Addressing research Question 3, the Bruss et al. study was a 2 year program that did have success when compared to a much longer program time that this research had and therefore time may not be an important component if collaborative efforts are involved.

The research for this study could also potentially be contrasted to the community based research study conducted by Economos et al. (2012). They performed a school based study that was comprehensive in nature because it contained a collaborative effort. The researchers tested for results of collaborative efforts within the community-based intervention provided to children who attended public elementary schools Grades 1to 3. The results of the Economos et al, study are important because they indicate as the Bruss study did providing culturally sensitive interventions may be more effective with collaborative efforts. This is in contrast to how the research was conducted in this study since it has no parental focus and no collaborative efforts and therefore is one of the reasons that the results on a whole were not significant for all research questions.

The study conducted by Fitzgibbon et al. (2011) most closely resembles research conducted in this dissertation since obesity prevention interventions were teacher delivered in school and had no active parental participation or collaborative efforts. The outcomes in this study also did not reveal significant differences in BMI and BMI *z* scores, which is similar to my results for Questions 1and 2. However, it is important to note the Fitzgibbon study intervention was only provided over a 14 week period whereas this research intervention has no particular timeframe associated with it and rather focused on continuation of intervention until an appropriate BMI was reached.

Therefore, addressing Questions 3, 4, and 5 time in program, season of enrollment, and distance to clinic do not appear to make a significant difference in whether obesity interventions effective. This is important because it again supports that collaborative efforts are perhaps a more effective approach to weight reduction than those provided by a single source without parental involvement.

Research conducted by Golden and Earp (2012) entailed a review of 157 articles addressing health behaviors that focused on nutrition initiatives and intervention. This study also included collaborative efforts such as interpersonal, institutional, and community activities. Golden and Earp also employed SCT as a based concept to conduct the study which is also part of the conceptual framework used in this research study. Johnston, et al., (2010) examined the difference of intervention success using self-help versus collaborative efforts. Review of the outcomes for both research approaches reveal success was greater when interventions were provided by more than one source rather than what was examined in this research study where intervention is only provided by one source PGA.

Rush et al. (2011) investigated the strength of using what is referred to as energizers to enforce progress through use of a trained physical activity/nutrition change agent. This approach is similar to this research and does employ collaborative efforts along with ages of the youth being similar to this study. Results compared to this research study revealed that there was decrease in BMI for the 5 to 7 year olds however, for the 10 to 12 year olds there were no significant effects which is similar to the outcomes in this research study for Questions 1, 2, and 3.

Limitations of the Study

Limitations are an important issue to address since they can provide certain reservations, weaknesses, and qualifications that may discredit the study design and therefore, affect internal validity. A potential limitation involving this research stems from the study population centering on a target population of Hispanic male and female participants aged 2 to 19 years who obtained overweight and obesity interventions from one clinic located in the Miami, FL area. Therefore, this study contains a deficiency that involves degree of generalizability to acculturation and assimilation processes in various other areas of the United States. This creates weakness and biases because the general conclusions are limited to a specific targeted group and might not accurately represent his population as a whole.

The second consideration regarding limitations of this study surrounds internal validity that involves data collection. The retrospective data supplied to me for this study were acquired through archival data sources from PGA. A threat to the construct of this data validity could exist, if the personnel did not properly calibrate scales when weighing the participants.

Lastly, any errors conducted by the individual transcribing retrospective participant patient information from the electronic medical records could result in a limitation.

Recommendations

Within the last 2 decades overweight and obesity has been positively linked to

higher rates of secondary complications such as diabetes, heart disease, hypertension, respiratory disease, osteoarthritis, and various cancers associated with the Hispanic youth population. Diabetes is a leading cause of morbidity and mortality presently in the United States linked to overweight and obesity (Ochner, Tasai, Kushner, & Wadden, 2015). The significance of this study is that interventions involving decreasing the rates of overweight and obesity in the Hispanic youth population aim to play a significant role in decreasing the secondary complications associated with such. Other possible factors include psychosocial effects causing stigma associated with an individual being overweight or obese.

This study only demonstrated to show a significant change in BMI for culturally sensitive interventions with regard to gender. It did not provide a positive impact with regard to the other independent variables. However, it still emphasizes the main issues of importance regarding to how overweight and obesity in the Hispanic youth population can be effectively improved by private and public health practitioners. It furthers the research that has been conducted prior to this study and adds to information on how more effectively strategies could be put into place to counter the issues of overweight and obesity for this population. The other recommendation would be forming support groups based on other dietary weight loss programs where membership would be required at no cost. The membership idea would be strictly based on a supportive theory since adolescents are peer oriented in their actions. These actions would still target the overweight and obese Hispanic youth population by focusing on the effects and outcomes of morbidity and mortality in their early lifecycle. The other recommendation that is of

importance would be to approach school systems in cities that have a high Hispanic population such as Chicago and have public health offer program information that provides good nutrition education and counseling.

The first research recommendation is based on results of this research study. In examining study results, found that many individuals only attended the initial referral overweight and obesity clinical appointment. Further research based on the concept of continuous care may provide insight into why individuals do not continue participating in an overweight or obesity intervention program. The concept of continuous care provides an individualized follow up conducted through a phone call 1 week after the initial counseling visit to the clinic to encourage participants to continue their participation in the plan and follow- up visits. The phone call should address any concerns the patient might have with his or her plan of action to decrease weight. This type of study would provide additional information as to why patients who make the effort to seek overweight and obesity counseling supported by their primary physician do not follow through after their initial visit to obtain overweight and obesity interventions.

Another recommended approach for further study would be to investigate if along with receiving intervention from the referral overweight and obesity physician whether results increase if more individualized counseling was provided by a dietitian. Further research based on collaborative efforts could investigate whether individualized counseling provided by a dietitian in addition to the overweight and obesity interventions conducted by the referral physician would increase significant BMI change results. It is also recommended that future studies concentrate on efforts conducted by school systems

to provide more education to increase nutrition and physical activity in addition to diet interventions. More research must be conducted into the behavioral analysis to investigate whether various interventions that include cultural aspects are effective in long term weight management in the Hispanic population which supports research involved in this study.

Implications

Social change involves a focus on real-world applications to accomplish transformation that ends with an approach toward positive social change implications. Social change should be interdisciplinary and can affect various parties such as individuals, families, communities, and organizations. In this research, I evaluated a clinical approach that included cultural sensitivity interventions toward reducing the rate of overweight and obesity that continues to rise in the Hispanic youth population. It is important to examine all efforts conducted toward decreasing these rates since the Hispanic population is the fastest growing population in the United States. The 2 to 19 year-old group represents 28% of the 52 million Hispanics in the United States (DHHS, 2012). This becomes a critical issue, especially since the Hispanic population is projected to increase to twice its size by 2050 (USDC, 2012). Efforts to decrease the prevalence of overweight and obesity in this population must continue to explore all potential approaches toward decreasing risk factors that involve such. The implications for positive social change include a better understanding of how interventions aimed at the Hispanic youth population can be geared toward healthy approaches to achieve weight loss and changing habits acquired through the processes of acculturation and

assimilation. The long-term consequences of overweight and obesity are coupled to increased rates of high blood pressure and high cholesterol that contribute to higher risk of heart disease, arthritis, and poor status of general health. Interventions aimed at goals of social change through examination of present attitudes of lifestyle habits in the Hispanic youth population could provide great insight into factors that decrease the prevalence rates of overweight and obesity in this population; which in turn will decrease the associated rates of diabetes. This research has the potential to contribute to social change since it reveals that interventions tailored for the 8-12 age group may significantly improve the effectiveness of the program in reducing BMI percentile, thus decreasing obesity rates and associated disease along with morbidity and mortality. The positive social change implications also includes knowledge that can be useful for educators, psychologists, community collaborative efforts, and other researchers who are involved exploring ways to improve the health of this population. Lastly, this could also influence overweight and obesity policies and modifications that promote positive social change.

Conclusion

In reviewing all of the literature in Chapter 2 and the results of this research it becomes very apparent that interventions can inspire behavioral change to be effective. A better understanding of how culture influences dietary habits during childhood may provide an opportunity to increase the use of culturally sensitive interventions and therefore decrease the risk of overweight and obesity. This retrospective study provides evidence that potential exists for behavioral change with regard to overweight and obesity in populations. However, such programs need to be managed and monitored very closely

so the process can promote progress over time especially, when youth populations are involved (Day, Shickle, & Smith, 2012). The continued efforts and research regarding decreasing overweight and obesity with regard to this youth population is very important since their prevalence continues to rise. The continued prevalence when coupled to the rates of diabetes provide a heighten concern regarding the rates of morbidity and mortality associated with this population.

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Appendix A: Human Research Participants

Certificate of Completion

The National Institutes of Health (NIH) Office of Extramural Research certifies that **Elizabeth Hartman** successfully completed the NIH Web-based training course "Protecting Human Research Participants".

Date of completion: 01/15/2015

Certification Number: 1649936