Latinos with Diabetes: How do Social, Psychological, and Cultural Factors Affect Health Outcomes?

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Abstract

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Diabetes has become one of the most common, costly, and preventable health problems diagnosed among all Americans (Centers for Disease Control [CDC], 2015a). Twenty-nine million individuals (9.3% of the population) have diabetes; this figure includes both diagnosed and undiagnosed diabetes cases (American Diabetes Association, 2014a,b). Diabetes is highly prevalent among Latinos in the United States; it is the fifth leading cause of death among this population (National Center for Health Statistics, 2011a). Yet, most people with diabetes do not die from diabetes per se; most people with diabetes die from cardiovascular disease. Given the large number of Latinos in the United States (i.e., 56.6 million) (United States Census Bureau, 2016), and the shift in migration patterns of Latinos to places other than the south (Krogstad, Passel, & Cohn, 2016), social workers will need to provide culturally competent services to heterogeneous Latino subgroups whose health beliefs, values, and practices may be different from their own.

The purpose of this study is to assess how socioeconomic, psychological, and cultural factors affect cardiovascular disease risk among Latinos with diabetes. The present study was guided by the following questions: what are the experiences of Latinos in accessing and utilizing health services and treatment?; how do Latino subgroups' experiences with diabetes complications differ when considering biological, psychological and cultural factors?; what are

the risk and protective factors that reduce or increase access to health care for people with diabetes?; and what are the risk and protective factors that reduce or increase the risk of cardiovascular disease risk for people with diabetes?.

The following theory, health behavior model, and frame work of preventive strategies were used to identify psychosocial factors that protect or increase Latinos' risk to diabetes and cardiovascular disease: the Ecological Systems Theory, Andersen's Health Behavior Model of Health Service Use, and Haddon and Baker's framework of preventative strategies. A cross-sectional design, utilizing data from the 2014 *Integrative Health Interview Series* (IHIS), was used (Minnesota Population Center and State Health Access Data Assistance Center, 2015). There were 24,909 individuals who have self-identified as Latinos in the 2014 IHIS data set; however, only participants who self-identified as an individual with diabetes were selected from the data set.

Aspects that are considered important in accessing health care include: having a usual source of care; not having a delay in care; being able to afford health care services and medications; not being worried about affording medication and health bills; being able to find health care provider and services; and having and being able to afford health insurance coverage (Office of Disease Prevention and Health Promotion, 2014; U.S. Department of Health & Human Services, Agency for Healthcare Research and Quality, Rodriguez, 2011). Most participants in this study had a usual source of care and were covered by health insurance; thus, very few experienced delay in accessing health care services, nor were they worried about affording medication and health bills. Differences were found when Latinos were compared on numerous psychosocial factors (i.e., education, psychological distress, access to health care, physical activity, body mass index, self-rated health, internet based health literacy, and cardiovascular disease risk) based on citizenship status, length of residence, language of interview, and Latino background. Furthermore, five salient factors were identified as direct factors associated with cardiovascular disease risk among Latinos with diabetes: age, sex, psychological distress, physical activity, and acculturation.

Furman, Negi, Iwamoto, Rowan, Shukraft, and Gragg (2009) provide a review of issues that social workers working with Latinos should be aware of, and recommend that social workers keep up with the current Latino literature. Findings from this study provided numerous implications and recommendations with a concentration on research, policy, and practice. In terms of research, there appears to be a serious need to a) advocate for the increased representation of Latinos from diverse countries of origin; b) the need of improved measures of acculturation; c) the need to assess the Latino health paradox for each Latino subgroups; d) standardization of data collected on Latino population; and e) propose that data on genetic and racial differences be included in epidemiological studies (Rodriguez et al., 2014). As for policy, the researcher identified policies that directly and indirectly affect Latinos access to health care, and provided recommendations to improve Latinos' access to health and mental health care. In regards to practice, the results suggest that social workers and related providers in health care settings should take into consideration a beneficial recommendation by Rodriguez el al. (2014) encouraging initiatives that: a) increase access to health care and offer assistance to help with the financial burden of attributed to diabetes and cardiovascular disease treatment; b) encourage diabetes and cardiovascular disease risk knowledge; and c) promote health behaviors that reduce the risk of diabetes and cardiovascular disease risk.

Chapter 1

Introduction to Diabetes Mellitus

Diabetes mellitus was once a disease considered not to pose a significant threat; on the contrary, over time it has become a worldwide epidemic in the 21st century (Johnson et al., 2007; World Health Organization [WHO], 2011; Zimmet, Alberti, & Shaw, 2001). From this point forward, diabetes mellitus will be referred to as diabetes. The consequences of this disease are expected to bring forth a monumental burden on the world, as well as the United States. The U.S. National Library of Medicine (2014a) states that diabetes is a chronic disease in which blood glucose (a type of sugar) levels are high, and it is categorized into three major types: Type 1[1], Type 2[2], and gestational diabetes[3] (National Institute of Diabetes and Digestive and Kidney Diseases, 2014a). However, 90 to 95% of individuals are afflicted with diabetes have Type 2 (National Diabetes Information Clearinghouse [NDIC], 2012). According to the WHO (n.d.), as diabetes cases steadily increase worldwide; in the next twenty-five years, diabetes will be a significant contributor of disability and death. This epidemic of diabetes can have severe adverse indirect and direct consequences. If left untreated or poorly managed, people with diabetes can experience severe health complications (e.g., heart disease, eye complications, kidney disease, nerve damage, foot problems, skin problems, and dental disease). Health complications may lead to an increased use of medical resources, which consequently results in an increase in medical expenditures to treat a preventable and costly chronic illness (American Diabetes Association,

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[1] Type 1 diabetes: referred to as juvenile onset diabetes; the body produces little or no insulin (U.S. National Library of Medicine, 2011).

[2] Type 2 diabetes: the body does not produce enough insulin or it does not accept the insulin produced (U.S. National Library of Medicine, 2011).

[3] Gestational Diabetes Mellitus (GDM): may occur in women who have no previous history of diabetes and suddenly develop high blood glucose levels during pregnancy (U.S. National Library of Medicine, 2011).

2013a). Diabetes also has an indirect effect on society; it negatively impacts labor supply and productivity, which ultimately will adversely affect economic growth (American Diabetes Association, 2013a).

Diabetes in the United States

Twenty-nine million individuals (9.3% of the population) have diabetes; including both diagnosed and undiagnosed diabetes cases (American Diabetes Association, 2014a,b). The number of individuals with diabetes in the United States is underestimated since there are at least 7 million individuals with diabetes who are undiagnosed (National Diabetes Information Clearing House [NDIC], 2011). When compared to other developed countries, the United States has one of the highest number of diabetes cases among developed countries (International Diabetes Federation [IDF], 2015), the IDF compared the top 10 countries/territories with the highest number of people with diabetes, the United States ranks number three with 29.3, behind China and India (109.6 and 69.2 million respectively) (IDF, 2015). In this list, the only developed countries listed are United States and Japan, yet the number of diabetes cases for the United States is a little more than four times that of Japan (7.2 million) (IDF, 2015).

Diabetes has become one of the most common, costly, and preventable health problems diagnosed among all Americans (Centers for Disease Control [CDC], 2015a). Diabetes is the seventh leading cause of death (CDC, 2015a), accounting for 75,578 deaths in 2013 (CDC, 2016). Among the top 10 leading causes of death, diabetes is one of four chronic illnesses listed (i.e., heart disease, cancer, and stroke) (CDC, 2015a). Even though diabetes ranks lower than the previously mentioned chronic conditions in terms of the number of deaths, having diabetes increases a person’s risk of dying from the leading cause of death in America (65% of individuals with diabetes die from heart disease and stroke) (National Diabetes Education Program, 2007).

Results from the 2007-2009 National Health Interview Survey, indicate that the total amount of expenditures as a result of diabetes in the United States was $174 billion, which includes both direct and indirect costs. This was 2.3 times higher for individuals with diabetes in comparison to individuals without diabetes (NDIC, 2011). As for indirect cost (e.g., disability, loss of employment, and premature mortality), $59 billion dollars were spent (NDIC, 2011). However, a more current estimate by the American Diabetes Association (2014b), in 2012 the summation of the direct and indirect cost attributed to diabetes in the United States was quoted at $245 billion dollars. According to the American Diabetes Association (2014b) in 2012, $69 billion dollars were spent on reduced productivity while $ 176 billion dollars were spent on direct medical costs in the United States. After adjusting for demographics, this continues to be 2.3 times higher for people with diabetes than those without.

However, the greatest consequences are experienced by individuals and family members who have to personally and financially take responsibility for the financial burden of this preventable chronic illness. In 2007, the American Diabetes Association (ADA) estimated that each year individuals with diabetes spend $11,744 on health care, which is two times the amount people without diabetes spend (American Diabetes Association, 2008). This cost differential, especially ethnic groups with many members who are economically disadvantaged and often uninsured, may compromise treatment access, quality and adherence (Duru et al., 2006). Latinos are such an ethnic minority group that has experienced higher than average rates of diabetes.

Importance of Studying Diabetes Among Latinos

Disproportionate Prevalence of Diabetes Among Latinos. Addressing diabetes among Latinos is important because of the high prevalence of Latinos diagnosed with Type 2 diabetes. In the United States, diabetes is the fifth leading cause of death among this population (National Center for Health Statistics, 2011a). Approximately 3.2 million Latinos (13.2% of the Latino population) 18 years of age or older have diabetes (The Office of Minority Health, 2011). However, it is important to note that Latinos are not a homogeneous group, and therefore the rate of diabetes is different among Latino subgroups. The national rate per 100 of diagnosed diabetes among Latinos for 2014 is as follows: all Hispanics 8.7, Puerto Rican 8.0, Mexican/Mexican American 9.7, and Cubans 5.4 (Centers for Disease Control, 2015b). These are the groups most often referenced in the literature; yet, ninety-two percent of the Latino origin groups residing in the United States are represented by 9 Latin American countries and 1 U.S. territory (i.e., Colombia, Cuba, Dominican Republic, Ecuador, Guatemala, Honduras, Mexico, Peru, Puerto Rico, El Salvador) (Motel & Patten, 2012).

Growth of the Latino Population. As previously mentioned, diabetes is highly prevalent among Latinos, with 8.7% rate of diagnosis (Centers for Disease Control, 2015b) in the United States. For the purpose of this dissertation, Latinos refers to those who are "residing in the U.S. whose nationality group, or the country in which the person or the person's parents or ancestors were born, is a Latin American country in the Western Hemisphere" (Hayes-Bautista & Chapa, 1987, p. 66). The term Latino and Hispanic will be used interchangeably. Latinos are the fastest growing racial and ethnic group in the United States, with 50.5 million Latinos in the United States (U.S. Census Bureau, 2011). It is estimated that by 2050, Latinos will comprise 30 percent of the entire U.S. population (U.S. Census Bureau, 2008). The demographic composition of the United

States has changed dramatically in the last 50 years, from 75% of foreign-born in the United States from Europe in 1960, to 80% of foreign-born coming from Latin America in 2009, currently Latinos alone comprised 53.1% of foreign-born residing in the United States (U.S. Census Bureau, 2009). "The projected growth of Hispanics in the U.S. combined with the uneven rate with which they suffer from diabetes, is set to dramatically increase the number of Hispanics with the disease" (National Alliance for Hispanic Health, 2010, p.1).

As a group, Latinos are disproportionately diagnosed with diabetes, are more likely to require treatment for end-stage renal disease, and are more likely to die from diabetes (The Office of Minority Health, 2011). Furthermore, risk factors for Type 2 diabetes are more common among Latinos and contribute to this disparity. To be more specific, Latinos experience disproportionate rates of: obesity, lower levels of physical activity, higher cholesterol levels, poorer eating habits, gestational diabetes, and a family history of diabetes (National Alliance for Hispanic Health, 2010). Being aware of and addressing the disproportionate prevalence of diabetes among Latinos is more important than ever, in order to: alleviate the suffering Latinos experience as a result of the disease, reduce the costs diabetes management afflicting the health care system, and by extension, ensure the United States is able to sustain a healthy long-term economy. The subsequent sections will discuss important reasons for directing attention specifically towards diabetes among Latinos.

Significance to Social Work

At first glance it may seem as if the topic selected for this dissertation (i.e., Latinos with diabetes) may be better suited for the discipline of public health. However, this changes once the concepts of health care disparity, social justice, and health inequity are connected to the population selected: Latinos who identify themselves as having diabetes. These are social issues that are not directly listed, but that are unequivocally appropriately addressed given the values and ethical standards set forth by National Association of Social Workers. Furthermore, one of the values written in the NASW (2008) Code of Ethics is social justice in which, the profession encourages practices that promote social justice. The NASW (2008) Code of Ethics provides guidelines that ensure clients receive culturally sensitive information and services with the aim of providing equal opportunity to all vulnerable populations.

This dissertation is focused on providing an understanding of the disproportionate prevalence of diabetes among Latinos, with consideration given to cultural beliefs and practices of this ethnic group. The health disparities faced by Latinos has been well documented (e.g., Mitrani, 2009; Perez-Escamilla, 2011). Health disparities are defined by the National Institute of Health (2010) as “differences in the incidence, prevalence, mortality, and burden of diseases and other adverse health conditions that exit among specific population groups in the United States” (para.1). Being diagnosed with this burdensome disease is further complicated by the challenges Latinos face in accessing health services.

Latinos’ are a vulnerable population in need of research that looks at their unique situation. Consideration of their culture should be given when addressing research questions about perception of heath, health beliefs and practices, and how to better improve their health. Furthermore, cultural sensitivity should be used when creating strategies to prevent this disease and addressing the consequences related to this disease. With that being said, one of the ethical guidelines for social workers is competency; more specifically, it focuses on cultural competence and social diversity. The NASW Code of Ethics asks social workers to: recognize the importance of culture not only for the individual but also for society, as well as being able to assess strength within each culture (NASW, 2008). With Latinos making up the largest minority groups in the

United States (Motel & Patten, 2012), it is important that professionals and academics understand the heterogeneity of Latino subgroups. As a profession, social work needs to take into consideration and understand Latino cultures, but they should also use it and derive strength from it for their clients (NASW, 2008).

Given the large number of Latinos in the United States (i.e., 56.6 million) (United States Census Bureau, 2016), and the shift in migration patterns of Latinos to places other than the south (Krogstad, Passel, Cohn, 2016), social workers who worked in states where Latino immigrants were previously not present will be responsible for providing culturally competent services to heterogeneous Latino subgroups whose health beliefs, values, and practices may be different from their own. Furman, Negi, Iwamoto, Rowan, Shukraft, and Gragg (2009) provide a review of areas that social workers working with Latinos should be aware of, and recommend that social workers keep up with the current Latino literature.

Social workers play an important role in health care settings (e.g., public and private hospitals, community health centers, specialty clinics) (Berg-Weger, 2010), as well as other settings (e.g., policy think tanks) that indirectly affect Latinos' access to health care and treatment. Thus, social workers play a vital role in both at the micro and macro levels (Browne, 2006). In terms of direct practice, social workers should create culturally sensitive treatment plans that take into consideration Latinos' health beliefs, practices, and address barriers encountered in accessing health care services and medications as mentioned by Livingston, Minushkin, and Cohn (2008). Diabetes is a complex disease that requires challenging treatment regiments to ensure normal glucose levels; making matters even more burdensome, Latinos are faced with socioeconomic difficulties (e.g., low income levels, low education levels, high levels of poverty) that prevent them from receiving appropriate services and treatments. According

Browne (2006) social workers are responsible for finding resources that guarantee clients are able to receive and understand important health information, reduce barriers that make it difficult to access and utilize healthcare services, and ensure they have access to medications (e.g., health coverage, prescription coverage, transportation).

Latinos are a population burdened by the difficulties mentioned by Brown; however, there are other challenges that social workers who come into contact with Latinos must be aware of. Diabetes treatment is complex: patients must monitor their food consumption; engage in physical activity; monitor blood sugar; be aware of high blood sugar (hyperglycemia) and low blood sugar (hypoglycemia); take diabetes medications; and some may need insulin (Mayo Clinic, 2016). Social workers in health care settings treating diabetes should be aware of current treatment options, practices, and local resources (Ciporen, 2012). Furthermore, Ciporen (2012) writes that social workers are in a unique position given that social workers may also have to address psychological factors associated with diabetes. Social workers should also address cultural factors that may ameliorate the burden of being diagnosed with diabetes (e.g., familismo).

Furthermore, it is important to take a biopsychosocial approach to assessing an individual; this will unearth the unique challenges Latinos with diabetes face (e.g., language proficiency, health literacy, migration and immigration concerns). Social workers should actively engage in addressing barriers that increase health disparities for Latinos and limit Latinos' access to health care services. Some barriers to health care need to be addressed from a macro level (e.g., health insurance coverage). For example, social workers should be aware of policies that affect Latinos' access to health care (e.g., Affordable Care Act [ACA], Personal Responsibility Work Opportunity Act [PRWORA]). A portion of Latinos (e.g., undocumented and recent immigrants) are often hurt by policies like the ACA and the PRWORA, which exclude subgroups entirely or includes restrictions that make it difficult for these subgroups to access health care. Therefore, it is the responsibility of social workers to advocate for the needs of Latinos.

Purpose Statement

The purpose of this study is to assess how socioeconomic, psychological, and cultural factors affect health outcomes of Latinos with diabetes. Given that there is a lack of theoretical framework to understand health practices and outcomes among Latinos with diabetes, objectives were created using a complementary framework that stemmed from an Ecological Systems Perspective, Andersen's Health Behavior Model of Health Service Use, and Haddon's and Baker's (1981) framework of preventive strategies to meet the purpose of this dissertation.

Objective 1. To describe the health care practices of Latinos with diabetes when it comes to:

a. Access to Health Care Services
b. Utilization of Health Care Services
c. Access and Use of Medications
d. Access and Utilization of Private and Public Health Insurance Programs

Objective 2. To describe and compare subgroups (e.g., ethnicities, place of birth [U.S. vs. non-U.S.], number of years in the U.S, language of interview) on the following variables: Social Economic Position, Access to Health Care, Psychological Distress, Physical Activity, Acculturation, Risk of Heart Disease, and Body Mass Index. This objective answers the question: how do Latino subgroups experiences with diabetes complications differ when considering biological, psychological and cultural factors? Statistical tests were selected with the help of information from the Institute for Digital Research and Education (2016a).

Objective 3. To test a hypothesized model of pathways concerning cognitive, socioeconomic, cultural health behavior, using Structural Equation Modeling (SEM), which explain healthcare utilization and health outcomes amongst Latinos in the United States that self-identify as having diabetes. The questions answered by this objective are: What are the risk and protective factors that reduce or increase the risk of heart disease for Latinos with diabetes? What are the risk and protective factors that reduce or increase access to health care for Latinos with diabetes? and what are the risk and protective factors that reduce or increase the risk of cardiovascular disease risk for people with diabetes?.

Definition of Important Terms

The following definitions have been defined to avoid misinterpretation of the objectives at hand.

Acculturation. Redfield, Linton, and Herskovits (1936) state "acculturation comprehends those phenomena which result when groups of individuals having different cultures come into continuous first-hand contact, with subsequent changes in the original culture patterns of either or both groups…" (p. 149-150).

Body Mass Index (BMI). A mathematical formula to assess body weight relative to height. The measure correlates highly with body fat. It is calculated as weight in kilograms divided by the square of height in meters (kg/m2) (Centers for Disease Control, 2015c).

Cardio Vascular Disease. "Cardiovascular disease generally refers to conditions that involve narrowed or blocked blood vessels that can lead to a heart attack, chest pain (angina) or stroke. Other heart conditions, such as those that affect your heart's muscle, valves or rhythm, also are considered forms of heart disease." (Mayo Clinic, 2014a, para. 1).

Heart Disease. "Heart disease describes a range of conditions that affect your heart.

Diseases under the heart disease umbrella include blood vessel diseases, such as coronary artery disease; heart rhythm problems (arrhythmias); and heart defects you're born with (congenital heart defects), among others. The term "heart disease" is often used interchangeably with the term "cardiovascular disease" (Mayo Clinic, 2014a, para. 1).

Insulin. “Insulin is a peptide hormone secreted by the β cells of the pancreatic islets of Langerhans and maintains normal blood glucose levels by facilitating cellular glucose uptake, regulating carbohydrate, lipid and protein metabolism and promoting cell division and growth through its mitogenic effects.” (Wilcox, 2005, p.19)

Hispanics or Latinos. Hispanics or Latinos “residing in the U.S. whose nationality group, or the country in which the person or the person’s parents or ancestors were born, is a Latin American country in the Western Hemisphere” (Hayes-Bautista & Chapa, 1987, p. 66).

Non-U.S. Born Latino. U.S. born Latinos will be defined as those meeting the definition of the U.S. Census Bureau, and who were born outside of the U.S. territory.

Physical activity. “Any bodily movement produced by the contraction of skeletal muscle that increases energy expenditure above a basal level. In these Guidelines, physical activity generally refers to the subset of physical activity that enhances health” (Centers for Disease Control, 2015d, para. 10).

U.S. Born Latino. U.S. born Latinos will be defined as those meeting the definition of the U.S. Census Bureau, and who were born inside a U.S. territory.

CHAPTER 2

Literature Review

Holistic Explanation of Latinos' Susceptibility to Type 1 and Type 2 Diabetes

As mentioned in the previous chapter, diabetes mellitus, also known as diabetes, is a set of diseases that are "characterized by chronic hyperglycemia with disturbances of carbohydrate, fat, and protein metabolism resulting from defects in insulin section, insulin action, or both" (Bennett & Knowler, 2005, p. 331). This dissertation will attempt to identify and integrate the factors that contribute to or explain the high incidence of diabetes among Latinos. Amongst adults, 90 to 95% of diabetes cases diagnosed in the United States are Type 2 diabetes (Centers for Disease Control, 2014a); given this fact, it is most likely that the findings of this dissertation will be more applicable to Type 2 diabetes. The original intention was to only focus on Type 2 diabetes because it is most commonly diagnosed among Latinos; however, since the data set utilized for this dissertation (see Chapter 4) does not make a distinction between the two types of diabetes, both will be explained and differences will be outlined.

The literature review will first provide an overview about diabetes; it will provide background information about Type 1 and Type 2 diabetes, it will discuss how diabetes is diagnosed for each type, and it will discuss the management and treatment for both Type 1 and Type 2 diabetes. Furthermore, this literature review will also discuss socioeconomic, psychological, and cultural factors associated with health outcomes of Latinos with diabetes. That is, subsequent sections of this literature review will focus on selected risk factors (i.e., acculturation, sleep disturbances, access to care, depression, socioeconomic status, and poor eating habits, access to health care) that have been identified in the literature as important factors associated with protecting against or increasing the risk of worse health outcomes for people with diabetes Latinos. This literature review will also highlight the connection between diabetes and cardio vascular disease, since it is one of the worst health outcomes that can ultimately leads to death.

Type 1 Diabetes

Type 1 diabetes is defined by the Mayo Clinic (2014b, para.1) as "…a chronic condition in which the pancreas produces little or no insulin, a hormone needed to allow sugar (glucose) to enter cells to produce energy." There is no known cause for Type 1 diabetes (U.S. National Library of Medicine, 2015a); however, known risk factors include: family history, genetics, geographic location, and age (Mayo Clinic, 2014c). In terms of family history, an individual's risk of developing Type 1 diabetes increases if a parent or sibling has this condition (Mayo Clinic, 2014c); however, this poses a small risk. In the United States, it is estimated that there are 10 to 20 cases of Type 1 diabetes per 100,000 individuals (U.S. National Library of Medicine, 2013).

The risk of developing Type 1 diabetes is elevated if you are a monozygotic twin. Numerous studies have utilized monozygotic and dizygotic twins to understand the role of genetics in Type 1 diabetes (e.g., Tattersall & Pyke, 1972; Hyttinen, Kaprio, Kinnunen, Koskenvuo, & Tuomilehto, 2003; Metcalfe, Hitman, Rowe, Hawa, Huang, Stewart, & Leslie, 2001; Redondo, Rewers, Yu, Garg, Pilcher, Elliott, & Eisenbarth, 1999; Redondo, Yu, Mackenzie, Pyke, Eisenbarth, Leslie, 2001; Sneider, Sawtell, Ross, Walker, Spector, & Leslie, 2001). Studies have also focused on the concordance and discordance rates among monozygotic and dizygotic twins (e.g., Olmos et al., 1988; Kyvik, Green, & Beck-Nielsen, 1995). In comparison to dizygotic twins, monozygotic twins have an elevated risk of developing Type 1 diabetes, with a concordance rate (both twins have the same trait) estimated between 30% to 50% (vs. 6 to 10% for dizygotic twins) (Atkinson, 2012).

Furthermore, geographic location also plays a role in the risk of developing Type 1 diabetes; countries that are geographically positioned away from the equator have a higher incidence of Type 1 diabetes (Mayo Clinic, 2014c). “People living in Finland and Sardinia have the highest incidence of Type 1 diabetes — about two to three times higher than rates in the United States and 400 times the incidence among people living in Venezuela” (Mayo Clinic, 2014b, para. 1).

Genetic Predisposition to Type 1 Diabetes. Research continues to unearth possible genes and environmental risks that attribute to the onset of Type 1 diabetes. However, genetics are only one contributing factor responsible for the cause of Type 1 diabetes. Atkinson (2012) stresses that there is no one gene that is solely responsible or has the ability to predict this disease. Dean and McEntyre (2004) write that the onset of Type 1 diabetes may be a result of inherited risk and environmental factors; furthermore, researchers also write that there are18 regions of the genome that have been attributed to the risk of Type 1 diabetes. These regions have been labeled IDDM to IDDM18; numerous genes are located within each region (Dean and McEntyre, 2004). Of these regions, the most researched region is IDDM1; this region contains HLA genes[4].

The risk of developing an autoimmune disorder has been attributed to alleles of HLA; however, in the case of Type 1 diabetes, HLA alleles genes in the body may result in three possible

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[4] HLA Genes- The HLA gene family provides instructions for making a group of related proteins known as the human leukocyte antigen (HLA) complex. The HLA complex helps the immune system distinguish the body's own proteins from proteins made by foreign invaders such as viruses and bacteria. (U.S. National Library of Medicine, 2009, para. 1)

outcomes: it can server as a protective factor; it can increase the risk of Type 1 diabetes; or it can have no effect (Dean and McEntyre, 2004). Variations in HLA are considered a risk factor for Type 1 diabetes; yet, other genes are involved and variations in HLA alone are not responsible for the onset of this autoimmune disease (Dean and McEntyre, 2004).

Environmental Factors Associated with Type 1 Diabetes. Environmental factors also play a role in elevating the risk of developing Type 1 diabetes. However, research identifying environmental factors associated with triggering Type1 diabetes is in its early stages. There are numerous arguments made for the importance of focusing on environmental triggers; this is especially true given that genetics only accounts for part of the susceptibility for developing Type 1 diabetes. As previously stated, the concordance rate for Type 1 diabetes amongst monozygotic twins only ranges from 30 to 50% (Atkinson, 2012). Furthermore, Type 1 diabetes is more common amongst Caucasians; but the rates based on geographic location are striking, with an annual rate of 63 per 100,000 in Finland where the highest numbers of cases are found (Mayo Clinic, 2014c). Other research of environmental factors increasing the risk of Type 1 diabetes points to cow's milk. Exposing a child to cow's milk too early may result in overt Type 1 diabetes (Mayo Clinic, 2014c).

Treatment of Type 1 Diabetes. The disease process which leads to overt Type 1 diabetes presents itself prior to the age of three, the duration of this process ranges from a couple of months to 20 years; however, the average duration of the "asymptomatic preclinical period" ranges between 2.5 to 3 years (Knip & Simell, 2012, p. 2). Once individuals are diagnosed with Type 1 diabetes a series events transpire in order to stabilize the patient and help them create a treatment plan that will allow them to manage their diabetes. Cooppan (2005) writes that the goals of diabetes treatment for patients are to eliminate symptoms resulting from hyperglycemia and to bring glucose levels as close as possible to recommended normal values.

Most individuals with Type 1 diabetes will require insulin therapy and other medications (Mayo Clinic, 2014d). Individuals will also have to follow a healthy diet, invest time in physical activities, and controlling their blood pressure and cholesterol. (Mayo Clinic, 2014d). There are several types of insulin: short lasting, rapid-lasting insulin, long-acting insulin, and other intermediate options (Joslin Diabetes Center, 2016). Insulin is described utilizing three characteristics: onset[5], peak[6], and duration[7] (Joslin Diabetes Center, 2016). The goal is to normalize glucose levels to 80 to 130 mg/dl during fasting, and no higher than 180 mg/dl two hours after eating (American Diabetes Association, 2015a). People with Type 1 also have to form healthy eating habits. They have to eat foods that are nutritious, low fat, and high in fiber such as: fruits, vegetables, and whole grains, and avoid refined carbohydrates and sweet (Mayo Clinic, 2014d).

Type 2 Diabetes

Unlike patients with Type 1 diabetes, the pancreas does produce insulin, but it has no effect on cells and tissue. The pancreas compensates by producing more insulin but it is unable to continue to work at this momentum and glucose levels start to spike (U.S. National Library of Medicine, 2014b). There are a number of symptoms associated with Type 2 diabetes; individuals may complain that they feel tiered, that they are constantly thirsty, or that they have the urge to urinate. Individuals may also complain of feeling dizzy or nauseous, and in the most severe cases, they may lose consciousness and enter into a diabetic coma (National Library of Medicine,

[5] "Length of time before insulin reaches bloodstream" (Joslin Diabetes Center, 2016, para.2)
[6] "Time period when insulin is most effective" (Joslin Diabetes Center, 2016, para.2)
[7] "How long insulin works for" (Joslin Diabetes Center, 2016, para.2)

2014b). The risk of developing Type 2 diabetes includes both inherent risk factors and environmental risk factors. Factors most often listed include: being overweight, not getting enough exercise, having a diet that is low in fiber and high in fat and sugar, taking medication that interferes with the body's ability to metabolize sugar, being a smoker, and genetic predisposition (National Library of Medicine, 2014b). The subsequent section will focus on genetic predisposition to Type 2 diabetes.

Genetic Predisposition to Type 2 Diabetes. There is consensus among researchers that Type 2 diabetes cannot be explained by one direct path, that is, biology alone (or any other factors) cannot explain the disproportionate prevalence of diabetes among Latinos (Black, 2002; Caballero, 2005a, 2005b; Mercado-Martinez & Ramos-Herrera, 2002; Umpierrez, Gonzalez, Umpierrez, & Pimentel, 2007). Genetics do play an important role in Latinos' increased susceptibility to Type 2 diabetes, but hyperglycemia develops only when environmental factors are present (Doria, 2005). The focus of this section will be on genetic factors associated with Latinos' susceptibility to Type 2 diabetes; environmental factors will be explored in subsequent sections.

One of the most widely accepted approaches used to explain the disproportionate incidence of diabetes among Latinos stems from a biological perspective (e.g., Caballero, 2005a, 2005b; Doria, 2005; Leahy, 2005; Leahy, 2008). Results from twin studies have demonstrated that Type 2 diabetes is linked to genetics (Mayo Clinic, 2013), and, therefore diabetes is often viewed as an inherent disease characterized by two distinct defects: insulin resistance and β-cell dysfunction (Cerf, 2013).

Insulin Resistance. Insulin resistance is a health condition in which the human body produces insulin but cells do not absorb it; this results in elevated levels of glucose in the blood that are outside of the normal range (National Diabetes Information Clearing House [NDICH], 2014). Depending on the amount of glucose in the blood (i.e., Hyperinsulinemia), this could be an indicator of pre-diabetes or overt Type 2 diabetes. Haffner, D'Agostino, Saad, Rewers et al. (1996) compared insulin resistance between Latinos and Non-Latino Whites; Latinos had higher rates of insulin resistance in comparison to Non-Latino Whites. In individuals who do not have an insulin resistance problem, food is transformed into glucose (i.e., sugar) and then absorbed by the blood stream. With the increased amount of glucose in the blood stream, the pancreas is then signaled to increase the secretion of insulin. When functioning properly, insulin will attach to cells and transform glucose into a useful source of energy (WebMD, n.d.).

Prevention and delay of onset Type 2 diabetes is possible if patients learn early enough that they are insulin resistant so that they have the opportunity to make lifestyle changes (Fujimoto, 2000). Causes of insulin resistance include: obesity, physical inactivity, and other factors (e.g., ethnicity, hormones, steroid use, older age, sleep apnea, and smoking) (National Institute of Diabetes and Digestive and Kidney Diseases [NIDDKD], 2014b). A lack of sleep or sleep apnea has also been associated with obesity, insulin resistance, and Type 2 diabetes (NIDDKD, 2014a). Individuals with insulin resistance may have dark patches of skin in different parts of their body (e.g., elbows, neck, armpit, back) called acanthosis nigrician (NIDDKD, 2014a). Insulin resistance is not the sole indicator of overt Type 2 diabetes, overt Type 2 diabetes occur when β-cell dysfunction is present (Poitout, & Robertson, 2001).

The Role of β-cell Dysfunction in Type 2 Diabetes. Patients with Type 2 diabetes experience β-cells failure (Ashcroft & Rorsman, 2012; Poitout, & Robertson, 2001; Prentki & Nolan, 2006). Patients with Type 2 diabetes have a β-cell dysfunction in which β-cells are unable to compensate against insulin resistance and, consequently, are unable to properly increase insulin secretion (Cerf, 2013). To have a comprehensive understanding of the role of β-cells (also called beta cells) in the progression to Type 2 diabetes, one must also understand the normal function of β-cells. β-cells are one of many types of cells in the pancreas; they are responsible for the storage and release of insulin (Soria et al., 2010). In diabetes research β-cells dysfunction is referred to as sine qua non (Poitout, & Robertson, 2001), a Latin term, which means that it is essential (Merriam-Webster, n.d.). Fonseca (2009) writes that the deterioration in the function of β-cells is present 12 years prior to the diagnosis of overt Type 2 diabetes and that this deterioration continues throughout the progression of the disease.

Weir and Boner-Weir (2004) propose a five-stage explanation of the process that leads to the dysfunction of β-cells: Stage 1 Compensation, Stage 2 Stable Adaptation, Stage 3 Unstable Early Decompensation, Stage 4 Stable Decompensation, and Stage 5 Severe Decompensation. There is consensus that β-cell mass decreases in Type 2 diabetes, but Doria et al. (2005) states that it is unknown when it takes place, as well as its association with β-cell failure, which then progresses into overt Type 2 diabetes.

Genes Associated with Type 2 Diabetes. In addition to studying β-cells, researchers have dedicated time to identifying genes associated with Type 2 diabetes. Research studies have concluded that there is no one single gene connected to Type 2 diabetes (Altshuler et al., 2000; Gloyn et al., 2003; McIntyre & Walker, 2002; Weedon, et al., 2003); rather, there are numerous genes associated with the risk of Type 2 diabetes (i.e., TCF7l2, PPARG, FTO, KCNJ11, NOTCH2, WFS1, CDKAL1, IGF2BP2, SLC30A8, JAZF1, and HHEX) (Lyssenko, 2008). Of those listed, 8 have been found to be associated with β-cells dysfunction. “Patterns of inheritance suggest that Type 2 diabetes is both polygenic and heterogeneous – i.e., multiple genes are involved and different combinations of genes play a role in different subsets of individuals" (Doria, Patti, & Kahn, 2008, p. 186). At this point in time, genetic testing is not used in treatment or management of Type 2 diabetes, Lyssenko and Laakso (2013) writes that genetic testing offers little use in clinical practice. For the most part, it is accepted that genes play a role in the development of Type 2 diabetes, but for now genetic testing is not recommended outside of research setting to predict Type 2 diabetes (Vassy & Meighs, 2013).

Scientists have faith that, in the future, identifying genetics will have clinical significance, especially with new advances in the field (e.g., genome analysis and population based DNA banks). However, when attempting to answer the question of why Latinos are more susceptible to Type 2 diabetes, researchers focus on an evolutionary perspective. In the next section, the focus will be on the thrifty gene theory and how it is used to understand the disproportionate incidence of Type 2 diabetes among Latinos.

Gaps in Knowledge Related to Insulin Resistance and β-cells Dysfunction. Latinos and other ethnic minorities are susceptible to insulin resistance and β-cell dysfunction, which equate to higher prevalence of Type 2 diabetes. Leahy (2005) confidently states that the quest to assess the importance of β-cells and insulin resistance is complete. Even though these findings have been established, there are questions and gaps that need to be addressed. Caballero (2005a) mentions that future research must focus on whether insulin resistance is a result of a genetic predisposition or if it is due to obesity. Furthermore, research is also needed to identify and assess the specific mechanisms and pathways that lead to development of Type 2 diabetes, as well as a need to understand why Latinos have a higher resistance to insulin than their Non-Latino White counterparts (Caballero, 2005a). Leahy (2005) states that the most significant challenge regarding insulin resistance lies in determining the molecular, biochemical and genetic base for the dysfunction in β-cells. Leahy (2005) predicts that the future of diabetic treatment lies in β-cell focused therapies.

Thrifty Gene Theory. The disproportionate prevalence of Type 2 diabetes among Latinos has been theorized to be a result of a specific gene labeled the *Thrifty Gene* (Caballero, 2005a, b; Liberman, 2003). Even though the *Thrifty Gene Theory* was introduced more than 50 year ago, researchers continue to use it as a theoretical framework in their studies (e.g., Carulli et al., 2005). The *Thrifty Gene* theory was developed and proposed by Neel (1962) to explain Native Americans' genetic predisposition to Type 2 diabetes. According to the theory, indigenous populations who experienced periods of feast and famine evolved genetically to efficiently store fat during periods of food depravation, and therefore were able to survive. Conversely, during periods in which they had an abundance of food they were able to rapidly use energy from the stored fat (Neel, 1962). As behaviors and lifestyles have changed throughout time, humans have evolved from a hunter-gather lifestyle to a more sedentary life (Neel, 1962).

A genotype that was once a protective factor for survival is now considered a risk factor that predisposes Latinos to diabetes (Caballero, 2005a, b; Neel, 1962). Although the *Thrifty Gene Theory* was not specifically developed to apply to the Latino population, it has been used to explain the high prevalence among racial and ethnic minority populations (e.g., Native Americans, African Americans, and Latinos). Like Native Americans, Latinos stem from ancestors who were hunters and gatherers (Martorell, 2005) and, therefore, the *Thrifty Gene Theory* is used to explain the prevalence of diabetes among this group. Extensive research has attempted to understand the role of the *Thrifty Gene*; however, researchers have been unsuccessful in identifying a uniform gene among minorities that would support the theory.

Therefore, it is unclear to what extent genetics alone contribute to the disproportionate prevalence of diabetes among Latinos and other minorities (Caballero, 2007).

Events that Transpire Once Diabetes is Suspected. Individuals are diagnosed with diabetes once they have undergone a series of tests that include: average blood glucose, fasting plasma glucose (FPG), and oral glucose tolerance (OGTT) (Mayo Clinic, 2016a). The average blood glucose test (also known as: A1c, HbA1c, and glycohemoglobin test) is used to diagnose diabetes (National Institute of Diabetes and Digestive and Kidney Disease, 2014c). The A1c measures the amount of glucose attached to hemoglobin; it essentially takes an average of blood glucose (also known as blood sugar) for a 3-month period (National Institute of Diabetes and Digestive and Kidney Disease, 2014c). The A1c is based on percentages that range from normal to overt diabetes; the results are reported in percentages; a percentage of 6.5 or higher is considered to be overt diabetes National Institute of Diabetes and Digestive and Kidney Disease, 2014d (See Appendix A Table 1 for A1c normal and pre-diabetes criteria).

An alternative test used to diagnose Type 2 diabetes is OGTT. To prepare for the test patients will follow their normal diet for three days, during this period the patient is asked to consume at least 150 grams of carbohydrates, and partake in their normal physical activities (Munjal, 2015, U.S. National Library of Medicine, 2014). Patients will be asked to fast for 8 hours (Mayo clinic, 2015); however, Munjal (2015) writes that fasting should last between 10 to 16 hours. Blood samples are taken from the patient two times (Mayo Clinic, 2014c, Munjal, 2015), once after a fasting period, and again after the patient consumes "75 g of anhydrous glucose in 150 mL to 300 mL of water within 5 minutes" (Munjal, 2015, p.475); blood is drawn 2 hours after consuming this concoction. Patients with 200 mg/dl or higher are considered to have diabetes (See Table 1 for OGGT Normal and Pre-diabetes criteria).

The most common test to detect pre-diabetes or diabetes is the FPG because of its convenience and cost effectiveness when compared to OGTT (National Institute of Diabetes and Digestive and Kidney Diseases, 2014d). The patient is instructed to fast for at least 8 hours, after which blood is drawn the following morning (American Diabetes Association, 2014d). If a person has blood glucose level of 126 mg/dl or higher two times, then the individual has overt diabetes (National Institute of Diabetes and Digestive and Kidney Diseases, 2014d) (See Table 1 for FPG Normal and Pre-diabetes criteria).

Treatment of Type 2 Diabetes. In terms of diabetic care, the American Diabetes Association's 2015b guidelines provide recommendations for health care providers and that would also be useful for patients with diabetes to be familiar with. The American Diabetes Association publishes these guidelines annually; these guidelines include information on what should happen during the initial evaluation of patients with diabetes, and steps for health care providers to take to help patients manage their diabetes and glycemic control. The American Diabetes Association (2013b, 2014c, 2015b, 2016) provides five standard steps to follow during a patient's initial examination. During the initial examination of a patient with diabetes health care providers should classify the type of diabetes the patient has, identify complication resulting from diabetes, and assist in creating a plan that patients can follow to manage their diabetes and ensure patients will have continued care (The American Diabetes Association, 2015b).

Glycemic Control. Glycemic control is essential in diabetes care to avoid diabetes complications. To evaluate whether the management plan set forth for glycemic control is achieving the desired goals there are two specific test recommended: self-monitoring blood glucose and the A1c (American Diabetes Association, 2014c). These recommendations suggest that adults with diabetes should lower their A1c to at least 7% or below, especially since evidence suggests this reduces the risk of diabetes complications (e.g., micro vascular and macro vascular disease) (American Diabetes Association, 2014d). Healthcare providers may also introduce an A1c goal of less than 6.5% for some individuals (e.g., short duration of diabetes) as long as this goal does not produce hypoglycemia (American Diabetes Association, 2013b). For those with short life expectancy or severe hypoglycemia and other cases (e.g., advance micro vascular or macro vascular complications, extensive comorbid conditions), A1c goals greater than 8% may be more appropriate (American Diabetes Association, 2013b).

Most diabetes experts suggest the utilization of a patient-centered approach when creating a treatment plan (American Diabetes Association, 2016a). Factors to consider are: efficacy, cost, side effects, effects on weight, co-morbidities, hypoglycemia risk, and patient’s preferences. When a patient is initially diagnosed, the most common pharmacological agent, or medication that forms part of the therapeutic treatment is Metformin (American Diabetes Association, 2014c, 2015b, 2016a). For patients who have been recently diagnosed, but have elevated glucose levels or A1c results, medical providers may consider prescribing insulin therapy (with or without other agents). If oral therapy does not adequately maintain the A1c target over a period of 3 to 6 months, it is recommended that a second oral agent (e.g., a glucagon-like peptide-1 [GLP-1] or insulin therapy) be introduced. Because of the progressive nature of Type 2 diabetes, at some point most patients will be prescribed insulin therapy (García-Pérez , 2013).

Managing and controlling diabetes is of upmost importance; this is essential to avoid complications associated with diabetes. This is especially true, since diabetes is a risk factor for cardiovascular disease. Most people with diabetes do not die from diabetes per se; most people with diabetes die from cardiovascular disease. Therefore, the following section is dedicated to explaining the relationship between diabetes and heart disease. Subsequent sections will identify factors that mediate the relationship between socioeconomic status and cardiovascular disease.

Diabetes and Cardiovascular Disease: How Diabetes Kills

As previously stated, one of the main objectives of this dissertation is to identify mediators that help explain the relationship between socioeconomic status and cardiovascular disease. Therefore, a portion of this dissertation will be focused on utilizing the literature to: a) support the relationship between socioeconomic status and pre-selected biological, psychological, and social factors; b) empirically support the relationship between cardiovascular disease and pre-selected biological, psychological, and social factors; and c) support pre-selected biological, psychological, and social factors as mediators between socioeconomic status and heart disease.

Up to this point, the focus of this chapter has been on what Type 1 and 2 diabetes are and Latinos' predispositions to these. From this point forward, the focus will shift to explicating the complexities of the biological, psychological, and social factors directly and indirectly associated with the risk of diabetes and cardiovascular disease. Understanding the direct and indirect factors associated with cardiovascular disease is important since diabetes is a risk factor for cardiovascular disease. In many cases patients with diabetes do not die from diabetes itself, but from cardiovascular disease (Gonda, 2006). Yet, most Latinos are unaware of the association between cardiovascular disease and diabetes, or the direct and indirect factors that lead to a higher risk of cardiovascular disease. Research suggests that there is a strong association between diabetes and heart disease with two out of three individuals with diabetes dying from heart disease (Randall, Segerson, & Romaine, 2011).

In comparison to individuals without diabetes, people with diabetes are two to four times more likely to have heart disease or a stroke (American Heart Association, 2015a). Even when those with diabetes have their glucose levels under control, the risk for heart disease does not disappear; the American Heart Association (2015a) states that this is due to the fact that people with diabetes also suffer from other health conditions that continue to augment the risk (i.e., high blood pressure, abnormal cholesterol and triglyceride levels, smoking, obesity, uncontrolled sugar levels, and a lack of physical activity). The current rate of heart disease related deaths among Latinos is 121.2 per 100,000; Ischemic[8] Heart Disease rate among Latinos is 80.3 per 100,000 and the rate of Cerebrovascular Disease among Latinos is 29.6 per 100,000 (National Center for Health Statistic, 2014). The National Center for Health Statistic (2014, p. 95) also report on the "years of potential life lost before age 75" in 2013 among Latinos was: 571 years for Heart Disease; 340 years for Ischemic Heart Disease, and 145.5 years for cerebrovascular disease.

According to the National Institute of Diabetes and Digestive and Kidney Diseases (2013) the two most common types of cardio vascular disease among people with diabetes, include: coronary artery disease[9] and cerebral vascular disease[10]. Other risks for people with diabetes include heart failure and peripheral arterial disease (Marso and Hiatti, 2006). The national rate per 100 of diagnosed diabetes among Latinos for 2014 is as follows: all Hispanics

[8] "Cardiac ischemia occurs when plaque and fatty matter narrow the inside of an artery to a point where it cannot supply enough oxygen-rich blood to meet your heart's needs. Heart attacks can occur - with or without chest pain and other symptoms (WebMD, 2015, para.1)."

[9] Coronary artery disease – "Coronary artery disease develops when your coronary arteries — the major blood vessels that supply your heart with blood, oxygen and nutrients — become damaged or diseased. Cholesterol-containing deposits (plaque) in your arteries and inflammation are usually to blame for coronary artery disease" (Mayo Clinic, 2015a, para.1).

[10] Cerebral vascular disease – "the term cerebrovascular disease includes all disorders in which an area of the brain is temporarily or permanently affected by ischemia or bleeding and one or more of the cerebral blood vessels are involved in the pathological process. Cerebrovascular disease includes stroke, carotid stenosis, vertebral stenosis and intracranial stenosis, aneurysms, and vascular malformations" (American Association of Neurological Surgeons, 2005, para. 1).

8.7, Puerto Rican 8.0, Mexican/Mexican American 9.7, and Cubans 5.4 (Centers for Disease Control, 2015b).

The American Heart Association's (2010) most recent goal is to improve cardiovascular health by 20%, as well as decrease the number of deaths attributed to cardiovascular disease and stroke by 20% (Loyed-Jones et al., on behalf of the American Heart Association [AHA], 2010). Current standards for ideal cardiovascular health are based on seven criteria for adults older than 20 years of age: never smoked or having quit more than 12 months ago, BMI of less than 25 kilograms per meter squared, participating in moderate intensity physical activities for 150 minutes per week or more (or participating in vigorous intensity physical activities for 75 minutes per week or more), health diet score [4-5 components of a healthy diet e.g., fruits and vegetables], cholesterol level of less than 200 mg/dl, blood pressure that is less than 120/<80 mmHg [millimeter of mercury], and fasting glucose of less than 100 mg/dl (Loyed-Jones et al., on behalf of the American Heart Association [AHA], 2010). In reference to these seven components, according to the findings from the National Health and Nutrition Examination survey from 2009 to 2010, the highest percentage of Mexican Americans (approximately 30%) only met two out of the seven criteria for ideal cardiovascular health; 24% met three out of the seven criteria (Based on graph produced by Mozaffarian, Benjamin, Go, Arnett, Blaha, Cushman et al., 2015, p. e27). One consideration of how to encourage Latinos to improve their cardiovascular health points to a focus on culture. Since the focus of this dissertation is diabetes care to prevent cardiovascular disease, select risk factors for diabetes and diabetes care will be discussed including acculturation, sleep disturbances, depression, inadequate physical activity, access to healthcare, socioeconomic status, and poor eating habits. It is important to note that these risk factors are all also risk factors for cardiovascular disease as well, further emphasizing the relationship between diabetes and cardiovascular disease. These shared risk factors will only be discussed in relation to diabetes since, if the diabetes is prevented or effectively treated, cardiovascular risk decreases.

Holistic Explanation of Factors Contributing to the Development of Diabetes

A holistic and ecological explanation of the factors that contribute to the development of Type 2 diabetes and worse health outcomes for people with diabetes requires a departure from genetic and biological factors into one that encompasses cultural, psychological, social, and political factors. Therefore, the next section will focus on psychological factor(s) associated with diabetes. The subsequent section will explain what depression is, how it manifests itself among Latinos, Latinos understanding of depression, Latinos reaction to mental health, and how depression is associated with diabetes.

Cultural Factor Associated with Diabetes Management and Outcomes. Assessing how acculturation affects Latinos' health has been of great interest to researchers (e.g., Gordon-Larsen, Harris, Ward, & Popkin, 2003; Lara, Gamboa, Kahramanian, Morales, & Bautista, 2005; Mainous, Diaz, & Geesey, 2008; Perez-Escamilla, 2011). Acculturation refers to "those phenomena which result when groups of individuals having different cultures come into continuous first-hand contact, with subsequent changes in the original culture patterns of either or both groups…" (Redfield, Linton, & Herskovits, 1936, p. 149). Empirical results in studies assessing the relationship between acculturation and Latino health outcomes are quite ambiguous (Perez-Escamilla & Putnik, 2007). Latinos' continuous contact with the dominant culture (i.e., American Culture) has been cited as being a protective factor in some studies (prevention behaviors) yet a risk factor in others (dietary behavior) (Abraido-Lanza, Chao, & Flórez , 2005; Ayala, Baquero, & Klinger, 2008; Crespo, Smit, Carter-Pokras, & Andersen, 2001; Fitzgerald, Damio, Segura-P, & Andersen, 2001; Hubert, Snider, & Winkleby, 2005; Mainous, Diaz, & Geesey, 2008; Marin, Perez-Stable, & Marin, 1989; Otero-Sabogal, Sabogal, Perez-Stable, & Hiatt, 1994; Perez-Escamilla, 2009; Perez,-Escamilla, & Putnik, 2007).

Morales, Lara, Kington, Valdez, and Escarce (2002) suggest that although acculturation effects have been found to be both health enhancing and harmful, the net effect is that the majority of the changes are harmful for Latinos. It has also been cited as one of the culprits for Latinos do not die from diabetes but from behaviors that lead to diabetes (e.g., Lara et al., 2005). Some research has indicated that diabetes is associated with higher acculturation (West et al., 2002). Among Latinos who have diabetes, Minous, Diaz, and Geesey (2008) found that Latinos who were more acculturated were more likely to engage in unfavorable dietary behaviors. Kandula et al. (2008) assessed the relationship between acculturation and the prevalence of diabetes amongst diverse ethnic groups including Mexican-origin Latinos and non-Mexican origin Latinos. Results indicated that a positive relationship between acculturation and the prevalence of diabetes existed, but this was only true for non-Mexican origin Latinos (Kandula et al., 2008), thus supporting the ambiguity in the relationship between diabetes and acculturation. This argument is also supported by results from a study by Marin, Perez-Stable, and Marin (1989) in which acculturation was associated with diabetes but only for one of the three groups (i.e., Mexican-American men in the middle group).

Part of the ambiguity in findings associated with acculturation may be due to the inconsistent measurement of acculturation. To be more specific, researchers have criticized the use of unidimensional constructs to measure acculturation in Latino health research, as well as the lack of uniformity and in definition and measurement of acculturation (Thomson & Hoffman-Goetz, 2009). Hunt, Schneider, and Comer (2004) provide numerous arguments against the manner in which the concept of acculturation is defined and utilized in Latino research. This is understandable, given that a review of Latino studies about health resulted in the identification of 26 acculturation scales (Wallace, Pomery, Latimer, Martinez, & Salovey, 2010). Despite the shortcomings on the relationship between diabetes and acculturation, it is not the sole culprit of high prevalence of diabetes among Latinos. There are psychological factors associated with both diabetes and acculturation; a combination of these variables lead to a high susceptibility to diabetes.

Critique of the Conceptualization and Measurement of Acculturation

Given the copious amount of literature that utilizes acculturation and the continued use of the construct in current empirical studies, it is difficult to ignore its regard by researchers. Acculturation is an important construct in Latino health research, and it is often used to assess its association to health related outcomes (e.g., Abraído-Lanza, Echeverría, & Flórez, 2016; Flórez & Abraído-Lanza; 2017; Johnson, Carroll, Fulda, Cardarelli, & Cardarelli, 2010; Lara, Gamboa, Kahramanian, Morales, & Hayes Bautista, 2005; Lopez & Yamashita, 2017; Mainous et al., 2006; Mainous, Diaz, & Geesey, 2008; Perez-Escamilla, 2011; Rodriguez et al., 2014); yet, researchers have critiqued its definition, conceptualization, and the manner in which it is measured (e.g., Fox, Thayer, & Wadhwa, 2017; Ngo, 2008; Rodriguez et al., 2014; Schwartz, Unger, Zamboanga, & Szapocznik, 2010). Therefore, this section will: discuss critiques made regarding the definition and conceptualization of acculturation; identify and discuss underlying assumptions held by prominent theoretical models of acculturation; and complete the discussion by providing suggestions to improve the measurement of acculturation.

Acculturation theoretical models have been criticized for their use of oppressive ideologies and language (Ngo, 2008; Sakamato, 2007). There are numerous definitions of acculturation; three of the most predominant definitions and conceptualization of acculturation come from diverse fields (i.e., anthropology, sociology, and psychology). For example, a definition by Redfield, Linton, and Herskovits (1936, p.149) is considered a classic definition and comes from the field of anthropology, it is asserted that “acculturation comprehends those phenomena which result when groups of individuals having different cultures come into continuous first-hand contact with subsequent changes in the original cultural patterns of either or both groups.” Yet, most measures of acculturation focus on the changes that occur for the individual or groups of individuals that come into a new host country and dismiss how the host country (i.e., dominant group) changes as it comes into contact with individuals who come with a different cultural background (Cabassa, 2003). One example of this is the conceptualization of acculturation as a unidimensional construct.

Unidimensional Conceptualization of Acculturation. Gordon (1964, 1995), a sociologist, conceptualized acculturation as a linear process in which an individual's adherence to their cultural heritage lies one side, and on the opposite end is the individual’s embracement of the host culture, with assimilation being the end result. However, unidirectional conceptualization of acculturation has been strongly critiqued. Ngo (2008) writes about the oppressive nature of unidirectional definition of acculturation since its main focuses is on the assimilation of immigrants. Ngo’s words are profound and they identify the ideological problem inherent in a unidimensional conceptualization and definition of acculturation. The ideological problem is that the acculturation process only affects the one group (e.g., immigrant groups) while the host group (often referred to as the dominant group) remains intact and unmodified by the incoming group (Cabassa, 2003).

Measurement. Scales used measure acculturation from a unidimensional approach are often criticized for adhering to Zero-sum phenomena, which refers to the loss of culture of origin as the dominant culture is adopted (Arends-Toth & Van de Vijver, 2004; Cabassa, 2003; Marín & Gamba, 1996). In Latino health research, proxies of acculturation are often used, which essentially support the unidimensional conceptualization of acculturation. That is, acculturation proxies only account for the changes that occur to incoming group as they are exposed to the dominant culture. Cabassa (2003) writes that unidimensional measurements of acculturation (e.g., Acculturation Rating Scale for Mexican Americans (Cuellar et al., 1980) do not take into consideration how an individual maintains equilibrium and attempts to balance two cultures (culture of origin and dominant culture). This raises the question: should researchers continue to use proxies as measures of acculturation when proxies do not represent the process in its entirety? Sometimes it not a question of preference, especially in national data sets (e.g., IHIS) where there are no valid or reliable measures of acculturation, and therefore researchers' only available options are to either exclude it from the study, or use proxies.

Bidimensional Conceptualization of Acculturation. To address the shortcoming of the unidimensional approach to acculturation, conceptualization shifted to a bidimensional approach. The bidimensional conceptualization of acculturation comes from the field of psychology in which Berry (1997) describes acculturation as a bidimensional process, one in which there are two dimensions: one dimension focuses on adherence to the culture of origin, and the other dimension focuses on adherence to the host culture (Arends-Toth &Van de Vijver, 2004; Cabassa, 2003; Marín & Gamba, 1996; Ngo, 2008; Schwartz, Unger, Zamboanga, & Szapocznik, 2010). Based on these two dimension, four categories were created: assimilation, separation, integration, and marginalization. Assimilation refers to the adoption of the host's culture, while rejecting their heritage culture. Separation refers to rejecting host culture and embracing heritage culture. Integration refers to acceptance of both heritage and host culture. Marginalization is rejecting both host and heritage culture. However, Del Pilar and Udasco (2004) critique the use of marginalization theory in acculturation models, given that it leads to the interpretation that if a person does not identify with their culture of origin not the dominant culture, then that person is considered deculturated. Del Pilar and Udasco (2004) write that there is no consensus on the definition of marginalization. McFee (1968) argued that regardless of the extent the acculturation process affects a person, deculturation cannot be an outcome because everyone is a part of a culture. McFee argues for the exclusion of marginalization from acculturation theoretical frameworks; given that, individuals are not without a culture because while they may not identify with the dominant culture nor their culture of origin, they may simply be in a transitional phase. Furthermore, they continue to hold knowledge (e.g., values, practices, tradition) about their culture of origin; thus, giving them the ability to identify with their culture of origin (McFee, 1968). It would be difficult to imagine how a person would develop a sense of self without drawing from their culture, origin, or their host culture. Empirical research has found little or no support for the existence of the marginalization group (Unger et al., 2002; Schwartz & Zamboanga, 2008).

Measurement. Researchers have created scales to measure Latino acculturation using the bidimensional conceptualization of acculturation. One example is the Bidimensional Acculturation Scale by Marín and Gamba (1996); the scale is comprised of 24 questions and asks about the person’s language preference (e.g., how often they speak in Spanish or English, listen to Spanish or English media, listen to Spanish or English music); yet focusing on language makes it difficult to assess whether the measure is assessing the current status or changes that occur over time (Fox, Thayer, & Wadhwa, 2017).

Additional Critiques. Furthermore, others have stated that models of acculturation follow a "one size fits all" approach (Rudmin, 2003) thus consideration for important characteristics are not addressed (e.g., migrant characteristics, country of origin, SES and resources of the migrant, characteristics of the host country) (Schwartz, Unger, Zamboanga, and Szapocznik, 2010, p.5). Another criticism of acculturation models is the emphasis placed on the person coming into a new country, yet there is no mention of how the receiving host is affected and the role they play in the experiences of immigrants (Ngo, 2008). Fox, Thayer, and Wadhwa (2017) provide a critique of measures of acculturation in studies related to minority health, stating that proxies are often used and writes that proxies (e.g., length of residence, nativity, language proficiency) are inadequate measures of acculturation in health. Yet, there is no consensus on the conceptualization and measurement of acculturation. However, Arends-Toth and Van de Vijver (2004) provide guidance on what needs to be considered when developing an assessment of acculturation (e.g., identification of: research goal(s), what aspects of acculturation will be focused on, what acculturation framework will be used).

Regrettably, researchers are often limited by the available data sets, in which acculturation is not measured properly, and often are left with the dilemma of either excluding the construct entirely from the research or utilizing proxies (e.g., language, place of birth, number of years in the united states). However, Arends-Toth and Van de Vijver (2004) are on point when they write that the utilization of a proxy to measure acculturation is inadequate, given that it in reality provides no representation for the acculturation process (e.g., knowledge, values, attitudes or behavior). Yet in studies that include the construct of acculturation, numerous proxies such as language preference, generational status, length of residency are often used in Latino studies. The assumption is made that acculturation can be assessed on the basis of the amount of time that person spends in the host culture (Negy & Woods, 1992); yet these are considered inadequate to measure acculturation given that it does not fully incorporate other important acculturation domains (e.g., language ability, social contacts, daily living habits, world-view) (Arends-Toth & Van de Vijver, 2004). Others have suggested that acculturation should be measured retrospectively, given that it is often a question of whether it is a construct measure of current status or changes that occur over time (Fox, Thayer, & Wadhwa, 2017).

Ideally, acculturation would be theorized in a manner that was not oppressive with concepts of social justice incorporated. The idea that the end result of acculturation is assimilation, and that assimilation is a positive outcome ignores the importance of immigrants' identity that is connected to their heritage, culture, and values. The protective factor of holding on to one's culture, the comfort, the role it plays in which they understand and view the world is not address by current measures of acculturation. Therefore, instead of using proxies and labeling them as acculturation, researchers may consider relabeling these proxies as Exposure to Dominant Culture (EDC).

Psychological Factors Contributing to the Development of Overt Type 2 Diabetes. Depression is an important psychological condition associated with diabetes and diabetes complications. Depression is a serious mental health condition; those who have this condition experience symptom differently, but ultimately these symptoms affect an individual's ability to function. Some of the symptoms people with depression may feel may include: changes in sleep and appetite, difficulty concentrating, lack of interest, low self-esteem, hopelessness, changes in movement, and psychosomatic symptoms (National Alliance on Mental Health, 2016). Depression increases the risk of diabetes and the comorbidity of depression and diabetes can result in diabetes complications, thus resulting in costly financial consequences stemming poor productivity, absenteeism from work, and even periods of disability (Centers for Disease Control, 2012).

Association between Diabetes and Depression. According to the Centers for Disease Control (2010b), Latinos are more likely to report major depression when compared to their non-Latino White counterparts. However, in a met-analytic review by Mendelson, Rehkopf, and Kubzansky (2008), results indicated that in comparison to their non-Latino White counterparts, there was no significant difference when it came to the prevalence of life-time major depression; yet, Latinos did report more depression symptomology but it was not deemed clinically meaningful (Mendelson, Rehkopf, & Kubzansky, 2008).

In a study among older Latinos with diabetes, results from a study indicated that there is an interaction between diabetes and depression; after controlling for demographic variables this relationship predicted greater: mortality, macro and microvascular complications, and disability (Black, Markides, & Ray, 2003). Diabetes has often been associated with an individual's poor lifestyle choices (e.g., poor diet and sedentary lifestyle); however, this is not always the case. Researchers have focused on factors that are not necessarily controlled through behavior modification (i.e., diet and exercise), and most often there is such stigma attached to mental health that it is not discussed nor addressed. Researchers have pondered whether diabetes increases the risk of psychiatric disorders, or whether having a psychiatric disorder increases the risk of diabetes (e.g., Kruse, Schmitz, & Thefeld, 2003). Depression is one psychiatric disorder researchers have been interested in, and numerous studies have assessed the relationship between diabetes and depression (Campayo et al., 2010; Carnethon et al., 2003; Eaton et al., 1996; Golden et al., 2008; Musselman et al., 2003). It has long been thought that diabetes and depression are associated; however, the nature of the relationship is complex. There is significant research attempting to understand whether diabetes results in depression, or whether depression is a risk factor for Type 2 Diabetes.

Cross sectional studies have identified that the risk of depression increases after the diagnosis of diabetes (Aarts et al., 2009), Aarts et al.'s (2009) longitudinal study supports this, findings indicate that the relationship is not as robust as presumed by previous findings. This is supported by numerous longitudinal studies (Arroyo et al. 2004; Golden et al., 2004). In a longitudinal study by Engum (2007) with a sample of 37,291, individuals who reported symptoms of anxiety and depression during the baseline phase of the study were more likely to develop onset Type 2 diabetes; conversely, Type 2 diabetes was not a predictor of anxiety or depression. In another study by Brown, Majumdar, Newman, and Johnson (2005), a 30% increase among individuals who were recently diagnosed with Type 2 diabetes was observed when compared to their non-depressed counterpart. However, this is not always the case, in a another longitudinal study by Vane den Akker, Schuurman, Metsemakers, and Buntinx (2004) findings suggest that gender plays a role; it increased the risk of developing Type 2 diabetes by 78% was found among males between the age of 20 and 50. Mezuk, Eaton, Albrecht, and Golden (2008) conducted a meta-analysis using only the MEDLINE database to examine the assertion that the relationship between Type 2 diabetes and depression is bidirectional with findings concluding that depression increases the risk of Type 2 diabetes by 60%. Depression is particular importance to the role it plays in diabetes and heart disease; given that, research has found a bidirectional relationship between diabetes and psychiatric disorders (Balhara, 2011).

Another focus is the impact diabetes has in terms of increasing depression. In a study by Peyrot and Rubin (1997), the researchers set out to assess the levels of anxiety and depression among adults with diabetes, concluding that indeed, having diabetes elevates the risk of mental health disturbances, especially among those who have more diabetic complications. This assertion is furthered supported by a meta-analysis completed by Ali, Stone, Peters, and Khunti (2006) in which the researchers came to the conclusion that individuals with Type 2 diabetes had increased rates of depression. Understanding the connection between depression and diabetes is of considerable importance given that minor and major depressions were associated with an increase in mortality (increase of 1.67 fold and 2.30 fold respectively) (Katon et al. 2005).

Yet, there is another factor that plays a role in the relationship between these two factors, both in the susceptibility of depression and diabetes. As previously mentioned in a section above, acculturation is at the cornerstone of Latino research, this includes diabetes and depression. Researchers question the role acculturation plays in the mental health of Latinos. The relationship between acculturation and mental health is limited; and research results of studies assessing the relationship between these two constructs is ambiguous (e.g., Burnam, Hough, Karno, Escobar, & Telles, 1987; Cuellar & Roberts, 1997; Falcon, & Tucker, 2000; González, Haan, & Hinton, 2001; Kaplan & Marks, 1990; Maestas, 2000; Mahard, 1988; Neff & Hoppe, 1993; Rivera, 2007; Ramos, 2005; Torres, 2010; Vasquez, Gonzalez-Guarda, & De Santis, 2011). More specifically, researchers have been interested in the relationship between acculturation and depression (González, Haan, & Hinton, 2001; Ramos, 2005; Rivera, 2007; Torres, 2010). In a study by Rivera (2007) of 850 Latinos from south Florida, the researcher questioned whether the relationship between acculturation and depression was mediated or moderated by family social support; indeed, the relationship between the two constructs was supported with the mediation of family social support.

Latinos' Reaction to Mental Health. In general, Latinos are apprehensive about discussing mental health conditions. Latinos often feel stigmatized and would rather not disclose information regarding their depression or treatment for depression to friends and family (Vega, Rodriguez, & Ang, 2010). To further complicate this matter, it has been well established that "minorities have less access to, and availability of, mental health services" (U.S. Department of Health and Human Services [DHHS], 2001a, paragraph 4). Lagomasino et al. (2005) found that Latinos who had managed care were less likely than Whites to receive any form of depression care (i.e., 50% of Whites received care vs. Latinos, 31%). Furthermore, Latinos with managed care were less likely than Whites to receive a minimum level of depression treatment (i.e., 36% of Whites received a minimum level of treatment vs. Latinos, 19%) (Lagomasino et al., 2005). Worse still, another study found that Latinos who sought mental healthcare did not return after their initial visit (Aguilar-Gaxiola, 2005).

Interestingly enough, Vega, Kolody, Aguilar-Gaxiola, and Catalano (1999) found Mexican Americans reluctant to use mental healthcare even though the symptoms of the mental illness greatly impaired the person's daily life. As Chong (2002) writes, there are factors that need to be assessed (e.g., education, country of origin, generation, years residing in the U.S., experience with health care systems in country of origin) to understand an individual's reluctance to utilize health care services. Vega et al. (1999) suggested that Mexican Americans use their families as emotional support rather than going to a mental healthcare provider. The *familia (the family)* has a moral obligation to aid its members in need, by providing social support to those in poor health (Clutter & Nieto, 2007).

Additionally, Latino first generation individuals living in the United States sometimes view health problems as stemming from supernatural or psychological origins (Chong, 2002). Latinos have a different mental health lexicon than do Americans and that lexicon can vary by region. For example, *ataque de nervios, nervios*, and *mal de ojo* are common terms for mental illness symptoms (Office of the Surgeon General (US); Center for Mental Health Services (US); National Institute of Mental Health (US). Mental Health, 2001). *Ataque de nervios* literally translated into English is “attack of nerves” and seems straightforward enough, but *nervios*, i.e. “nerves,” and *mal de ojo*, i.e., “evil eye,” are more troublesome to those with limited Spanish vocabularies. Also, the literal translations of these terms do not fully communicate the nuances of each.

Individuals who have spent more time in their host country may have been exposed to the biomedical model[11] of understanding disease and illness. According to Wade and Halligan, (2004) critique the biomedical model, and state that it assumes that: “all illness has a single underlying cause, disease (pathology) is always the single cause, and removal or attenuation of the disease will result in a return to health” (p. 1398). Research on the assessment of the relationship between acculturation and health care utilization is unclear. In a study Solis, Marks, Garcia, Shelton (1990) utilized data from NHANES and found that acculturation was associated with utilization of health care services but only for some groups (i.e., Mexican Americans and Cuban Men) but not others (i.e., Cuban women and Puerto Ricans). Acculturation affects how Latinos view on the development of diabetes, attitudes, beliefs, and health practices of Latinos towards diabetes. Qualitative studies provide a direct insight into the thoughts Latinos have regarding how they developed diabetes and how Latinos manage their diabetes (Coronado, Thompson, Tejada, & Godina, 2004).

Important Health Behaviors Associated with Prevention and Management of Diabetes

The subsequent section will focus on health behaviors that play a detrimental part in the prevention of diabetes. However, once diabetes is diagnosed, these factors also play an important

[11] Biomedical Model – model used to explain illness, model excludes social and psychological factors (Farlex Partner Medical Dictionary, 2012).

role in the management of diabetes. Therefore, the subsequent section will focus on nutrition, physical activity, and sleep, and how they relate to diabetes.

Diabetes and Nutrition

One of the challenges that people with diabetes face is not knowing what is appropriate to eat in order to manage and control their numbers (e.g., blood glucose level). Part of the problem is that there are no universal diet guidelines for people with diabetes. However, there are some guidelines and recommendations set forth by the American Diabetes Association (2014c). Given the benefits attributed to nutrition therapy (e.g., decrease in A1C), the American Diabetes Association (2014c) recommends nutrition therapy as part of a treatment plan for both Type 1 and Type 2 diabetes patients. The American Dietetics Association first introduced Medical Nutrition Therapy (MNT) in 1994; it was defined as “the use of specific nutrition services to treat an illness, injury or condition” (American Dietetic Association, 1994, p. 838).

The American Diabetes Association (2002) writes that the overarching goals of MNT is to: 1) achieve and maintain metabolic outcomes, 2) change food intake and behavior as a means to prevent diabetes related complications and treat diabetes related complications, 3) improve health by through behavior modification and selection of healthy foods, and 4) assess patient’s nutritional goals with consideration given to patient’s cultural practices. One thing the American Diabetes Association (2014c) writes is that there is no one set of guidelines for people with diabetes in terms of the number of calories from carbohydrate, protein, and fat; instead it is highly stressed that each plan should be individualized based on the person’s eating patterns.

The American Diabetes Association (ADA) (2014c) suggests that glycemic control can be achieved through carbohydrate monitoring, and recommends that the carbohydrates consumed be from vegetables, fruits, whole grains, legumes, and dairy products. Furthermore, the ADA

(2014) also recommends that people with diabetes avoid beverage sweeteners so as to avoid health complications and weight gain. As previously mentioned, the ADA (2014c) writes that fat intake by people with diabetes should be individualized, and they point out that quality of the fat is more important than the amount of fat that is consumed (i.e., benefits of long-chain n-3 fatty acids and n-3 linolenic acids, which show a positive effect on lipoproteins, prevent heart disease, and are linked to other healthy outcomes). Recommendations related to transfat and sodium intake are the same as for the general public. Reduction in sodium intake should be based on individual situations (American Diabetes Association, 2014c).

A French philosopher Jean-Anthelme Vrillian-Savarin (1825) once said, “Tell me what you eat, and I will tell you who you are.” This quote reflects the connection between food and one’s identity, and Latinos are no exception. Food is an essential part of the Latino culture; it is a mechanism by which individuals are able to express their national identity, their cultural identity, as well as the shifts that take place as they are exposed to other cultures (Janer, 2008). It is also a mechanism by which they indirectly communicate with family; food preparation is often used to indirectly share your emotions with family. Time is taken out of busy schedules to prepare food for family members. As a member of the National Council of La Raza once stated “The act of sitting down at the dinner table is more important than the actual food” (As reported by Rodriguez, 2013, para. 20). However, when Latinos are diagnosed with diabetes they must make behavioral changes and changes in their diet. Latino families often eat dinner together instead of eating alone or on the go; they also gather together during the weekend and cook a meal that is to be shared (Janer, 2008). This can often be a stressful time for Latinos with diabetes, because to manage their diabetes they have to change their behavior (e.g., avoiding certain foods, counting their carbohydrate intake, avoiding sodium). They feel like they don't belong, as though they are often watched, or they are pressured by family members for not indulging during family gatherings, or even made fun of for not being able to eat certain foods. In a qualitative study by Hu et al. (2013), participants described a lack of family support. One participant stated the following:

> The food is a problem because my husband is not used to eating what I eat. He eats how I used to eat and it's all junk food. He does not eat healthy foods. He eats other things, and it is difficult to make separate food for him, for my daughter, and me. He eats his own food, and my daughter eats her own food, and I eat healthy food. (female, 42 years old) (Hu et al., 2013, p.8)

Managing food intake is an important part of puzzle in managing glucose levels, but this is also one of the most difficult things Latinos face when first diagnosed. Part of the problem may be due to due to the misconception that because some of the diseases prevalent in Latinos are connected to diet, it is presumed that Latino cuisine is unhealthy (Janer, 2008). Nothing could be further from the truth, given that some of the ingredients found in Latino cuisine are rich in vitamins and minerals that are healthy and beneficial (Janer, 2008). Rodrigues (2013) summarizes the issue at heart, it is not the food that is killing Latinos, but the modifications made. Rodriguez (2014, para. 18) writes,

> …with immigration and acculturation to the United States often comes a change in eating behaviors, such as cooking fewer meals at home, eating larger portions, preparing foods differently, and buying more cheap and convenient fast foods loaded with sodium, fat and sugar.

This is where the challenge lies for health professionals: creating a plan of action that obtains ideal outcomes for people with diabetes, but at the same time are culturally sensitive as recommended by ADA (2002).

Acculturation, Less Healthful Food Selection and its Relation to Diabetes

Management of dietary intake is important in the control of diabetes; however, there are numerous factors that affect the dietary intake of Latinos (e.g., acculturation process, SES, culture). Numerous researchers have sought to assess the relationship between acculturation and dietary intake (e.g., Ayala, Baquero, Klinger, 2008; Neuhouser, Thompson, Coronado, & Solomon, 2004; Woodruff, Zaslow, Candelaria, & Elder, 1997). Research findings suggests that the acculturation process is related to dietary intake, but the findings seem inconclusive given the lack of uniformity in the operationalization of acculturation. Some studies find that more acculturation leads to less healthful food selection; other studies conclude that less acculturation results in less healthful selection.

Physical Activity

Diabetes is a preventable disease; regardless of the genetic predisposition, engagement in physical activities and a healthy diet may postpose or prevent overt Type 2 diabetes. Physical activity and exercise have often been used interchangeably, yet the definition and operationalization of each term suggests that these two terms are not interchangeable. For the purposes of this dissertation, the definition by Caspersen, Powell, and Christenson (1985, p. 126) will be utilized, "Physical activity is defined as any bodily movement produced by skeletal muscles that results in energy expenditure." Currently, the American Diabetes Association (2013b) outlines physical activity as: activity[12], aerobic exercise[13], strength training[14], and flexibility exercise[15]. The AAD states that for people with diabetes, physical activity results in

[12] Activity—walking, using the stairs, moving around—throughout the day
[13] Aerobic exercise, such as brisk walking, swimming, or dancing
[14] Strength training, like lifting light weights
[15] Flexibility exercises, such as stretching (ADA, 2013b, paragraph 2)

several benefits such as helping individuals keep their blood glucose levels at recommended levels and reducing the risks of pre-diabetes and Type 2 diabetes (ADA, 2013b,c). According to the Centers for Disease Control and Prevention (CDC, 2014b) physical activity is recommended for prevention or management of weight control, reducing the risk of developing Type 2 diabetes and cardiovascular disease, and improving mental health and mood. Historical evidence shows that the recommendation for physical activity to treat diabetes dates back to 600 B.C., when an Indian physician named Sushruta recommended physical activity as a therapeutic treatment for specific types of diabetes (as cited by Vranic & Michael Berger, 1979). The U.S. Department of Health and Human Services (2008) writes that adults should avoid inactivity; and therefore, guidelines suggest that: adults should participate in moderate activity for at least 150 minutes per week, or 75 minutes a week of vigorous-intensity aerobic physical activity.

Furthermore, physical inactivity is a risk factor for heart disease. In comparison to their White counterparts (27.0%), Latinos are more likely to be physically inactive (39.7%), with 58.6% of Latinos not meeting the federal guidelines for physical activity (National Center for Health Statistics, 2014). It is unfortunate that more than half of Latinos in the United States do not engage in physical activity, since evidence suggests that physical activity alone can reduce the progression of glucose intolerance (Sigal et al., 2006) and subsequently also reduces the risk of developing cardiovascular disease.

Looking at the relationship between acculturation and physical activity may unearth why more than half of Latinos do not meet the federal guidelines for physical activity. Although not specific to Latinos, Gerber, Barker, and Pühse (2012) conducted a systematic review of the relationship between physical activity and acculturation among immigrants, and reported that even after researchers controlled for cofounders, 57% of the studies they included found an association between acculturation and leisure physical activity. Never the less, among Latinos, findings are mixed, with some indicating no association (e.g., Guinn, Vincent, Wang, & Villas, 2011) and others supporting the association (e.g., Banna, Kaiser, Drake, & Townsend, 2011). Part of the reason for the inconsistency in findings may be due to the definitions used for physical activity, or how the researchers decided to measure acculturation.

In a study by Abraido-Lanza, Chao, and Flórez (2005), the authors utilized data from the 1991 National Health Interview Survey to test the hypothesis that “Health behavior and risk factors become more unfavorable with greater acculturation” (p. 1243). When specifically looking at physical activity, after the authors adjusted for socioeconomic status and age, findings indicated that Latinos with higher acculturation levels were more likely to report having recently engaged in physical exercise (Abraido-Lanza, Chao, & Flórez, 2005). This is one instance in which acculturation served as a protective factor. However, this association is not supported by the results yielded in a study by Banna, Kaiser, Drake, and Townsend (2011); in a sample of all Latina women from California, after controlling for confounders, there was no association between various measures of acculturation (e.g., language acculturation and duration of residence in the USA) and moderate and vigorous physical activity. However, the authors do note that acculturation was associated with sedentary health behaviors such as watching television. In contrast, Everson, Sarmiento, and Ayala (2004) also used a sample of all female Latinas, and found that those with higher English language acculturation were more like to be physically active than their less acculturated counterparts. This is further supported by findings of a more current study by Vermeesch and Stommel (2014).

Furthermore, while length of residence in the United States was not associated with physical activity, Everson, Sarmiento and Ayala did find that those who immigrated to the

United States prior to the age of 25 were more likely to engage in physical activities when compared to those who immigrated after the age of 25. Berrigan, Dodd, Troiano, Reeve, and Ballard-Barbash (2006) also assess the relationship between physical activity and acculturation among Latinos; however, they were more liberal in their definition of physical activity, and they also made a distinction between leisure and non-leisure physical activity. Interestingly enough, Marquez and McAuley (2006) recruited participants from central Illinois, their finding suggest that more acculturated Latinos are less active than less acculturated Latinos. Furthermore, less acculturated Latinos are considered to be less active because of the lack of participation in leisure time physical activity, yet this may not be accurate if one takes into account the physical activity they participating in their employment that requires manual labor. According to the Centers for Disease Control (2014c) physical activity guidelines are more likely to be met by those who are more educated and by those whose family income is above the poverty level. Nevertheless, prevention and management requires that nutrition is taken into consideration.

Sleep

Sleep is essential for optimal health among people with diabetes; the National Heart, Lung, and Blood Institute (2012) recommends that adults and the elderly sleep seven to eight hours a day. Sleep is also important to prevent and manage diabetes. According to Patel et al. (2014) years of poor sleep can lead to adverse health consequences, which include: weight gain, diabetes, heart disease, and shorter life expectancy. For people with diabetes, poor sleep may be a result numerous health ailments (e.g., sleep apnea, restless leg syndrome, low or high glucose, depression, anxiety, peripheral neuropathy) (Patel et al., 2014). This is understandable, given the processes that occur during various stages of sleep, as explained by the National Institute of Neurological Disorders and Stroke and Sleep (2014).

Even though the sleep is an essential part of health outcomes, the Latino research community has not fully explored this relationship (Loredo et al., 2010) as evidenced by very few studies assessing and documenting factors related to sleep and health of Latinos (e.g., Sleep quality, sleep duration, and sleep disorders) (Ayala, Loredo, Arredondo, Patrick, & Elder, 2012; Baldwin et al., 2010; Cespedes et al., 2015; Loredo et al., 2010). Loredo et al., (2010) provide an overview of the current challenges that plague Latino sleep research, in his critique he mentions that there is a lack of sleep research that includes Latinos, there are differences (e.g. anatomical and cultural) that may predispose some Latino subgroups to sleep disturbances, and the role acculturation and its effects. Latinos. Yet, there is evidence highlighting the effect of poor sleep increases the risk and of Type 2 diabetes (Touma & Pannain, 2011). Interestingly, both short and long sleep duration were identified as risk factors for Type 2 diabetes (Beihl, Liese, & Haffner, 2009; Botros et al., 2009; Cappuccio, D'Elia, Strazzullo, & Miller, 2010; Chaput, Després, Bouchard, & Tremblay, 2007; Cespedes et al., 2015; Gangwisch et al., 2007; Gottlieb et al., 2005; Mallon, Broman, & Hetta, 2005; Spiegel, Knutson, Leproult, Tasali, & Van Cauter, 2005; Vgontzas et al., 2009) and heart disease (Nagai, Hoshide, & Kario, 2010); however, the vast majority of sleep research has been on non-Hispanic Whites of European background (Loredo et al., 2010). Ayas et al., (2003) found that the relationship between short sleep duration and diabetes becomes non-significant once BMI is introduced.

The same goes for research on the relationship between acculturation and sleep. A few studies assessing the relationship between acculturation and sleep behavior have been conducted with Latino adolescents (e.g., Ebin, Sneed, & Morisky et. al., 2001; McHale, Kim, Kan, & Updegraff, 2011; Roberts, Lee, & Hernandez et.al., 2004), but even fewer focusing on or including Latino adults (Cantero et al., 1999; Hale & Rivero-Fuentes, 2011; Hale, Troxel, Kravitz, Hall, & Matthews, 2014; Soler et al., 2013). In a study by Hale and Rivero-Fuentes (2011), researchers used data from the National Health Interview Survey, which was comprised of 1,436 Mexican Americans; results indicated that in comparison to their U.S. born Mexican American counterparts, Mexican immigrant's sleep patterns are healthier (25.9% vs. 20.0% respectively sleep less than 6.5 hours a day). Researchers have found that Mexican-born immigrants report less sleep symptoms or disturbances (Grander et al., 2013; Hale & Rivero-Fuentes, 2011). This partially supports the Latino Paradox, also known as the Hispanic paradox or the epidemiological paradox, a term first coined by Markides and Coreil (1986) as *Hispanic Epidemiological Paradox*. "The epidemiologic paradox describes a set of research findings showing that some groups of Hispanic immigrants to the United States have rates of mortality and health outcomes that are similar to native-born, non-Hispanic Whites and better than native-born, non-Hispanic Blacks" (Hamilton, 2012, para.1). This is an area that needs to be looked at more closely, given that the consequences of sleep disorders and issues regarding sleep duration are detrimental to improving health outcomes among Latinos. Yet, sleep is more complex than simply studying the relationship between sleep duration and health outcomes. Baldwin, Reynaga-Ornelas, Vaudillo-Cisneros, Gamino, and Quan (2010) provide an overview of the literature regarding the relationship between sleep disorders (e.g., obstructive sleep apnea, insomnia, restless legs syndrome, excessive daytime sleepiness) and numerous health ailments (e.g., Type 2 diabetes, coronary artery disease, depression).

As noted, sleep is important to look at when assessing health outcomes; additionally, researchers have identified sleep as a mediator between socioeconomic status and health outcomes (Moore, Adlre, Williams, & Jackson, 2002; Van Cauter & Spiegel, 1999). Numerous studies have found that socioeconomic status is associated with sleep quality (Friedman et al.

2007; Grander et al., 2013; Mezick et al. 2008; Moore, Adlre, Williams, & Jackson, 2002; Whinnery et al., 2014). Data from the Behavior Risk Factor Surveillance System was used to assess the association between socioeconomic status and sleep duration and sleep disturbances; findings suggest that overall, socioeconomic status and sleep are associated (Grander et al., 2013). Nevertheless, this relationship is described as a complex one, with a recommendation to look at subgroup differences (Grander, 2013). Furthermore, Whinnery et al. (2014) found a significant relationship between socioeconomic status and short and long sleep, even after controlling for health status.

Access to Health Care: Its Effects on Latinos' with Diabetes

Regardless of the health behavior an individual practices; without access to health care, it is difficult to assess the health status of an individual. Therefore, the subsequent section will focus on the importance of access to health care, barriers that prevent Latinos for accessing health care services, Latinos' current state of access and utilization of health care services, and the relationship between access and utilization of health care services important factors (e.g. SES). Furthermore, a portion of this section will be focused on the importance of health literacy in Latinos' understanding of diabetes.

Access to Health Care

Access to health care is one of the most important factors in prevention and management of diabetes. Access to health care is defined by the Institute of Medicine (1993, para. 4.) as "the timely use of personal health services to achieve the best health outcomes." As a group, Latinos have less access to health care, underutilize health care services (Ortega, Rodriguez, Bustamante, 2015), and receive poorer health care services (U.S. Department of Health and Human Services, 2011). According to the 2011 National Healthcare Quality and Disparities Reports, in comparison to Non-Hispanic Whites, Latinos received worse care on 39% of measures and had worse access to care on 63% of measures. When Latinos have poor access to health care services as well as poor quality of care, the likelihood of this population suffering from complications due to poor management of diabetes increases (e.g., diabetic retinopathy[16], end-stage renal disease, foot ulcers, and neuropathy[18]) (Shaw & Cummings, 2005). Solis, Marks, Garcia, and Shelton (1990) write that access to health care services is a strong predictor of health care utilization.

In addition, having usual source of care and health insurance are two predictors of improved access to health care and improved health outcomes. Usual source of care is “the particular medical professional, doctor's office, clinic, health center, or other place where a person would usually go if sick or in need of advice about his or her health” (U.S. Department of Health & Human Services, Agency for Healthcare Research and Quality, 2009, para.1). Having a usual source of care has been associated with receiving preventive services, improved access to health care, and improved health outcomes (Corbie-Smith, Flagg, Doyle, & O'brien, 2002; DeVoe, Fryer, Phillips, & Green, 2003). Other studies have found that individuals without usual source of care are more likely to utilize the emergency department (Liaw, Petterson, Rabin, & Bazemore, 2014). Escarce and Kapur (2006) write that usual source of care and health insurance are two significant barriers to accessing health care services. Devoe, Tillotson, and Wallace (2009) reported that individuals with health insurance and a usual source of care are more likely to receive the recommended diabetes services.

Direct Barriers Associated with Lack of Access and Utilization of Health Care Services. There are numerous barriers that make it difficult to access and utilize health care

[16] Diabetic retinopathy is damage to the eye's retina. (U.S. National Library of Medicine, n.d., a).
[18] Neuropathy is a damaged nerves may stop sending messages, this causes numerous symptoms such as numbness, tingling or burning sensation (U.S. National Library of Medicine, n.d., b).

services for Latinos. Escarce and Kapur (2006) list some of the barriers Latinos face, these barriers include: acculturation, language, and immigration status. However, there are other barriers that are indirectly associated with and make it difficult to access health care services (i.e. socioeconomic status and education). The literature supports the protective nature of acculturation in the access and utilization services by Latinos. The literature also supports to the positive effect acculturation has on access to health care (Perez-Escamilla, 2011). In an early study of a Mexican American Community by Chesney et al., (1982) researchers found a direct relationship between acculturation and utilization of health care services; that is, those who were more acculturated were more likely to use health care services.

Furthermore, immigration policies Impact Latinos' eligibility to federally funded programs. Given that numerous Latinos migrate from various Latin American countries, a barrier to Latino immigrants' access to health care is immigration status (Bustamante, Fang, Garza, Carter-Pikras, Wallace, Rizzo, Ortega, 2010; Cristancho, Graces, Peters, and Mueller, 2008; Fuentes-Afflick & Hessol, 2009; Ku & Matani, 2001). There are three specific laws that use immigration status as a stipulation to received government funding for health care services. The three laws include the: 1.) Personal Responsibility and Work Opportunity Act (PRWO), 2.) Children's Health Insurance Program Reauthorization Act of 2009 (CHIPRA), and 3.) Patient Protection and Affordable Care Act (PPACA) (American College of Physicians, 2011).

The PRWORA established the rule that legal immigrants were not eligible for federally funded programs for the first five years of residency in the United States (Cohen, 2007). Undocumented immigrants are ineligible for many federally funded benefits under the PRWORA (Office of the Assistant Secretary for Planning and Evaluation, 2009). Kandula, Grogan, Rathouz, and Lauderdale (2004) conducted an analysis of the impact PRWO had on the utilization of health care services. In their findings Kandula et al.'s (2004) results indicated that prior to the passage of this legislation non-U.S. born Latinos were less likely than U.S. born Latinos to enroll into Medicaid.

After PRWO was passed, Latinos were even less likely to enroll for services, with a 3% immediate drop after its passage. Nevertheless, access to health care improved for immigrant children and women after the passage of CHIPRA 2009 (American College of Physicians, 2011). After the passage of CHIPRA, immigrant women and children were now eligible for health care services with the use of federal funding even if they had not resided in the U.S. for five years (Kaiser Commission on Medicaid and the Uninsured, 2008). Accessing health care becomes even more complicated when members of a family are not eligible for the same services. Unfortunately, children are eligible for CHIP, but are born to families where there is mixed eligibility are more likely to be uninsured (Hudson, 2009). Immigration status produces an intangible burden to undocumented Latino individuals and their children. Due to their inability to present proper documentation of their legal status, undocumented immigrants do not seek services due to the fear of being deported (Perez-Escamilla, Garcia, & Song, 2010).

Cavazos-Rehg, Zayas, and Spitznagel (2007) suggest that emotional distress associated with the experience of being deported is associated worse health outcomes. Other undocumented immigrants do not access health care services because they also fear that if one-day amnesty legislation were to be passed they will not be eligible because they used government funding for health care, and therefore they were a burden to the United States. A myth is that undocumented immigrants enter the United States in order to access health care; however, findings suggest that this is not the case. The predominant reason for immigrants to enter the United States is to look for employment opportunities (Berk, Schur, Chavez, & Frankel, 2000). However, identifying barriers in accessing health care and ascribing recommendation is a complex assignment due to the heterogeneity of this population. Barriers to health care are not the same for all Latino subgroups, an amalgamation of barriers exist for naturalized citizens, non-citizen immigrants, and undocumented immigrants. The previously mentioned terms will be defined in order to have a clear understanding of what is meant. Naturalized citizens are foreign-born individuals who become U.S. citizens through a lawful process, and who have rights equivalent to those of U.S.-born citizens (Kaiser Commission on Medicaid and the Uninsured, 2008).

As for non-citizens, these are foreign-born individuals who live in the U.S. lawfully, but do not have U.S. citizenship. Non-citizens include Legal Permanent Residents (LPR), refugees, and asylees (Kaiser Commission on Medicaid and the Uninsured, 2008). The last category is that of undocumented immigrants. These are foreign-born individuals who live in the U.S. without proper documentation to verify legal status. This also includes individuals who have stayed after their visa expired (Kaiser Commission on Medicaid and the Uninsured, 2008). Undocumented Latino immigrants are often referred to as the “invisible” population because they are always hiding in the shadows with fear of being deported to their country of origin (Perez-Escamilla, Garcia, & Song, 2009).

The most current federal legislation affecting Latinos access to health care is the Patient Protection and Affordable Care Act (ACA). ACA has reduced the number of uninsured Latinos, according to Doty, Bluementhol, and Collins (2014), the number of uninsured Latinos for ages 19-64 was reduced from 36% to 24%. However, there are still areas that PACCA needs to address to improve the overall health of Latinos, and ensure that they have access to care. Ortega et al. (2015, p. 525) write that undocumented immigrants have no coverage under PACCA. Nevertheless, there is one federal law that allows uninsured and undocumented Latinos to be treated. The Medical Treatment and Labor Act of 1986 requires individuals be rendered emergency services regardless of their insurance status, immigration status, or inability to pay for services (Centers for Medicare and Medicaid Services, 2012). However, this is not the most cost-effective manner in which people should receive treatment, since it is costlier for tax payers and patients who receive treatment at hospital emergency room (Ortega et al., 2015).

Indirect Factors Associated with Access and Utilization of Health Care Services. Empirical findings make a compelling argument in which, access to health care and utilization of health care services are associated with gradients of socioeconomic status. Poverty is one gradient of socioeconomic status. Individuals who live in poverty are less likely to have health insurance, which translates into less access to health care, and higher mortality rate.

When compared to other minorities, Latinos' socioeconomic status is similar to African Americans (Morales et al., 2002); 23.5% of Latinos in the United States live below the poverty level, which is comparable their Black counterparts (27.2%), and almost two times that of their White counterparts (12.3%) (DeNavas Walt & Proctor, 2014). A partial explanation of this is that "the occupations in which Hispanics are concentrated rank low in wages, educational requirements and other indicators of socioeconomic status" (Kochhar, 2015, p. i). Research indicates that there is a positive relationship between SES and health; that is, higher levels of SES indicate better health outcomes (Cutler, Lleras-Muney, & Vogl, 2008).

Education as a gradient of socioeconomic status also indicates that those with less education are less likely to have usual sources of care[19]; for example 32% of those with less than a high school diploma did not have a usual source of care (Livingston, Minushkin, & Cohn, 2008). That is, an increase in level of education resulted in a decrease in lacking a usual source

[19] Usual Source of Care: "Usual source of care is the particular medical professional, doctor's office, clinic, health center, or other place where a person would usually go if sick or in need of advice about his or her health" (Agency for Healthcare Research and Quality, 2009, para.1).

of care (Livingston, Minushkin, & Cohn, 2008). Additionally, it has been stated that individuals from lower socioeconomic status prefer hospitals instead of outpatient care. Latinos are more likely to report that they do not have health care insurance coverage and that they do not have a usual source of care. Interestingly enough, most Latinos indicated that they do not have a usual source of care because they do not need it; this is followed by 17% who indicated that they do not have health insurance, and 11% who indicated high cost of care, one 3% indicated difficulties navigating the health care system (Livingston, Minushkin, & Cohn, 2008).

***Health Literacy*.** Among the Latino population health literacy is another culprit for the disproportionate prevalence of diabetes; however, little is known regarding the extent to which health literacy affects health outcomes (Shillinger et al., 2002). Health literacy is defined as "the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions" (Ratzan & Parker, 2000, As Cited by the IOM, 2004, p. 32). Individual and systematic factors affect an individual's capacity for an adequate level of health literacy, such factors include: a) communication skills of individuals and professionals, b) individual's knowledge regarding health topic(s), c) culture, and d) healthcare system's demand of individuals (U.S. Department of Health and Human Services, n.d.). Consequently, health literacy affects an individual's ability to navigate the health care system and perform necessary tasks (e.g., filling out forms, locating providers, setting appointments) to be eligible to utilize services (U.S. Department of Health and Human Services, n.d.).

In comparison to Non-Hispanic Whites, Latinos have lower health literacy, with 41% having below basic health literacy levels in English (i.e., 24% basic, 31% intermediate, 4% proficient) (USDHHS, 2008). To make matters worse, 62% of Spanish-speaking patients had fair to poor health literacy (Williams et al., 1995). An individual must have basic reading and numerical skills to have an adequate health literacy level (Safeer & Keenan, 2005), yet approximately 45% of foreign-born Latinos and 16% for U.S. born Latinos did not complete a high school education. Latinos often drop out of high school and do not complete college (KewalRamani, Gilbertson, Fox & Provasnik. 2007), with only 63% of Latinos obtaining a high school diploma (U.S. Census Bureau, 2011).

A combination of low levels of education attainment, inadequate health literacy, and a lack of access to a primary care physician, creates a deadly formula. Among Latinos, non-medical sources of health information are highly valued, especially among those without access to a health care system, with 68% of Latinos relying on information from television (Livingston, Minushkin, & Cohn, 2008). Information from non-medical sources has the potential to lead to poor knowledge about symptoms of diabetes, management of diabetes, or prevention of diabetes. For example, in a qualitative study participants indicated that their encounter with diabetes began with life experiences that produced strong emotions such as bad news that a family member was in trouble, or they themselves were suffering from an illness that caused them to be severely stressed. “My diabetes started with a surgery that I had . . .maybe I was very stressed; I don’t know; maybe I was very scared and because of that I had diabetes” (Cherrington et al., 2006, p. 608). In another qualitative study a participant stated:

> …when I went to Mexico, my daughter fainted because she got a potato chip stuck [in her throat]. I was very frightened and I think that this is when my diabetes began, because I was very frightened. I thought that she was going to die. (Coronado et al., 2004, p. 580)

In the two previously mentioned cases, the participants identified an event that produced strong emotions, and therefore contributed to the development of diabetes. Even though Type 2 diabetes is attributed to obesity and heredity, participants reduce their diagnosis of diabetes to a simple bidirectional relationship between emotions and diabetes. Instead of taking preventive steps to reduce the likelihood of being diagnosed with diabetes, they focus on one factor, and are unaware that diabetes does not develop after a traumatic event, but it is the result of a combination of biological and environmental factors.

Summary of Gaps

Latinos' predisposition to diabetes can be viewed from an ecological perspective, one which includes biological, psychological, and environmental factors. Even though the literature has found significant contributors to diabetes, there are still gaps that need to be addressed. The preceding section examined the factors that contribute to the disproportionate incidence of diabetes among Latinos. Research studies need to be developed to further understand the nuances, and thus help alleviate the burden this population endures due to the disproportionate incidence of diabetes (e.g., financial burden, poor quality of life, loss of ability to work). The following section will briefly summarize the gaps in literature regarding the disproportionate incidence of diabetes among Latinos.

Although not unique to Latinos, *Thrifty Gene Theory* has been widely used to understand Latino predisposition to diabetes, since Latinos' stem from ancestors who were hunters and gathers, yet research has been unable to provide evidence of a uniform gene that would support this hypothesis. Instead the literature is shifting to understanding the predisposition of diabetes by understanding why Latinos are resistant to insulin. Even with resistance to insulin there are gaps that need to be addressed. Researchers continue to struggle to understand the mechanism by which lead to development of Type 2 diabetes. As previously mentioned, there is an environmental component to understanding Latinos predisposition to diabetes. However, debates continue to overshadow finding since researchers continue to debate how SES should be measured. The biggest challenge is to understand the mechanisms that link SES with health outcomes. There is a lack of research capturing the quality of care received by uninsured Latinos, as well as undocumented Latinos. Furthermore, an area that may result in alleviating the burden of diabetes among Latinos is health literacy; however, there are important gaps that need to be addressed before Latinos are able to benefit from Health Literacy interventions. On a positive note, there is a push to create guidelines that will improve health literacy (e.g., USDHHS, 2010).

Concluding Statement

In conclusion, the purpose of this review was to: identify the gaps in the literature regarding the disproportionate incidence of diabetes among Latinos, to identify factors that are related to diabetes, and this was taken one step forward by making the connection between diabetes and heart disease. As previously mentioned, individuals with diabetes do not die from diabetes itself, but due to cardiovascular disease. Therefore, a portion of this dissertation was set aside to identify direct and indirect factors associated to socioeconomic factors and cardio vascular disease, as well as mediators that help explain the relationship between socioeconomic status and heart disease.

Chapter III

Theoretical Framework

A theoretical framework guides all aspects of an empirical research study from inception to conclusion (e.g., from understanding the phenomena of interest to interpreting and disseminating results.) (Herek, 2011). Herek (2011) gives four main arguments on how a research study is strengthened by providing a clear articulation of his or her theoretical framework, these arguments include: a) allows assumption to be critically evaluated, b) allows a review of existing literature about the phenomenon and prioritize research questions and variables, c) allows identification of theoretical underpinnings and focus on why and how it applies to the phenomenon, and d) helps identify limitations and generalization of a study based on a theoretical framework. There are numerous studies reporting and tracking the diabetes epidemic in the United States and the disproportionate incidence of diabetes among Latinos. Absent from these empirical studies is a theoretical framework or a theoretical model that helps researchers and stakeholders understand this occurrence, its concepts, and the relationships between these concepts which help illustrate a systematic view (Glanz, Rimer, & Viswanath, 2008) of the disproportionate incidence of diabetes among Latinos. This dissertation is exploratory in nature, therefore exploratory theories will be utilized. Exploratory theories help researchers identify modifiable factors that can provide an explanation for the existence of a problem (Glanz, Rimer, &Viswanath, 2008)

The literature on this phenomenon was utilized to identify relevant exploratory theories and models to help provide a rational for the questions and variables for this dissertation. Most articles focusing on Latinos with diabetes did not use a theory or theoretical model (n=37, 92.5%). Of the studies that used theory, Ecological Systems Theory and Social Cognitive

Theory (SCT) were primarily used (Caban, Walker, Sanchez, & Mera, 2008; González, Vega & Tarraf, 2010; Heisler et al. 2007). These theories are consistent with the list of theories that Glanz et al. (2008) note as being used in health behavior research. Among other theories the authors also list the following: Health Belief Model, Social Learning Theory, Theory of Planned Behavior, The Trans Theoretical Model/ Stages of Change, Social Support and Social Networks, Community Organization, Diffusion of Innovations, Stress and Coping, Patient-Provider Interaction, and Social Ecology. Yet, researchers studying health care disparities among Latinos with diabetes have neglected to use a theoretical model to understand the pathways that lead to the disproportionate incidence of diabetes in comparison to other racial groups. The following theory, health behavior model, and frame work of preventive strategies were used to identify psychosocial factors that protect or increase Latinos' risk to diabetes and cardiovascular disease: the Ecological Systems Theory, Andersen's Health Behavior Model of Health Service Use, and Haddon and Baker's framework of preventative strategies. Due to the exploratory status of this phenomenon the following section will identify theories and a model useful in exploring and exploring the extent to which Latino subgroups with diabetes or at risk for diabetes are affected by different dimensions of health care.

Ecological Systems Perspective

According to Sallis, Owens, and Fisher (2008), over the past 20 years there has been an inclination towards the use of the ecological perspective. A few of the studies of diabetes reviewed use Bronfenbrenner's Ecological Systems Theory (1979) as a theoretical foundation for their studies. Additionally, several studies have used social ecological systems theory to study health care disparities (e.g., Organista, 2007; Reifsnider, Gallaher, & Forgione, 2005; Whittemore, D'Eramo, & Grey, 2004). Therefore, it is argued that Bronfenbrenner's Ecological

Systems Theory (1979) may provide insight into understanding the disproportionate incidence of diabetes among Latinos given that it is a serious and complex health issue with irreversible consequences. Whittemore, D'Eramo, and Grey (2004) state that although three specific factors—genetics, ethnicity, and the individual's lifestyle—are factors responsible for an individual's susceptibility to Type 2 diabetes, current efforts have focused on the role of social and environmental factors. Understanding the cause and consequences of diabetes must be viewed from a holistic perspective, particularly with the emphasis on genetics and environment (Doria, 2005).

Some researchers have argued that in comparison to other theories, the systems perspective provides a holistic view of a phenomenon (Payne, 2005). Andersen (1995) directs attention to the ability of the systems theory to provide an "automatic-holistic continuum" depiction of an issue; that is, systems theory allows researchers to take health care disparities among Latinos with diabetes and look at it from the context of personal, social, and biological agents, and how these agents interact with each other, thus proving a holistic picture of the phenomenon. The systems perspective states that: 1) systems are comprised of interrelated components that form a larger system; 2) actions taken by a subsystem affects other subsystems, thus affecting the larger system; 3) each subsystem is comprised of a boundary, which in essence gives each subsystem an entity; and 4) dynamic interactions between, among, and within subsystems will have different outcomes (e.g., stability, change, dramatic change) (Hutchison, 2008). As Payne (2005) writes "this biological theory sees all organism as systems, composed of subsystems, and in turn par of super-systems" (p.143).

Hutchinson (2008) further describes the systems perspective as an "approach that sees human behavior as the outcome of reciprocal interactions of persons operating within organized and integrated social systems" (p.44). An ecological environment is comprised of micro-systems, meso-systems, and macro-systems. Within the micro-system, attention is placed on individual factors such as biological factors and psychological factors (e.g. Thrifty Gene Theory, Insulin Resistance, Acculturation). The meso-system moves away from the individual and focuses on small groups like family, friends, school, and religion. As for the macro-system, this refers to culture, society, and laws that affect an individual (Fisher et al. 2005).

Reasons for using the ecological systems perspective. When it comes to an individual being predisposed to diabetes, viewing the issue from an ecological perspective is useful because it allows the researcher to view the complexity of the issue, as well as the risks and protective factors surrounding diabetes. As the review of the literature indicates, health disparities among Latinos have been well documented; however, research studies addressing health care disparities among Latinos with diabetes neglect to provide a theoretical framework to understand this health issue. The Ecological Systems Theory demonstrates the complexity of health care disparities, and it hypothesizes that individuals exist within a system and are influenced by sub-systems (e.g., interpersonal networks, organization, community environment, and society and public policy). Mausner and Kramer (1985) state that the ecological framework is most often used in epidemiology to examine a disease because, for the most part, a disease cannot be attributed to or explained by one factor, instead a disease is a result of interactions between various factors. In this case, diabetes cannot be explained only by focusing on genetic factors. Symptoms of Type 2 diabetes take a significant amount of time to develop. Even though a person might be genetically predisposed to Type 2 diabetes, it is not an indicator that a person will suffer from it. Instead, diabetes is a chronic disease that can be prevented if people understand the factors that increase the risk of diabetes, eat healthy foods, exercise, and have access to preventive health care.

Therefore, attention should be placed on the interaction between micro-level, meso-level, and macro-level factors, which protect or increase the risk of developing diabetes.

Whether an individual is able to exercise, has access to healthy food, and has access to routine health care, is dependent on the interactions among micro (e.g., education, income, occupation, race, age, gender, genetics.), meso (e.g., family friends, safety of neighborhood, access to grocery stores), and macro factors (e.g., community environment, economic conditions, health policies). The way in which systems interact for an individual who does not have a high school education, is 40 years or older, of Latino descent, is employed in a blue collar job, lives in poverty, lives in a neighborhood that is not safe and does not have a grocery store is different as compared to a person with opposite characteristics (i.e., high school education or higher, younger, White, white collar employment, middle-class, lives in safe neighborhood with access to healthy food). Race and ethnicity may contribute to Latinos' predisposition to Type 2 diabetes; however, there are other societal factors that the ecological systems model uncovers that illustrate the complexities of this chronic disease, which can only be ameliorated if levels of the ecological web are addressed. To further strengthen the argument for the need of theoretical frameworks that take into consideration environmental factors, this dissertation turns to Haddon and Baker's (1981) preventive strategies, this framework will be applied to Type 2 diabetes among Latinos.

A Framework of Preventative Strategies

The need for a focus on preventive strategies. Diabetes among Latinos is of major concern as argued previously, however, most research emphasizes what practitioners should do after a person is diagnosed with diabetes instead of investing in efforts to prevent Type 2 diabetes. Haddon and Baker (1981) explicate a framework of preventive strategies: "The fundamental tasks in injury control are 1) to prevent the agents from reaching people in amounts or at rates that exceed injury threshold, and 2) to minimize the consequence of injury" (Haddon & Baker, 1981, p.111-112). Haddon and Baker (1981) provide a definition of the word injury as meaning "not right", but go on to describe it as meaning harm, hurt, loss, or wrong. The authors further explicate that there is no scientific distinction between the two terms: injury and disease. Although the authors use the term injury as referring to damaging results from an individual's exposure to physical and chemical agents; in this case, the term injury will be used to refer to diabetes resulting from biological, psychological, and social agents. Preventative approaches by Haddon and Baker (1981) will be utilized to view possible strategies to prevent Type 2 diabetes. Haddon and Baker (1981) strategies include: *1.) Preventing and Marshaling of Potentially Injurious Agents; 2.) Reducing Their Amounts; 3.) Preventing Inappropriate Release of the Agent; 4.) Modifying the release of the agent; 5.) Separating in Time of Space or 6.) with Physical Barriers; 7.) Modifying Surfaces and Basic-Structures, 8.) Increasing Resistance to Injury; 9.) Beginning to Counter Damage Already Done;* and *10.) Stabilizing, Repairing, and Rehabilitating the Injured.* The focus will be place on strategies one, two, nine, and 10 in order to avoid getting side tracked into strategies that are unfeasible.

Preventing and marshaling of potentially injurious agents and reducing their amounts. Step one refers to the reduction of agents that cause injury. Even though it is impossible to alter Latinos genetically so as to reduce the likelihood of injury, in this case the injury refers to being diagnosed with prediabetes or developing diabetes. There are other agents that increase Latino's likelihood of being diagnosed with prediabetes or developing diabetes. These agents are outlined by the Mayo Clinic (2016 b,c); a person is more likely to develop Type 2 diabetes if they:

- have a family history of diabetes
- are overweight or obese

- are 45 year old or older
- have had diabetes while pregnant (gestational diabetes)
- are not getting enough physical activity
- have polycystic ovary syndrome (PCOS)
- have prediabetes
- identifying as a Hispanic, American Indian, or an Asian-American, Black

Agents that increase the likelihood of developing prediabetes or diabetes are factors that contribute to becoming overweight or obese, developing high blood pressure, having abnormal cholesterol, and not getting the required amount of physical activity. These can be prevented by understand how to read food labels, understanding the importance of quantity and quality of food, drinking water, and following the required amount of physical activity. However, there are often barriers to these preventive methods. This calls for the communities where individuals living in poverty having access to affordable fitness centers, affordable nutritious food, and having a safe community. This plays into attacking the physical barriers, thus helping improve the likelihood of individuals participating in preventive behaviors. If these things are in place and used as directed, this would help increase an individual's resistance to injury. However, strategy number 2 refers to reducing the amount of agents that increase the risk of developing Type 2 diabetes. With this strategy, we look at factors that increase the risk of Type 2 diabetes, such as: the number of fast food restaurants in a community, the type of food offered in a fast food restaurant, ingredients in food. If one looks at the number of fast food restaurants in a low-income neighborhood, in comparison to grocery stores, one can see where strategies may be helpful in reducing the risk of Type 2 diabetes.

Beginning to counter damage already done and stabilizing, repairing, and rehabilitating the injured. Focusing on step nine and 10 as an intervention is appropriate when dealing with a disease that can not be prevented, however, diabetes can be prevented altogether even if the person is genetically predisposed to Type 2 diabetes. However, for some it may be too late, and therefore strategies must focus on controlling and preventing further complications caused by Type 2 diabetes. In this case we look at Type 2 diabetes in terms of having adequate access to health care, improve utilization access to health care, ensuring that barriers to access and utilization of health care services are in place, ensuring that individuals have are able to purchase treatment such as diabetic medication or insulin, and other medication to reduce the possibility of developing diabetic complications. The focus of this stage is on alleviating the damages causes by Type 2 diabetes, this is corresponds with *Andersen's Health Behavior Model of Health Behavior Use* (1968).

Andersen's Health Behavior Model of Health Service Use

Andersen's (1968) *Behavior Model of Health Service Use* will be used to explain and predict utilization of health services based on the ecological systems perspective. It is used in public health to understand why families utilize health care services, to define equal access and use of health care services, as well as to help in the development of policies that promote equality (Andersen, 1995). In the last 60 years, Andersen's *Behavior Model of Health Service Use* has evolved with three additional models produced based on the original 1960's model Andersen used in his dissertation. For the purposes of this dissertation, the primary focus will be on the original model; however, Andersen's (1995) recommendations were be taken into consideration. According to Andersen (1968), the *Behavior Model of Health Service Use* was developed to predict and explain the pathways to health care service utilization. Andersen (1995) proposes that predictors of care seeking can be divided into three main components and subcomponents: 1) predisposing factors, 2) enabling factors, and 3) need factors.

Predisposing factors. Predisposing characteristics include: demographic factors (e.g., age, gender), social structures and health beliefs. Other predisposing factors include: having a family history of diabetes, being a member of an ethnic group (e.g., Hispanics/Latinos), being 45 years of age or older, and having had gestational diabetes. According to Andersen (1995) demographic factors are characteristic of biological priorities, which can be interpreted as people's need for health services.

Social structures (e.g., Social Economic Status) represent an individual's status in their community, their ability to cope with their health issues, as well as their ability to command resources to improve their health status. Research supports the association between socio economic status and factors that increase the likelihood of developing Type 2 diabetes (e.g., poor nutrition, low fiber diet, obesity). An individual's ability to live in a community that has access to safe neighborhoods, fitness centers, and grocery stores is often limited by their social economic status (Everson et al., 2002). Empirical evidence such as a study by Smith (2007) further support this notion, with results indicating that individuals with a low socioeconomic status: 1) had a slightly higher risk of contracting diabetes, 2) had a greater risk of having their diabetes undiagnosed and untreated, and 3) had a more difficult time in managing and controlling their diabetes using complex treatments shown to be effective.

Latinos' ability to cope with Type 2 diabetes and to utilize services to improve their health also lies in the availability resources and Latinos' ability to access these resources. Exercise as a treatment option for mental health and health is more acceptable yet still often unachievable. Mier, Medina, and Ory (2007) write that Latinos understand that physical activity is a good way to control their blood glucose levels and take care of their mental health and wellbeing. In their qualitative study a participant stated the following: "One does it because of the disease [Type 2 diabetes] and at the same time to feel better, to look better. The clothing fits better since you are thinner" (Mier et al. 2007, p. 3). However, because of their socioeconomic status, Latinos are often unable to practice activities that reduce the likelihood of developing or controlling Type 2 diabetes. In this same qualitative study participants mention that family obligations, not having time because of work, and living in unsafe environments prevents them from having a regular exercise regime. One participant said “There are no sidewalks. There are no streetlights. Not even an adequate park…It’s true, on the streets, the dogs...and we need a park where one can find a safe place to walk” (Mier et al., 2007, p. 4). Participants made suggestions that they would like to have a facility that was in close proximity to their home, was inexpensive, and had a family oriented program.

Another component of Andersen’s (1995) model is health beliefs; these include an individual’s attitude, knowledge, and values that affect their perception of health and health services, thus affecting an individual’s perception of their need as well as their use of health services. These are only some of the factors included in the original model. In essence, an individual’s perception of how an illness develops, their attitude towards the illness or the health care system, as well as their values regarding health (e.g., value of health) will determine their perception of preventing Type 2 diabetes, controlling Type 2 diabetes (e.g., seeking treatment for Type 2 diabetes), and overcoming Type 2 diabetes. In a qualitative study, several participants’ descriptions emphasized the connection between emotions and diabetes.

> “My diabetes started with a surgery that I had . . .maybe I was very stressed; I don’t know; maybe I was very scared and because of that I had diabetes”. (Cherrington et al., 2006, p. 608)

Participants emphasized the need to be relieved from stress and strong positive or negative emotions in order to prevent increases in their blood glucose levels. These examples demonstrate some of the perceptions Latinos have regarding how they developed Type 2 diabetes and what practices are essential to control it.

Andersen writes that there is room for expansion, and that genetic and psychological characteristics can also be included. It is widely accepted that for the most part, individuals who develop prediabetes and diabetes are genetically predisposed; however, there are numerous environmental factors and health behaviors that also increase the risk of developing diabetes (Murea, Ma, & Freedman, 2012). One of the most widely accepted approaches used to explain the disproportionate incidence of diabetes among Latinos stems from a biological perspective (e.g., Caballero, 2005a, 2005b; Doria, 2005; Leahy, 2005; Leahy, 2008). The disproportionate prevalence of Type 2 diabetes among Latinos has been theorized to be a result of a specific gene labeled the *Thrifty Gene* (Liberman, 2003; Caballero, 2005a,b), as well as insulin resistance in the study of the disproportionate prevalence of diabetes among Latinos (Caballero, 2005a). Latinos' and other minorities' propensity to β-cell failure in combination with insulin resistance equate to higher prevalence of Type 2 diabetes.

Enabling factors. The second component of Andersen's model is Enabling factors, which include: personal and family factors, and community factors. Andersen explains that for service utilization to take place, certain factors must be present; such factors include community and personal enabling resources. Health professionals and health clinics must be present in the community where people live, and people must have the means and be aware that these services exist in order for them to utilize these services (e.g., income, health insurance, regular source of care, travel, waiting time, hours of operation of health facilities). As a group, Latinos encounter numerous barriers that make access to health care more difficult, and receive poorer quality health care services (Escarce & Kapur, 2006; Livingston, Minushkin, & Cohn, 2008). When

Latinos have poor access to health care services as well as poor quality of care, the likelihood of this population suffering from complications due to poor management of diabetes increases. Indeed, Latinos are disproportionately affected by inadequate quality of care and poor access, with results indicating that 60% of Latinos experience worse care and access to health care than Non-Hispanic Whites; and less than 20% of the disparities experienced by Latinos and other minorities are seeing improvement (Institute of Medicine, 2010).

Need. The last component of Andersen's Health Behavior Model (1968) is comprised of perceived and evaluated needs. According to Andersen (1995), the purpose of this category is to determine the immediate utilization of health care services; however, Andersen realized that an individual's perception could be altered through different mechanisms (e.g., health education or physicians evaluation). One thing that the behavioral model takes into consideration is external force, which helps researchers explicate the utilization of health services. Such factor like health care policies, resources and organizations can translate into an easy or difficult towards utilizing health care series.

To conclude, at the beginning of this chapter the lack of theoretical framework in Latino Type 2 diabetes was identified. After a review of the literature and other theories, the Ecological Systems Theory, a frame work of preventative strategies, and Andersen's Health Behavior Model have seem to provide the best fit to understand the complexity of Type 2 diabetes. They will be used as a guide to develop objectives, as well as a source to develop a rational for the use of variables. As previously stated, a strong theoretical framework is absent from most research studies about Type 2 diabetes among Latinos. Therefore, in this dissertation Herek's (2011) recommendations were taken into consideration when reviewing the literature to identify research questions and variables. The identification of theories and explanation of the theoretical underpinnings of the selected theories align with Herek's recommendations in explaining why and how they apply to Type 2 diabetes. Finally, understanding the limitation of the study based on a theoretical framework.

Chapter IV

Methodology

The purpose of this study was to assess how socioeconomic, psychological, and cultural factors affect access to health care and cardiovascular disease risk of Latinos with diabetes. Objectives were created to achieve the purpose of this study with the guidance of the Ecological Theoretical Framework, Andersen's Health Behavior Model (1968), and Haddon's and Baker's (1981) framework of preventive strategies. Request for approval from The University of Texas at Arlington Institutional Review Board was not required since the data secondary, were publicly available and considered exempt. The subsequent sections include a discussion of: a) selected data source, b) research design, c) study sample, d) purpose statement and objectives, e) power analysis, f) calculation of sample size, g) examination of assumptions for each statistical test proposed in this dissertation proposal, and h) a discussion of internal and external validity as it applies to this dissertation proposal.

Data Source

The 2014 *Integrated Health Interview Series* (IHIS) was used to answer the objectives in this dissertation proposal. "The Integrated Health Interview Series (IHIS) is a harmonized set of data and documentation based on material originally included in the public use files of the U.S. National Health Interview Survey (NHIS) and distributed for free over the Internet" (Minnesota Population Center and State Health Access Data Assistance Center, 2015, para.1). The IHIS allows researchers to obtain data freely from a web-based system. It was created to overcome challenges posed by the original NHIS as explained by Johnson et al. (2008). These challenges included, but were not limited to: changes in questionnaires, sampling designs, and changes in coding schemes over the years.

Since 1957, the National Center for Health Statistics (NCHS)—part of the U.S. Centers for Disease Control (CDC)— the NHIS is a mechanism by which the health of the United States is monitored (CDC, 2015e). Some of the information collected by the NHIS includes, but is not limited to demographic information, socioeconomic status, health conditions, health behaviors, mental health, access and utilization of health care services (Minnesota Population Center and State Health Access Data Assistance Center, 2015). The NHIS collects data every year; the content of the survey is updated every 10 to 15 years (CDC, 2010a). There are supplemental questions that are changed each year based on the health problems the people of United States are facing. For example, in 2010, supplemental questions included information about diabetes, diet and nutrition—information that was not asked previously in the NHIS (Minnesota Population Center and State Health Access Data Assistance Center, 2015).

Research Design and Sampling Strategy

This dissertation utilized a cross-sectional design. The design of this dissertation was deemed appropriate, since "a cross sectional study examines a phenomenon by taking a cross section of it at one point in time" (Rubin & Babbie, 2011, p. 281). The NHIS collects data annually, but only the most recent data available, 2014, will be utilized. Since data were not collected specifically for this dissertation, it was considered secondary analysis of existing data (Cheng & Phillips, 2014).

The NHIS utilizes a multistage probability design (CDC, 2015e). "The first stage of the current sampling plan consists of a sample of 428 primary sampling units (PSU's) drawn from approximately 1,900 geographically defined PSU's that cover the 50 States and the District of

Columbia." (CDC, 2015e, para. 7). Each PSU is comprised of an area segment[20] and permit segment[21], each generating different quantities of addresses (i.e., 8 to 16 addresses vs. 4 addresses respectively) (CDC, 2015e). The current design oversampled Black, Hispanic, and Asian research participants. This was done to increase the reliability of these groups, and therefore, sampling weights were used to correct for oversampling and ensuring representative sampling estimates were achieved (CDC, 2015e). Weighted data was used for variables selected for this dissertation.

Sample. The NHIS representatives contact about 30,000 to 40,000 households, which translated to about 75,000 to 100,000 participants each year (CDC, 2015e). In 2014, there were a total of 89,976 participants; however, since the focus of this study is Latinos, other racial and ethnic groups were excluded (Minnesota Population Center and State Health Access Data Assistance Center, 2015). There are 24,909 individuals who self-identified as Latinos in the 2014 IHIS data set. Appendix B Table 1 demonstrates the distribution of Latinos based on the country or territory of origin, and Appendix B Table 2 shows the distribution of Latinos with Diabetes (Minnesota Population Center and State Health Access Data Assistance Center, 2015).

Purpose Statement

The purpose of this study was to assess how socioeconomic, psychological, and cultural factors affect health outcomes of Latinos with diabetes. Given that there is a lack of theoretical framework to understand health practices and outcomes among Latinos with diabetes, objectives were created using a complementary framework that stemmed from an Ecological Systems

[20] "Are segments are defined geographically" (CDC, 2015e, para. 8)
[21] Permit Segment include housing units based on homes constructed after the 2000 census (CDC, 2015e)

Perspective, Andersen's Health Behavior Model, and Haddon's and Baker's (1981) framework of preventive strategies to meet the purpose of this dissertation.

Objectives and Data Analysis

Described below are the objectives and how each objective was analyzed. The alpha level for all inferential statistical analyses was set *a priori* to .05. Statistical Package for the Social Sciences (SPSS) version 24 and Analysis of Moment Structure (AMOS) 24 was used for the statistical analysis of objective 4. Descriptive analyses were conducted to describe Latino participants with diabetes based on the selected demographic characteristics: Age; Sex; Marital status (including living with a partner); Hispanic ethnicity; Number of years spent in the United States; Born in the United States; U.S. citizenship; Region born; Language of interview; Educational attainment; and Income).

Measures. The following section presents the objectives created for this dissertation (See Appendix C Tables 1, 2, 3 for Coding and Measurement of Variables for Demographic Information and All 3 Objectives).

a) Age of the Participants: Age is an important factor in diabetes research. Age is a risk factor for diabetes complications; as individuals age there is a tendency to not exercise as much, which can result in weight gain and the loss of muscle mass (Mayo Clinic, 2014e). In the NHIS data extracted from the IHIS system, participants are asked to state their age based on the year since their last birthday. Responses for this question range from 0 to 85+. Since this variable is continuous, the mean age of participants and standard deviation will be reported.

b) Gender is an important variable to monitor; given that, a shift has occurred in a long-standing trend in which women were more likely to be diagnosed with Type 2 diabetes.

However, data suggests that relative to women, men are developing Type 2 diabetes with a lower degree of obesity (Faerch, 2014). Gender is also important given that it affects the likelihood of developing heart disease, with men being more likely to develop heart disease. Women's likelihood of developing heart disease increases after they enter menopause, but their risk never becomes higher than males (American Diabetes Association, 2014e). For Type 1 diabetes, males and females are equally affected in young populations (Soltesz, Patterson, and Dahlquist, 2007). In this data set, gender of the participants is a nominal, dichotomous variable and therefore the mode will be reported (Gravetter & Wallanau, 2009), including the total number and percentage for each level of the variable.

c) Marital Cohabitation is also an important variable research to monitor; given that, research on men has alluded to the notion that men who do marry or are widows have a higher risk of developing Type 2 diabetes (Cornelis et al., 2014). Marital Cohabitation is a nominal variable with multiple categories. The mode will be reported.

d) Latino ethnicity is one of the most important variables in this dissertation. One of the main assertions made in this dissertation proposal alludes to the importance of not treating the Latino population as a homogenous group; this is clearly evident when it comes to the difference in prevalence of diabetes among Latinos. Furthermore, the national rate per 100 of diagnosed diabetes among Latinos for 2014 is as follows: all Hispanics 8.7, Puerto Rican 8.0, Mexican/Mexican American 9.7, and Cubans 5.4 (Centers for Disease Control, 2015b). Latino Ethnicity is a nominal variable with multiple categories. The mode was reported, including the number and percentage for each sub-group category.

e) Acculturation is an important variable to consider, empirical studies support the association between acculturation and numerous Latino health outcomes (Lara et al., 2005). However, acculturation is not a variable that is included in the NHIS 2014 data set, therefore a proxy was used, in which an acculturation score was created aggregating four variables (i.e., number of years spent in the United States, Born in the United States, United States, citizenship status, and language of interview). A likert scale was created, with higher scores indicating higher levels of acculturation. The following are proxies for acculturation cited in the literature (Thomson & Hoffman-Goetz, 2009).

1. Number of years spent in the United States: Years in the United States is an ordinal variable. The mode will be reported for this variable, including the number and percentage for each category. Categories include: (Less than 1 year= 0, 1 year to less than 5 years=1, 5 to less than 10 years=2, 10 years to less than 15 years= 3, 15 years or more=4, Unknown=5).
2. Born in the United States: This is a nominal variable. This variable was recoded into a nominal dichotomous variable (Born in the United States or U.S. Territory=1, Born Outside of the United States or United States Territory=0). The mode will be reported for this variable, including the number and percentage for each category.
3. U.S. Citizenship: Are you a citizen of the United States? This is a nominal variable. This variable was recoded into a nominal dichotomous variable. The mode was reported for this variable, including the number and percentage for each category (No=0, Not U.S. Citizen =0, Yes, U.S. Citizen= 1, Unknown=9, Unknown- Don't Know= 9).
4. Language of interview: The language that the participant chose was reported based

on the following nominal categories: English=2, Spanish=0, English and Spanish=1, Other Unknown-not ascertained=9. The mode was reported by reporting the number of cases under each category as well as the percentage.

5. Acculturation (Continuous). There are numerous ways to measure acculturation; however, the National Health Interview Survey did not utilize valid or reliable measures for this variable of interest. Therefore, proxies cited in the literature will be used to create an index (See Appendix C Table 3) Thompson and Hoffman-Goetz (2009) conducted a systematic review of measures of acculturation used in public health literature, Nativity, Length of Residence, Language of Interview, and citizenship status were among the top most used in studies.

f) Educational attainment was used as a proxy for socioeconomic position (SEP). Research suggests, "in high-income countries, low socioeconomic status seems to be related to a high incidence of Type 2 diabetes, but very little is known about the intermediate factors of this relationship" (Sarcedote et al., 2012, p. 1162). Educational attainment was a continuous variable: It was recoded for an analysis that requires a continuous variable (e.g. regression). However, for descriptive purpose, the variable will be a nominal variable with multiple categories. Therefore, for objective one, the mode was reported for this variable.

g) Individual income has often been used as a proxy for socioeconomic position. Although it was not used as a proxy for SEP, it is important to assess the individual income of Latino individuals; given that, research suggests that those individuals with lower income have a higher prevalence of diabetes, as well as diabetes related complications (Rabi et al., 2006). The mode was reported for this variable, including the number and percentage for each category.

h) Access to health care. Appendix C Table 3 has a list of variables that will help address objective 2. Since all variables for objective two are nominal, the mode was reported for this variable, including the number and percentage for each category. Access to health care was selected because of the important role it plays in diabetes prevention and management. It is important to monitor Latinos' access and utilization of health care services, since it has been reported that Latinos, on average, are the least likely ethnic group to have health insurance, have less access to health care, underutilize health care services (Ortega, Rodriguez, & Bustamante, 2015), and receive poorer health care services (U.S. Department of Health and Human Services, 2011b). Lack of access and underutilization of health care services for people with diabetes can lead to serious complications due to poor management of diabetes increases (e.g., diabetic retinopathy, end-stage renal disease, foot ulcers, and neuropathy) (Shaw & Cummings, 2005). Access to health care is a predictor of health care utilization (Solis, Marks, Garcia, & Shelton, 1990).

i) Social Economic Position (SEP) (Continuous). Two indicators of Social Economic Position were used in this study: income and education. Questions and measurement of these two indicators can be found in Appendix C Table 3. According to Galobardes, Lynch, and Smith (2007) income may not directly affect health outcomes; yet, it provides the means by which improve access to health promoting/enhancing opportunities. Furthermore, Galobardes, Lynch, and Smith (2007) propose the numerous indicators of SEP should be utilized within a life course framework. Therefore, education was also utilized, given that; these indicators represent the opportunities people have in life (Lynch & Kaplan, 2000).

j) Access to Health (Continuous). An index will be created to measure access to health care based on questions regarding source of usual care, delay in access to health care and ability to afford services (See Appendix C Table 3). These are factors used and cited in the literature to measure access to health care (Fiscella et al., 2002; Ortega et al. 2007; Weinick et al. 2004). Importance of this variable can be found in objective 2.

k) Psychological Distress (Continuous). To measure psychological distress, the Kessler 6 was used. Questions for the Kessler 6 can be found in Appendix C Table 3. The Kessler 6 has been described as having excellent internal consistency and reliability, with a Cronbach's alpha of .89 (Australian Institute of Family Studies, n.d.). Psychological distress is an important variable to consider given that it has been associated with diabetes and cardiovascular disease. According Kessler et al. (2003, p. 184), the K6 "had a sensitivity (SE) of 0.36 (0.08) and a specificity of 0.96 (0.02) in predicting SMI [serious mental illness]." The Kessler 6 has been used in studies associated between diabetes and psychological distress (Egede & Dismuke, 2012; Herrera, Smith, Ory, Rodriguez, Warre, Thompson, et al. 2011; Shin, Chiu, Choi, Cho, & Bang, 2012; Williams, Haskard-Zolnierek, Banta, Haviland, Dimatteo, Anderson, et al. 2010; Zizi, F., Pandey, A., Murrray-Bachmann, R., Vincent, M., McFarlane, S., Ogedegbe, et al., 2012) and cardiovascular disease and psychological distress (Fan, Strine, Jiles, Berry, & Mokdad, 2009; Ferketich, & Binkley, 2005; Manson, Jiang, Zhang, Beals, Acton, Roubideaux et al., 2011).

l) Physical Activity (Continuous). An index was created to measure physical activity utilizing three questions from the National Health Interview Survey. A summation of the responses for the three questions (See Appendix C Table 3) was used to create a score. The Office of Disease Prevention and Health Promotion (2016) reports the Physical Activity Guidelines for Americans, which state that aerobic activity should be performed during a time period of at least 10 minutes throughout the week. Physical activity is an important aspect for management of diabetes (National Institute of Diabetes and Digestive and Kidney Disease, 2014a) and heart disease (American Heart Association, 2014).

m) Cardiovascular Disease Risk (Continuous). Risk of Heart disease is comprised of 4 Factors from IHIS based on a Study by Fang et al. 2015. An index was be created using four questions; details are discussed on Appendix C Table 3. Risk of Heart disease is an important factor given that, research suggests that there is a strong association between diabetes and heart disease, with two out of three individuals with diabetes dying from heart disease (Randall, Segerson, & Romaine, 2011).

n) Body Mass Index (BMI) (Continuous). BMI is a measure of body fat in proportion to height and weight (See Appendix C Table 3). BMI was measured by computing the ratio of self-reported weight (in kilograms) and height (in meters square) (Centers for Disease Control, 2015c). BMI is an important factor to consider, especially since being overweight or obese is associated with an increased risk of developing diabetes (Narayan et al, 2007).

Objective 1. To describe the health care practices of Latinos with diabetes when it comes to:

a) Access to Health Care Services

b) Utilization of Health Care Services

c) Access and Use of Medications

d) Access and Utilization of Private and Public Health Insurance Programs

This objective answered the question: what are the experiences of Latinos in accessing and utilizing health services and treatment?

Objective 2. To describe and compare subgroups (e.g., ethnicities, place of birth [U.S. vs. non-U.S.], number of years in the U.S., language of interview) on the following variables (See Appendix D Table 1 for Test to be Completed for objective 2 and Appendix C Table 3 for Measurement and Coding of Variables):

a) Social Economic Position (SEP) (Continuous)

b) Access to Health (Continuous)

c) Psychological Distress (Continuous)

d) Physical Activity (Continuous)

e) Acculturation (Continuous)

f) Risk of Heart Disease (Continuous)

g) Body Mass Index (BMI) (Continuous)

This objective answered the question: how do Latino subgroups experiences with diabetes complications differ when considering biological, psychological and cultural factors? Statistical tests were selected with the help of information from the Institute for Digital Research and Education (2016a).

Assumption for 2 Independent Sample T-test. According to Lared Statistics (2013a) the following assumptions had to be met to utilize a two- independent sample *t*-test. These assumptions include: a) dependent variable measured at an interval or ratio level of measurement, b) the independent variable should be comprised of two independent groups, c) there should be independence of variables, d) there should be no significant outliers[25], e) there should be a normal distribution[26] of the dependent variable for each independent variable, and f) there should be homogeneity of variance[27]. There are no statistical or graphical methods to assess assumptions a, b, and c. These assumptions were assessed by evaluating the variables and ensuring that dependent variables are measured at a continuous level, and that independent variables are independent groups comprised of two categories, and that the design of the study ensures that a relationship does not exist between the amongst each group or between groups (Lared Statistics, 2013a). As previously mentioned, one of the assumptions of a two-independent sample *t*-test, is that no outliers are present. An outlier may be skew data; thus, leading to misinterpretation of results. It may also be an indicator of sampling error (Vogt, 2005). To assess whether outliers[28] were present, a box plot was computed. Details on how to interpret results from the box plot are provided by Garson (2012a). Furthermore, to assess whether there is a normal distribution of the dependent variable for each independent variable, a graphical method (i.e., histogram) was utilized. This is considered a rough assessment of normality; normality is achieved if the histogram displays a normal distribution of residuals (Garson, 2012a). As for normality, this was assessed utilizing the Shapiro-Wilks test of normality to ensure that the dependent variable is normally distributed for the independent variables in this study. The Shapiro-Wilks test can be used with small samples, ranging from

[25] Outlier- "A subject or other unit of analysis that has extreme values on a variable" (Vogt, 2005, p. 223).
[26] Normal Distribution- "A theoretical continuous probability distribution in which the horizontal axis represents all possible value of a variable and the vertical axis represents the probability of those values occurring. … In a normal distribution the mean, median, and mode are all the same" (Vogt, 2005, p. 211).
[27] Homogeneity of Variance – "An assumption that populations from which samples have been drawn have equal variance" (Vogt, 2005, p.145).

50 to 2000 (Lared Statistics, 2013b). Hair, Black, Babin, and Anderson (2010) recommend that both a graphical and a statistical method be used; since, test of significance are sensitive to small and large samples. Significance values greater than .05 indicate that data approach normality (Lared Statistics, 2013b). As for homogeneity of variance, it was assessed with the use of Levene's test, since it is regarded the most commonly used (Garson, 2012a). If the significance level is greater than .05, this indicates that group variances are equal and the assumption has been met (Lared Statistics, 2013a).

Assumptions for One Way Analysis of Variance (ANOVA). ANOVA is another statistical test used to answer objective 2. ANOVA is used to test the difference in means of two groups and assessing if the difference is statistically significant (Vogt, 2005). According to Hair et al., (2010), ANOVA is valid if “the dependent variable is normally distributed, the groups are independent in their response on the dependent variable, and the variances are equal for all treatment groups” (p. 364). As explained in the previous paragraph, a graphical method and a statistical method was used to assess normality (i.e., histogram and Shapiro Wilks test). Another assumption of ANOVA is homogeneity of variance, which was assessed by using Levene's test, the most commonly used test of homogeneity (Garson, 2012). Guidelines to interpret the graphical test, Shapiro Wilks test, and Levene's test can also be found in the previous paragraph. As for the assessment of the groups’ independence from their responses on the dependent variable, there is no graphical or statistical test to perform.

Assumptions for Linear Regression. Linear regression is “a method of describing the relationship between two or more variables by calculating a ‘best fitting’ straight line (or plane) on a graph” (Vogt, 2005, p. 175). Linear regression assumes that there are little or no outliers, normal distribution of data, linearity, no autocorrelation, homoscedasticity, normal distribution of residuals (Lared Statistics, 2013c). To assess whether outliers are present, a box plot was computed. Details on how to interpret results from the box plot are provided by Garson (2012a). As explained in the previous paragraphs, a graphical method and a statistical method were used to assess normality (i.e., histogram and Shapiro Wilks test). Linearity requires that the relationship between the two variables be linear. A graphic method (i.e., scatter plot) was used to ensure this assumption is met. Garson (2012a, p. 42) also writes the following, “a plot of standardized residuals against standardized estimates (fitted values) of the dependent variable should show a random pattern when non-linearity is absent).” Linear regression requires that there is little or no auto correlation, meaning that residuals are correlated (Vogt, 2005). To assess for autocorrelation, the Durbin Watson test was used, scores should be between 1.5 and 2.5 for auto correlation not to be present (Garson, 2012a). Homoscedasticity means that random noise will stay the same even if the *x* values change (Allison, 1990). To assess whether the data meets the assumption of homoscedasticity, a graphical method was used. If the scatter plot of residuals shows that there is no pattern, homoscedasticity was assumed as suggested by (Hair et al. 2010). To assess normal distribution of residuals, a histogram was used with a superimposed normal curve (Lared Statistics, 2013b).

Objective 3. To test a hypothesized model of pathways concerning cognitive, socioeconomic, cultural health behavior, using Structural Equation Modeling (SEM), which explain healthcare utilization and health outcomes amongst Latinos in the United States that self-identify as having diabetes. The questions answered by this objective are: What are the risk and protective factors that reduce or increase the risk of heart disease for Latinos with diabetes? What are the risk and protective factors that reduce or increase access to health care for Latinos with diabetes? and what are the risk and protective factors that reduce or increase the risk of cardiovascular disease risk for people with diabetes?. Sub questions included:

a. What mediates the relationship between Socioeconomic Position and Access to Health Care?; and
b. What mediates the relationship between Socioeconomic Position and Risk of Cardio Vascular Disease?

Mediating Analysis

Hypothesis 1

a. SES is significantly associated with Access to Health Care (HC), through acculturation.
b. Physical Activity is significantly associated to Risk of Cardio Vascular Disease, through Psychological Distress.
c. Psychological Distress is significantly associated with Access to Health care, through Acculturation.
d. Internet Utilization is significantly associated with Risk of Cardiovascular Disease, through Acculturation
e. Acculturation is significantly associated with Risk of Cardio Vascular Disease through Psychological Distress.

The hypothesized model was created with the consideration of Andersen's Behavior Model of Health Service Use, Bronfenbenner's Ecological Systems Theory, and empirical research (i.e., Bardenheier, Bullard, Caspersen, Cheng, Gregg, & Geiss, 2013). Andersen (1995) writes the following of his 1960's model "people's use of health resources is a function of their predisposition to use services, factors which enable or impede use, and their need for care" (Andersen, 1995, p. 1). Andersen writes that the model can be used to predict utilization of health care services or a means by which the factors within the model can be used to explain process of health care utilization. The behavior model of health service use has evolved over the last 50 plus years since its development, with researchers taking into consideration the need for health care policy reform. The original model introduced factors that contribute to, or impede, health care utilization; the factors that appear in the original model included: predisposing characteristics, enabling resources, need, and use of health care services. Under predisposing characteristics were three subtopics (i.e., Demographics, Social Structures, and Health Beliefs); Andersen provides a description of factors that can be included under each subgroup. For example, under demographic factors, Andersen states that factors like age and gender; examples of biological markers that point to predisposition of future need of health care services (Hulka and Wheat, 1985, as cited by Andersen, 1995). Therefore, for this dissertation, age, gender, physical activity, body mass index were included in the model.

Under predisposing characteristics is social structure, which refers to factors that describe an individual's position within a community; examples include: education, occupation, and ethnicity. These factors can be used to assess a person's status in a community, their ability to cope with the difficulties, as well as ability to access resources and utilize those resources and overcome the difficulties presented (Andersen, 1995). Therefore, socioeconomic position was included; it was measured utilizing the following variables: education, income.

Under the auspices of social structure, Andersen agrees with critiques that other factors such as social networks, social interactions, and culture should be included. Therefore, building on his original framework and in accordance with his suggestion, acculturation was included in the model because Latinos' continuous contact with the dominant culture (i.e., United States culture) has been cited as being a protective factor in some studies (prevention behaviors) yet a risk factor in others (dietary behavior).

The final subtopic under predisposing factors is health beliefs. Andersen (1995) describes health beliefs as “attitudes, value, and knowledge that people have about health and health services that may influence their subsequent perception of need and use of health services” (p. 2). The next overarching topic is enabling resources; this is comprised of community and personal factors, which must be present in order for utilization of health services to occur (Andersen, 1995). That is, communities need to have resources (e.g., health care personnel and facilities) available for people to access before utilization of these services can happen. However, it is not up to the communities alone; people must also have the knowledge of how to access these services, as well as the means to access these services (e.g., health insurance, interpreters). One variable that is not overtly addressed by Andersn’s model, but is a good fit, is that of internet-based health literacy. This variable is comprised of questions regarding an individual’s use of a computer and Internet to carry out health related actions (e.g., scheduling appointments, searching for health-related material, and communicating with health provider).

Andersen’s model of health care use states that “service’s’ use must consider how people view their own general health and functional state as well as how they experience symptoms of illness, pain, and worries about their health and whether or not they judge their problems to be of sufficient importance and magnitude to seek professional help” (Andersen, 1995, p. 3). The outcome of Andersen’s model, when proposed in the 1960s, was health care utilization; however, with time and changes in the health care needs of Americans, the model was re-interpreted by Andersen (1995). Building on this framework, cultural and psychological factors were included toward a holistic understanding of the pathways that lead to the risk of cardio vascular disease.

Structural Equation Modeling. Structural Equation Modeling (SEM) is a "statistical methodology that takes a confirmatory (i.e., hypothesis-testing) approach to the analysis of a structural theory bearing on some phenomenon" (Byrne, 2010, p. 3). According to Suhr (2010), there are numerous similarities between SEM and more traditional statistical methods like correlation and regression (e.g., approaches are based on linear models, validity of result is contingent on assumptions being met, normality is assumed, purpose of approaches is not to establish causality). However, in comparison to other approaches like regression, SEM provides numerous advantages (Byrne, 2010). Unlike more traditional statistical methods: a) SEM takes into account measurement error; b) it allows researchers to utilize both observed and unobserved variables; c) is a feasible statistical approach that allows for the modeling of multivariate relationships and provides estimation of the indirect effect of variables (Byrne, 2010).

Before computing SEM, numerous assumptions that underlie this multivariate statistical technique had to be considered. SEM assumes the following regression diagnostics: multivariate normal distribution, linearity, absence of outliers, sequence, non-spurious relationships, model identification, large sample size, uncorrelated error terms, and interval level data (Statistic Solutions, 2016). Garson (2012a) explains that multivariate normality refers to the normal distribution of all variables of interest as they relate to each other. Multivariate normal distribution was assessed with the use of a histogram (Garson, 2012a) as well as the Shapiro Wilks test.

Additionally, to ensure validation of the model, a bootstrapping approach was used, especially since normal distribution is not likely (Vogt, 2005). Bootstrapping is used to "validate a multivariate model by drawing a large number of sub-samples and estimating models for each subsample" (Hair, 2010, p. 2). Furthermore, the relationships between exogenous and endogenous variables are assumed to be linear. To assess whether this assumption has been met, a graphic method was used (i.e., scatter plot). SEM also assumes that there are no outliers. A box plot was computed to assess the presence of outliers. Details on how to interpret results from the box plot are provided by Garson (2012a).

Another assumption of SEM is that the sample size is large. Daniel Soper's (2016a) sample size calculator was used to ensure that an adequate sample size was available; details on the criteria used to calculate the appropriate sample size can be found in the subsequent paragraph. SEM assumes model identification; that is, "Equations must be greater than the estimated parameters or models should be over identified or exact identified. Under identification models are not considered" (Statistics Solutions, 2016, para. 3). This assumption was tested using the following formula: $P(P-1)/2$. The last assumption for SEM is that error terms are uncorrelated (Statistics Solutions, 2016). To test this assumption the Durbin Watson test was used; scores should be between 1.5 and 2.5 for auto correlation not to be present (Garson, 2012a). SEM requires that factors be measured at an interval level of measurement (Statistics Solutions, 2016).

Variables utilized in the proposed model were measured at an interval level of measurement; details on the measurement of variables can be found in Appendix C Table 3. SEM assumes sequence; that is, "there should be a cause and effect relationship between endogenous and exogenous variables, and a cause has to occur before the event" (Statistics Solutions, 2016, para. 3.); this is difficult to assess in the social sciences. Finally, there should be no spurious relationships, meaning that there should be support for identified co-variances (Statistics Solutions, 2016). Theoretical and empirical support has been the basis for the development of this model; theoretical support can be found in previous paragraphs.

Appropriate Sample Size for Statistical Test Selected: Power Analysis

A power analysis is calculated to assess a statistical technique's ability to detect a relationship, essentially assessing the probability of rejecting a false null hypothesis (Vogt, 2005). Cohen, Cohen, West, and Aiken (2013) writes of the complex relationship between power and four parameters (i.e., effect size, power of the statistic, sample size, and probability level. Cohen (1988) writes that it is worse to make type II error in comparison to a type I error. Also, given the inverse nature of the relationship between type I and type II error (as the probability of making a type II error increases the probability of making a type I error decreases) and consideration of the severity of making a type II error, a probability level of .05 was selected. That is, the researcher is comfortable making a type II error no more than 5% of the time. In regards to effect size, Cohen's d of .5 was selected, given that it is considered a medium effect size based on Cohen's review of social science literature, it is acceptable to use to use these guidelines when expected effects size based on literature on the same population is unavailable. Soper (2016b) states that power is by convention accepted to be ≥.8. For a Student's *t*-test with an anticipated effect size (Cohen's d) of .5, a desired statistical power level of 0.8, and a probability level of .05, a sample size of 128 is required for a two-tailed hypothesis. A minimum of 64 per group is required for a two-tailed hypothesis (Soper, 2016b).

Sample size for ANOVA was calculated using G*Power 3.1. (Institute for Digital Research and Education, 2016b). The following criteria was utilized: Effect size f of .25, α err probability 0.05, Power (1-β err probability) 0.95, number of groups 4. Total sample size needed is 25.

Sample size to conduct a linear regression has been calculated using an anticipated effect size (f^2) of.15, a desired statistical power level of 0.8, with 1 predictor, and a probability level of

.05. A minimum required sample size of 54 is needed (Soper, 2016c).

Sample size for a Structural Equation Model has been calculated *a priori* using the following criteria: an anticipated effect size (f^2) of 0.3, a desired statistical power level of 0.8, 5 latent variables, 22 observed variables, and a probability level of 0.05. The minimum sample size to detect effect is 45; the recommended minimum sample size is 88 (Soper, 2016a).

Internal Validity

Internal validity is often more relevant in studies in which an intervention is being conducted or when primary data is being collected. However, internal validity required researchers who use secondary data to become more familiar with data and have a more in-depth understanding (Smith, Ayanian, Covinsky, Landon, McCarthy, Wee & Steinman, 2011). Internal validity refers to the confidence the researcher has that the independent variable(s) is responsible for a change in the dependent variable (Rubin & Babbie, 2010). With a cross sectional design, there are a number of factors that threaten the internal validity of the study. One such threat is history; this threat occurs when an extraneous event occurs in concurrence with the manipulation of the independent variable (Rubin & Babbie), and therefore the outcomes is attributed to the event and not the intervention. According to Lavrakas (2008, p. 10), history is not a threat to internal validity

> because the dependent variable often is gathered immediately after the administration of the independent variable (e.g., most wording experiments built into a questionnaire require that the respondent answer the question immediately after being exposed to the wording), but in other instances the researcher must be very conscious of the possibility that history may have undermined the integrity

of the experimental design.

Since a cross-sectional design was used, and observing events are one point in time, it is unlikely that history poses a threat. No mention of major historical event was documented by NHIS.

Another threat to internal validity is maturation; it can either refer to the passage of time, or to natural changes that occur as time passes and the milestones that are reached as people age (Cook & Campbell, 1979). Maturation does not pose a threat to this study because of the cross-sectional design of the study, in which all data is collected within an hour. It is highly unlikely that major milestones occurred or were achieved within an hour, or that an event transpired within the time frame mentioned.

Testing is another threat to the internal validity of the study; it refers to the effect of administering a pre-test might have on a dependent variable (Cook & Campbell, 1979). If a pre-test is administered, questions might arise on whether the changes or improvements on the dependent variable can be attributed to the independent variable(s), or whether changes are due to participants' exposure to pre-tests. Testing is not a threat to this study because no pre-tests were utilized in this study and are not part of a cross-sectional design.

Furthermore, instrumentation is also a threat to internal validity, this threat occurs when instruments used to measure the dependent variable are changed between pre-test and post-test (Cook & Campbell, 1979). Since this is a cross-sectional study, all questions were asked at one point in time; no pre-test or post-test were utilized; and there were no changes in measurements used for this study, instrumentation does not pose a threat.

Statistical regression is also referred to as regression towards the mean (Vogt, 2005). This refers to the tendency of participants' whose scores are low become higher once they have taken the exam once (or vice versa). Statistical regression is a threat when utilizing a cross sectional design, but given the fact that participants were not selected based on their scores on an instrument it is unlikely that this study is significantly affected by statistical regression.

Selection is a threat to internal validity; it refers to the comparison of groups that are comprised of participants who decided to participate. In this case, the researcher does not have control of designating participants to a control and experimental group (Vogt, 2005). Moreover, selection is a threat to the internal validity of this study, since a difference may exist between those who decided to participate in the study and those who decided not to participate or were not recruited. Those who participated may be more motivated and or more willing to participate.

Furthermore, internal validity is threatened by ambiguity about the directions of causal influence (Cook and Campbell, 1979); given the design of the study, there is no way of establishing temporal order. It is unfeasible to establishing that the independent variable was indeed responsible for the changes in the dependent variable given the fact that there is no pre-test or post-test, or comparison group, or randomization.

Finally, mortality refers to participants dropping out of a research study for numerous reasons such as: geographically moving, dying, negatively affected by research study, or simply no longer desiring to be part of a study (Cook and Campbell, 1979). One the strengths of this study is that the survey only lasts 1 hour, and therefore it minimizes the likelihood of mortality or attrition before the completion of the study.

External Validity

External validity refers to the generalizability of a study's findings to other populations (Rubin & Babbie, 2010). Threats to the external validity of the study can be attributed to the people selected, places in which individuals were selected from, or time in which a study took place (Trochim, 2006). Reactive or Interaction Effect of Testing complications occur when the results of a study cannot be generalized from studies in which a pre-test was utilized to populations not exposed to a pre-test. Exposing a participant to a pre-test can affect the responses provided by participants to post-tests. To control this threat researchers wait some time in between the pre-test and post-test, or utilize a more robust design (e.g., Solomon Four-Group Design) (Kalaian & Kasim, 2008). In this dissertation, Reactive or Interaction Effect of Testing does not pose a threat to the external validity of this study since this is a cross sectional study and no pre-test was utilized.

Interaction effects of selection biases and the experimental variable poses the question of whether the sample is representative of the population; if the sample is not representative of the population then the results of the study are not generalizable (Cook and Campbell, 1979). To avoid this, the researcher must ensure that the sampling design (e.g., simple random sampling, stratified sampling, cluster sampling) will translate into a sample that is representative of the population of interest. This threat is controlled for, since the NHIS uses a multistage probability design, and the over sampling of Blacks, Hispanics and Asians; which was done to increase the reliability of the data from these groups. Therefore, furthermore sampling weights were used to correct oversampling and ensure representative sampling estimates.

Reactive Effects of Experimental Arrangements are factors found in the study's setting that may interfere with the generalizability of the findings (Cook and Campbell, 1979). Such factors include: the Hawthorne Effect, the Novelty or Disruption Effect, and or the Experimenter Effect. The Hawthorne Effect threat occurs when participants are cognizant that they are participating in a research study, in turn, being aware that one is being studied may affect the responses or behavior of participants (Cook & Campbell, 1979). The Hawthorne Effect is a threat to the external validity of this study, since participants are aware that they are participating in survey research. One strategy to reduce this is by not using obtrusive measures.

Novelty and disruption effect refers to the threat to external validity when a disruption from a novel treatment or disruption from a treatment occurs (Cook & Campbell, 1979). This is not a threat to this study since no treatment was utilized. The experimenter effect poses a threat to external validity when the researcher consciously or unconsciously gives cues to participants and therefore influences the responses given by participants. Researchers should monitor and report if experimenter effects are observed. To control for this, the researcher should be familiar with the experimental setting. This variable is out of the control of the researcher; given that the author played no role in the collection of data. It is likely, given that data were collected through phone interviews, this threat does exist.

Multiple Treatments refers to a threat to external validity in which participants are exposed to more than one treatment, and therefore it is difficult to determine if the results are due to the current treatment or if it is the cumulative summation of the exposure to multiple treatments. One way to avoid this threat is to avoid studying subjects that are frequently used in studies such as college students. Another is to use an experimental design that often is unfeasible in social science research. In this dissertation, multiple treatments were not used, and therefore are not a threat to this dissertation.

Chapter V

Results

Description of the Sample

Participants in this study are described on the following socio-demographic characteristics: sex, marital status, years lived in the United States, Latino background, citizenship status, language, and socio economic status (APPENDIX, F Tables 1-6). Results include both weighted and non-weighted descriptive statistics. The majority of participants were female (*n*= 362, 55.50%). Females comprised a little more than half of the participants (N= 757,941, 53.80% vs. *N*=649,930, 46.20%) when weighted cases (weighted by PERWEIGHT) were used. In regards to participants' marital status, participants who were married comprised the largest group (unweighted *n*=310, 47.60%, weighted *N*=675,305, 48.00%), followed by those who were divorced (unweighted *n*=98, 15.00%, weighted *N*=191,124, 13.60%) and never married (unweighted *n*=88, 13.50%, weighted *N*=177,331, 12.60%) (See APPENDIX F, Table 1). The average age of participants was 61.5 years of age.

Furthermore, a little over half of participants indicated that they had lived in the United States for 15 years or more (*n*=342, 52.50%, weighted *N*=726,378, 51.60%) (See APPENDIX F, Table2). When comparing all Latinos based on their background, the highest percentage were of Mexican origin (unweighted *n*=246, 37.70% weighted *N*=511,940, 36.40%), followed by Mexican Americans (unweighted *n*= 160, 24.50% weighted *N*=341,764, 24.30%) and Puerto Ricans (unweighted *n*=74, 11.30%, weighted *N*=178,060, 12.60%) (See APPENDIX F, Table3). A majority of participants indicated that they were U.S. citizens (*n*=464, 71.20% weighted *N*=1,011,348, 71.80%) (See APPENDIX F, Table 4). About half of participants also indicated that they were born outside of the U.S. (*n*=346, 53.10% weighted *N*=731,786, 52%) (See

APPENDIX F, Table5). A little over half of participants indicated that they spoke English (*n*=367, 56.30% weighted *N*=806,592, 57.30%) (See APPENDIX F, Table 6).

Results for Objective 1

Objective 1 was to describe the health care practices of Latinos with diabetes when it comes to:

a) Access to Health Care Services;

b) Utilization of Health Care Services;

c) Access and Use of Medications; and

d) Access and Utilization of Private and Public Health Insurance Programs.

This Objective will answer the question, "What are the experiences of Latinos with diabetes accessing and utilizing health care services?" (See APPENDIX G, Tables 1-39 for Complete Results). The majority of participants indicated that they had a usual place for medical care (unweighted *n*=609, 93.40%; weighted *N*=3,239,938, 93.70%); only a small percentage indicated they had no usual place for medical care (unweighted *n*[30]=34, 5.20%; weighted *N*[31]= 171,281, 5%) (See APPENDIX G, Table 1). In terms of the place in which usual source of care is sought, the about half of participants indicated that they visited a doctor's office or HMO (*n*=330, 50.60%, *N*=1,781,174, 51.50%) (See APPENDIX G, Table 2).

The second highest group was represented by respondents who indicated they went to a clinic or health center (*n*= 251, 38.50 %, *N*=1,285,909, 37.20%). Questions regarding reasons for not having usual source of care (i.e., too expensive, did not get around to it, of other reason) were largely coded NIU (See APPENDIX G, Table 3-5). Very few indicated that they had trouble finding a general doctor (*n*=29, 4.40%; *N*=156,998, 4.50%) (See APPENDIX G, Table 6).

[30] n refers to unweighted frequencies
[31] N refers to weighted frequencies

Questions regarding the ability of finding a doctor even though it may have been difficult did not apply to most participants (responses were coded as Not In Universe [NIU]), less than 3% indicated that this was a problem (*n*=17, 2.60%, *N*= 86,749, 2.50%) See APPENDIX G, Table 7).

Also, very few indicated that they were told new patients were not accepted (*n*=16, 2.50%; *N*=86,253, 2.50%) (See APPENDIX G, Table 8). A small number of participants (*n*=2, .30%) indicated they did not have a usual source of care because they did not know where to go (*N*=12,859, .40%) (See APPENDIX G, Table 9). Only 1 person indicated that they had no usual source of care because a previous doctor is unavailable (.20%) (*N*=8,127, .20%) (See APPENDIX G, Table 10). Not having usual source of care does not seem to be affected by distance or inconvenience (See APPENDIX G, Table 11). Language was not a factor in not having usual source of care (See APPENDIX G, Table 12). Only 1 person indicated that they had no usual source of care because they do not like doctors (.2%; *N*=4,574; .10%) (See APPENDIX G, Table 13). Only 1.70% (*n*=11; *N*=63,226, 1.8%) indicated that they did not have a doctor because they did not need one (See APPENDIX G, Table 14).

When participants were asked if care was delayed as a result of not being able to get an appointment soon, a majority indicated that this was not an issue (*n*=590, 90.50 %; *N*=3,086,803, 89.20%) (See APPENDIX G, Table 15). Most participants indicated that delay in care was not due to a doctor's office not being open (*n*=618, 94.80%; *N*= 3,273,214, 94.60%); nor the inability to contact the doctor's office by phone (*n*=614, 94.20%; *N*= 3,244,919, 93.80%); nor long waits in a doctor's office (*n*=591, 90.60 %; *N*= 3,137,757, 90.70%); nor a lack of transportation (*n*=616, 94.50%, *N*= 3,305,611, 95.60%) (See APPENDIX G, Tables 16-19). The majority of participants also indicated that if medical care was delayed in the past 12 months, it was not due to cost (*n*=562, 86.20%; *N*=1,225,118, 87%) (See APPENDIX G, Table 20).

The majority of participants responded “No” when asked: if they needed but could not afford medical care (*n*=588, 90.20%; *N*=1,283,637; 91.20%), needed but could not afford prescription medicines (*n*=552, 84.70%; *N*= 2,897,399, 83.30%), needed but could not afford mental health care (*n*= 632, 96.90%; *N*=3,371,535, 97.50%), needed but could not afford follow-up care (*n*=588, 90.2%; *N*=3,129,785, 90.5%), needed but could not afford a specialist (*n*=580, 89%; *N*=3,065,807, 88.60%) (See APPENDIX G, Tables 21-25).

However, more than half of participants indicated they did not ask their doctor for medications that cost less (*n*=448, 68.70%; *N*=2,324,944, 67.20%) (See APPENDIX G, Table 26). An overwhelming majority also indicated that they did not buy medications in other countries as a means to reduce cost (*n*=615, 94.30%; *N*= 3,258,623, 94.20%) (See APPENDIX G, Table 27). More than three-quarters of participants also indicated that they did not take less medication to save money (*n*=512, 78.50%; *N*=2,686,119, 77.70%) (See APPENDIX G, Table 28). Over three-quarters indicate they did not have to delay refilling medications in the past 12 months (*n*= 502, 77%, *N*= 2,626,643, 75.90%) (See APPENDIX G, Table 29).

There was, however, an indication that participants worried about paying medical bills, with some indicating they were very worried (*n*=203, 31.10%; *N*= 1,140,778, 33%) followed by participants who indicated that they were somewhat worried about paying medical bills (*n*=180, 27.60%; *N*=957,634; 27.70%) (See APPENDIX G, Table 30). A little more than 40% indicated that they were not at all worried (*n*=262,40.20%; *N*=1,336,162, 38.60%). Almost twenty-five percent (24.50%) of participants are paying medical bills over time, the large majority are not (*n*=492, 75.50%; *N*=1,082,718, 76.90%) (See APPENDIX G, Table 31). A little more than twenty percent (21.50%) of participants indicated they were having difficulty paying or were unable to pay medical bills in the last 12 months (*n*=140, 21.50%; *N*=286,670, 20.40%) (See APPENDIX G, Table 32). A little over twelve percent (12.10%) indicated they were unable to pay medical bills (*n*=79; *N*=157,675, 11.20%) (See APPENDIX G, Table 33). The majority of participants were labeled as NIU for the question regarding the confidence in affording a private health insurance plan (*n*=428, 65.60%; *N*=916,634, 65.10%) (See APPENDIX G, Table 34).

The majority indicated that they did not have problems with their health coverage, with almost ninety-five percent (*n*= 619, *N*= 3,313,303, 95.8%) indicating that they were not told their coverage was not accepted (See APPENDIX G, Table 35). More than three-quarters of participants indicated that they had health insurance coverage (*n*=544, 83.40%, 1,178,392, 83.70%) (APPENDIX G, Table 36), more than half indicated that they were not covered by private health insurance (*n*=449, 68.90%, 964,681, 68.50%) (APPENDIX G, See Table 37) More than half of participants refused to answer whether they were covered by Medicaid, or whether they received public assistance or chip (464, 71.20%, *N*=1,012,478, 71.90%) (APPENDIX G, See Table 38). The majority of responses regarding confidence in affording private health insurance were coded as NIU (*n*=428, 65.60%, 916,634, 65.10%), less than 5.0% (*n*=28, *N*=63,868, 4.50%) indicated that they were very confident in affording private health insurance (APPENDIX G, See Table 39).

Results for Objective 2

Objective two was to describe and compare subgroups (i.e., ethnicities, place of birth [U.S. vs. non-U.S.], number of years in the U.S., language of interview) on the following variables:

a) Psychological Distress (Continuous Variable)

b) Socioeconomic Status (i.e., Education) (Continuous Variable)

c) Access to Health Care (Continuous Variable)

d) Physical Activity (Continuous Variable)

e) Cardio Vascular Disease Risk (Continuous Variable)

f) Body Mass Index (BMI) (Continuous Variable)

g) Acculturation (Continuous Variable)

h) Internet Based Health Literacy (Continuous Variable)

i) Self-Rated Health (Continuous Variable)

Changes were made in for the proposed statistical test to make comparisons due to sample size and violations of statistical assumptions for Student's *t*-test and Analysis of Variance (ANOVA). Given that data violated the assumption of normality, bootstrap method was implemented. Bootstrap method is a resampling procedure first introduced by Efron (1979). Mooney and Duval (1993) wrote the following about bootstrapping:

> The central idea is that it may sometime be better to draw conclusion about the characteristics of a population strictly from the sample at hand, rather than by making perhaps unrealistic assumptions about that population. Bootstrapping involves "resampling" the data with replacement many, many, times in order to generate an empirical estimate of the entire sapling distribution of a statistic. (p.12)

Since SPSS did not provide a Bootstrap option for ANOVA, the Kruskal-Wallis H-test was used instead. A non-parametric test was selected given that the assumption of normality was violated. More details about assumption violations will be provided in subsequent paragraphs. See Appendix D, Table 1 for a comprehensive summary of statistical test to be conducted. Results of the Student's *t*-test results will be presented first, followed by ANOVA results, Kruskal-Wallis H test results, Kendall's Tau-b. Guidance from Laerd Statistics (2013 a,b,c;

2015 a,b; 2016) was used run and interpret Student's *t*-test, Kruskal-Wallis H test results, and Kendall's Tau-b. ***Student's t*-test Results.** Results for objective 2 regarding Student's *t*-test are presented in the following order: 1) A discussion of sample size and statistical power; 2) a summary of tests conducted to ensure assumptions were met for each individual Student's *t*-test; and 3) results. Prior to running independent Student's *t*-test, six assumptions were assessed to ensure the following criteria was met: a) dependent variable were measured at an interval or ratio level; b) independent variables were made up of two categories; c) independence of observations was present; d) significant outliers were not present; e) dependent variable were normally distributed; and f) homogeneity of variance. A summary of sample size to ensure sufficient power can be found in the appendix (See Appendix H, Table1). Since there are 18 individual Student's *t-test*, a table is available with a summary of the assumptions tested (i.e., box plots, Shapiro-Wilks tests, Levene's tests, outliers) (See Appendix H, Table 2, 3, and 4). Lastly, a summary of Student's *t*-test results will be presented a comprehensive summary of findings can be found in the appendix (See Appendix H, Table 5 and Table 6).

Power Analysis for Student's t-test. A power analysis was calculated to assess a statistical technique's ability to detect a relationship, essentially assessing the probability of rejecting a false null hypothesis (Vogt, 2005). For a Student's *t*-test with an anticipated effect size (Cohen's *d*) of .5, a desired statistical power level of 0.8, and a probability level of .05, a sample size of 128 is required for a two-tailed hypothesis. A minimum of 64 per group was required for a two-tailed hypothesis (Soper, 2016b). All variables surpassed the minimum number of 64 participants per group for a two-tail hypothesis (See Appendix H, Table 1).

Testing Assumptions for Student's t-test. When developing a strategy on how variables were going to be measured, it was ensured that the dependent variables were measured continuously. It was also ensured that independent variables for independent Student's *t*-tests were comprised of two categorical levels (i.e., citizenship status [U.S. citizen vs. Not U.S. citizen] and born in U.S. territory [U.S. born vs. non-U.S. born]). There is no statistical test to ensure independence of observation. Graphical and statistical analysis were used to assess for significant outliers, normal distribution of dependent variables (i.e., Shapiro-Wilk's test [. Normality is assumed if *p*-value(s) is greater than .05.]) and homogeneity of variance (i.e., Levene's test [homogeneity of variance is not assumed if *p*-value is less than .05]).

***Outliers*.** To identify outliers, the box plot method was used. Tukey's (1977) original publication stated that observation that were 1.5 greater were considered outliers. However, a subsequent publication by Haglin & Iglewicz, (1987) suggest that utilizing 1.5 for demarcation purposes is unreliable, given that 50% of the time it labels observations as outliers when they are not. Therefore, it has been suggested that 2.2 be used in a formula to assess outliers (Haglin & Iglewicz, 1987), but it can only be used if data is normally distributed (How2stats, 2016). It is recommended that a factor of three, which SPSS labels with an *, and therefore, for the purposes of the analysis of outlies only observations with an * were considered outliers (How2stats, 2016).

Normal Distribution. The Shapiro-Wilk test was used to assess whether the dependent variables were normally distributed for each group in the independent variable. Appendix H Table 2 provides a list of all the dependent (i.e., Psychological distress, education, access to health care, physical activity, cardio vascular disease risk, BMI, acculturation, internet based health literacy, and self-rated health) and independent variables (Citizenship status and place of birth). The Shapiro-Wilk test found that the dependent variables were not normally distributed for each level of the independent variables (i.e., citizenship status and place of birth), $p < .05$ (See Appendix H Table 2 for Complete Results).

Equality of Variance. Levene's Test for Equality of Variance was used to assess whether the assumption of homogeneity of variance was violated; if *p*-values were greater than .05, the assumption that groups had equal variance was assumed (See Appendix H Table 2 for Complete Results). Under citizenship status: Education (F=.45, p=.50), BMI (F=2.38, p=.12), Self-Assessed Health Status (F=.38, p=.54) did not violate the assumption of homogeneity of variance; other variables violated the assumption of homogeneity of variance and therefore equal variances were not assumed when interpreting results. Under language of interview, only psychological distress (F=1.50, p=.22), access to health (F=3.75, p=.05), cardiovascular disease risk (F=5.25, p=.02) and self-rated health (F=.05, p=.83) were assumed to have equal variances; *p*-values for other combinations were less than .05 and therefore equal variances were not assumed.

Student's t-test Based on Citizenship Status. Results of Student's *t*-test suggest that U.S. citizens and non-U.S. citizens were statistically significant different in: psychological distress scores ($t_{(455.80)}$ =-3.08, p<.01), education ($t_{(643)}$ =-11.30, p<.01), access to health care ($t_{(509.70)}$ =2.72, p=.02), BMI ($t_{(621)}$ = -2.44, p= .02, acculturation ($t_{(590.45)}$ = -31.76, p=.001), and internet based health literacy scores ($t_{(604.55)}$ =-7.56, p<.01). Non-U.S. citizens' mean scores were lower when it came to psychological distress, education, BMI, acculturation, and internet based health literacy. The mean scores for psychological distress was lower for non-U.S. citizens', lower scores mean less psychological distress. As for education, Non-U.S. citizens' had lower education scores, lower scores translate to less education. Non-U.S. citizens' also had lower BMI scores (i.e., lower BMI score means lower BMI). However, their access to health care mean score was higher in comparison to their U.S. Citizen counterpart, higher scores mean more access to health care. Bootstrap for independent sample Student's *t*-test further supported the results. Non-U.S. born citizens had lower internet based health literacy mean scores, this translates to less internet based health literacy. See Appendix H, Table 5 for complete Student's *t*-test results based on citizenship status.

Student's t-test Based on Place of Birth. A Student's *t*-test were conducted and those who were born outside of the U.S. or a U.S. territory were statistically significant different in: education ($t_{(643.58)}$ =-10.19, p<.01), cardiovascular disease risk ($t_{(215.10)}$ = -2.48, p<.01, BMI ($t_{(527.62)}$ = -3.60, p<.01), acculturation ($t_{(624.56)}$ =-47.04, p<.01), and internet based health literacy scores ($t_{(444.30)}$ =-5.73, p<.01), in comparison to those born in the U.S. or a U.S. territory. Latinos born outside of the U.S. (or U.S. territory) lower education scores, lower scores mean less education. Latinos born outside of the U.S. (or U.S. territory) also had lower BMI scores, lower scores mean lower BMI. Latinos born outside of the U.S. (or U.S. territory) also had lower acculturation scores, lower scores mean less acculturation. Latinos born outside of the U.S. (or U.S. territory) also had lower scores on internet based health literacy, lower scores mean less internet based health literacy. Those born outside of the U.S. or a U.S. territory's mean scores are lower when it came to education, cardiovascular disease risk, BMI, acculturation, and internet based health literacy. See Appendix H, Table 6 for complete Student's *t*-test results based on place of birth.

Results for Objective 2a

Objective two was to describe and compare subgroups (i.e., Latino country or territory of origin and Language of Interview], number of years in the U.S., language of interview) on the following variables:

a) Psychological Distress (Continuous Variable)

b) Socioeconomic Status (i.e., Education) (Continuous Variable)

c) Access to Health Care (Continuous Variable)

d) Physical Activity (Continuous Variable)

e) Cardio Vascular Disease Risk (Continuous Variable)

f) Body Mass Index (BMI) (Continuous Variable)

g) Acculturation (Continuous Variable)

h) Internet Based Health Literacy (Continuous Variable)

i) Self-Rated Health (Continuous Variable)

ANOVA and Kruskal Wallis H-Test. The original intention was to conduct ANOVA analysis based on ethnicity and language preferences. Assumptions for ANOVA were tested; a summary of the box plots, Shapiro-Wilks tests, and Levene's tests can be found in APPENDIX I Table 1; however, data violated the assumption of normality for all variables and SPSS did not offer a bootstrap function. Therefore, a non-parametric test was selected to assess whether group differences existed. The Kruskal-Wallis H test was selected to assess group differences based on ethnicity and Language.

Kruskal Wallis H-Test Assumptions. Prior to running Kruskal-Wallis H test, there are four assumptions that were met; these included: a) dependent variable should be measured at an ordinal or continuous level of measurement; b) the analysis must include an independent variable that is comprised of a categorical variable with at least two independent categories; and c) independence of observations. The fourth assumption requires an assessment of the independent variable to see if the groups have the same or different distribution; this will affect how the Kruskal-Wallis H test is interpreted. Given that the first three assumptions have been met, it is appropriate to use the Kruskal-Wallis H test. The last assumption is assessed once the Kruskal-Wallis H-test has been conducted, and results will provide information regarding the distribution of the independent variable; and thus, determine how results were interpreted. Medians were calculated for variables for which distribution of the independent variable were similarly distributed for each group of the dependent variable (See APPENDIX I Tables 2 and 3). In cases where distributions were dissimilar, mean ranks were calculated (See Appendix I Tables 4 and 5).

Kruskal-Wallis H Test Based on Ethnicity. A Kruskal-Wallis H test was conducted to assess whether group differences existed among ethnicities (i.e., Mexicans, Mexican-American, Puerto Rican, Other, Central or South American). Kruskal-Wallis H-test based on ethnicity revealed that groups were statistically significantly different when it came to: education (H (4) =70.95, p<.01), physical activity (H (4) =9.79, p=.04), cardio vascular disease risk (H (4) =12.25, p=.02), acculturation (H (4) =206.38, p<.01), and self-rated health (H (4) =9.76, p<.01) (See APPENDIX I Table 6 for Complete Results).

Post Hoc Results. Pairwise comparisons were performed using Dunn's (1964) procedure with Bonferroni correction for multiple comparisons for variables on which groups were found to be statistically significantly different. Adjusted p-values are presented (See APPENDIX I, Tables 7-11 for Pair Wise Comparisons of Post Hoc Results Based on Language). This post hoc analysis revealed statistically significant differences in education scores between Mexican (*Mdn*= 9) and Central and South American (*Mdn*= 14) (p= .01); Mexican and Puerto Rican (*Mdn*= 13) (p< .01); Mexican and Other (*Mdn*= 14) (p< .01); and Mexican and Mexican American (*Mdn*= 14) (p<.01); but not between any other group combinations. Lower education scores can be translated as less education. Mexicans' had lower median education scores in comparison to Central and South Americans', Puerto Ricans', Others, and Mexican Americans'. Another post hoc analysis revealed statistically significant differences in physical activity scores between Other (*Mdn*= 0) and Central and South American (*Mdn*= 0) (p= .03); but not for any other group combinations. It is difficult to interpret this finding; given that, both groups had the same median score.

Furthermore, a post hoc analysis revealed statistically significant differences in acculturation scores between Mexicans (*Mean rank*=228.12) and others (*Mean rank*= 336.38) (p<.01); Mexicans and Puerto Ricans (*Mean rank*= 378.46) (p<.01); Mexicans and Mexican Americans (475.74) (p<.01); Central or South Americans (*Mean rank*= 228.7) and others (p<.01); Central or South American and Puerto Ricans (p<.01); Central or South American and Mexican Americans (p<.01); Other and Puerto Rican (p<.01); Puerto Rican and Mexican American (p<.01); but not for other group combinations. Higher acculturation scores mean more acculturation. Therefore, Mexicans had lower acculturation in comparison to Others, Puerto Ricans, Mexican Americans. Central and South Americans had lower acculturation levels in comparison to Others, Puerto Ricans, and Mexican Americans. Puerto Ricans had lower acculturation levels than Mexican Americans. The final post hoc analysis for country of origin revealed that there were no statistically significant differences in self-rated health scores and cardiovascular disease risk scores for any group combination.

Kruskal-Wallis H Test Based on Language. A Kruskal-Wallis H test was conducted to assess whether group differences existed based on language preference (i.e., Spanish, English, Both). Kruskal-Wallis H-test based on ethnicity revealed that groups were statistically significantly different when it came to: education (H (2) =169.934, p<.01), physical activity (H (2) =9.15, p=.01), BMI (H (2) =13.77, p<.01), acculturation (H (2) =453.90, p<.01), internet based health literacy (2) =59.69, p<.01, and self-rated health (H (2) =9.54, p=.01) (See APPENDIX I, Table 12 for Complete Results).

Post Hoc Results. Pairwise comparisons were performed using Dunn's (1964) procedure with Bonferroni correction for multiple comparisons. Adjusted *p*-values are presented (See APPENDIX I, Table 13-19 for Pair Wise Comparisons of Post Hoc Results Based on Language). This post hoc analysis revealed statistically significant differences in education scores between Spanish (*Mdn*=7) and English (*Mdn*=14) (*p*<.01) and English and both languages [*Mdn*=9] (*p*<.01), but not between Spanish and both. Higher education scores mean more education. Therefore, those interviewed in Spanish had less education than those who were interviewed in English. Those who were interviewed in both languages had less education than those interviewed only in English. In regards to physical activity scores, post hoc analysis revealed statistically significant differences in physical activity scores between Both (*Mdn*=.00) and English (*Mdn*=.00) (*p*=.01) but not between any other group combinations. Higher physical activity scores mean higher level of physical activity. However, it is difficult to interpret these findings; given that, both groups had a median of .00.

As for cardiovascular disease risk, post hoc analysis revealed statistically significant difference between both (*Mean rank*= 91.31) (*p*<.01) and English (*Mean rank*=125.57), but not for other combinations. Higher scores are indicative of higher cardiovascular disease risk. Those who were interviewed in English had a higher cardiovascular disease risk than those interviewed in two languages (Spanish and English). Another post hoc analysis revealed statistically significant differences in BMI scores between Spanish (*Mdn*=28.96) and English (*Mdn*= 31.05) (*p*<.01) but not between any other group combinations. BMI scores (higher scores are indicative of higher BMI) were higher for those who were interviewed in English.

Furthermore, post hoc analysis revealed statistically significant differences in acculturation scores between Spanish (*Mean rank*=118.47) and Both (*Mean rank*= 235.55) (*p*<.01); Spanish and English (453.39) (*p*<.01); and Both and English (*p*<.01). Higher scores are indicative of more acculturation. Those were interviewed Spanish had a lower levels of acculturation in comparison to those who were interviewed in both languages. Between those who were interviewed in Spanish and English, those who were interviewed in English had higher levels of acculturation. Between those who were interviewed in two languages (i.e., Spanish and English) and only in English, those who were interviewed in English had higher levels of acculturation.

A post hoc analysis revealed statistically significant differences in internet based health literacy scores between Both (*Mean rank*= 275.16) and English (*Mean rank*=356.42) (*p*<.01); and between Spanish (*Mean rank*= 277.99) and English (*p*<.01), but not between any other group combinations. Higher scores are indicative of higher levels of internet based health literacy. Those who were interviewed in both languages (i.e., Spanish and English) had lower levels of internet based health literacy than those interviewed in English. Those who were interviewed in Spanish had lower levels of internet based health literacy than those interviewed in English.

The last post hoc analysis revealed statistically significant differences in self-reported health status between Spanish (*Mdn*=2) and Both (*Mdn*=3) (*p*=.01) but not between any other group combinations. Higher scores are indicative of higher levels of self-report health. Those who were interviewed in two languages (i.e., Spanish and English) reported higher levels of self-rated health in comparison to those who were interviewed in Spanish.

Objective 2b

To assess whether a relationship exists between number of years in the U.S. and other variables. The original intention was to assess whether group differences existed on the basis of the amount of time spent in the United States amongst those not born in the U.S. or a U.S.

territory. However, an assessment of group differences using a t-test or an ANOVA could not be conducted because of insufficient sample size within each group (i.e., n =5 [1 year to less than 5 years], n=14 [5 years to less than 10 years], n=36 [10 years to less than 15years], n=342 [15 years or more]). Data did not meet the assumption of linearity, normality, and absence of outliers for Pearson's correlation coefficient. Therefore, it was decided that a non-parametric test would be used in its place and a new objective was created (i.e. To assess whether a relationship exists between number of years in the U.S. and other variables. Data did not meet the assumption of having monotonic relationships for Spearman's Rho, and therefore Kendall's tau was used. Kendall's tau has three assumptions: a) must have two ordinal variables; b) must have paired observations; and c) relationship should be monotonic. Having a monotonic relationship is not a "strict" assumption (Lared Statistics, 2016, p. 3, Understanding Kendall's tau-b).

Kendall's tau-b correlation was used to assess the relationship between the number of years in the United States and numerous independent variables (i.e., psychological distress, access to health care, education, physical activity, CVD risk, BMI, internet based health literacy, and self-rated health). There was a positive association between number of years in the United States and psychological distress (tb=.10, p=.04) and acculturation (tb=.47, p<.01), but not for any other combinations (See Appendix J, Table 1 for complete results). The more years in the U.S. resulted in higher psychological distress and higher levels of acculturation.

Results for Objective 3

To test a hypothesized model of pathways concerning cognitive, socioeconomic, cultural health behavior, using Structural Equation Modeling (SEM), which explain healthcare utilization and health outcomes amongst Latinos in the United States that self-identify as having diabetes. The questions answered by this objective are: What are the risk and protective factors that reduce or increase the risk of heart disease for Latinos with diabetes? What are the risk and protective factors that reduce or increase access to health care for Latinos with diabetes? and what are the risk and protective factors that reduce or increase the risk of cardiovascular disease risk for people with diabetes?. To ensure the accuracy of the results, the Gauss-Markov assumptions were tested before SEM and mediation analyses were computed. The following will detail the results of the assumptions (i.e., multivariate normality, assessment of missing data for dependent and independent variables, assessment of whether missing data were missing completely at random, linearity, multicollinearity, outliers, multivariate outliers, missing data after outliers were eliminated) that were tested and what steps were taken to correct violations of assumptions that were identified.

Assessment of Missing Data for Dependent Variable. Frequency counts were run on all independent variables and dependent variables. The dependent variable was comprised of four questions about cholesterol, hypertension, smoking, and diabetes. A summary of missing data for each variable can be found in APPENDIX K tables 1-4 (No table is available for diabetes since participants in this study identified themselves as a person with diabetes). A score was created by summating four questions, creating a total score that ranged from 1 to 4 (Ever told had diabetes, Ever told had hypertension on 2+ visits, Had high cholesterol, past 12 months, Ever smoked 100 cigarettes in life). Everyone received one point, since all participants in this sample reported they had diabetes. The sample included 652 cases; however, SPSS was unable to calculate a CVD risk score for all participants because two questions (i.e., Ever told you had hypertension on 2+ Visits; Had high cholesterol, past 12 months) included the code *Not In*

Universe (NIU)[32]. NIU code was treated as missing, and all cases with NIU were eliminated. Consequently, this reduced the sample from 652 to 230. There were 2 additional participants whose CVD risk scores were not calculated because they did not answer the question about cholesterol. These cases were also deleted since these questions were dichotomous and could not be imputed; this resulted in a sample size of 228 participants.

Assessment of Missing Data for Independent Variables After Missing Data for Cardio Vascular Disease Risk Were Eliminated. Missing data were also assessed for all independent variables. Bennett (2001) suggests that missing data greater than 10% is considered biased. Missing data for each independent variable is less than 10 percent (See APPENDIX K, Table 5). Little's (1988) Missing Completely at Random (MCAR) method was used to assess whether missing data were missing completely at random. According to Garson (2015), MCAR is assumed if p>.05. All variables in the proposed model were included in the analysis (i.e., psychological distress, education, physical activity, CVD risk, BMI, Acculturation, Internet Based Health Literacy, Self-Rated Health, CVD risk, and access to health care). Little's MCAR results (x^2=43.40, df=55, p=.87) is indicative of the data indeed being missing at random given the p>.05. If data are MCAR, researchers may use leastwise or pairwise deletion method (Garson, 2015).

Bivariate Assessment of Variable Using Pearson's Zero-Order Correlation. Before deleting missing data or imputing appropriate variables, Pearson's zero-order correlation was used to assess which variables were associated at the bivariate level between independent (psychological distress, education, physical activity, CVD risk, BMI, Acculturation, Internet

32 "The universe is the population at risk of having a response for the variable in question. In most cases, these are the households or persons to whom the survey question was asked, as reflected on the survey questionnaire….Cases that are outside of the universe for a variable are labeled "NIU" (Not In Universe) on the codes page. (IPUMS Health Survey, para. 10)."

Based Health Literacy, Self-Rated Health) and dependent variables (CVD risk and access to health care). Independent variables that were not associated at the bivariate level were not included in the SEM model (See APPENDIX K, Table 6). Therefore, the only variables included in the SEM model were psychological distress, physical activity, acculturation, and self-rated health. Little's MCAR test was run again to ensure that missing data continued to be missing at random; results indicated that they were. The following was the result for Little's MCAR of only significant independent variables with CVD Risk (x^2=6.93, *df*=4 *p*=.14); therefore, data continue to be MCAR given that *p*>.05 as suggested by Garson (2015).

Multivariate Normality. Univariate and multivariate normality were assessed. Kurtosis values were used to assess univariate normality. Using West et al.'s (1995) criteria, values greater than 7 were considered to violate the assumption of normality. Physical activity was the only variable that violated the assumption of univariate normality, it had a kurtosis value of 46.08. Furthermore, Mardia's (1974) normalized estimate was used to assess multivariate kurtosis (i.e., Critical Ration in AMOS). Values greater than 5 were indicative of violation of multivariate normality (Bentler, 2005). Normality was not assumed given that the critical value was greater than 5 (Multivariate *C.R.=26.43*), therefore, bootstrap will be used to address the violation of multivariate normality.

Linearity. Linearity was assessed using a curve estimation. According to Garson (2012b) "both curve fitting and nonlinear regression are methods of finding a best-fit line to a set of data point even when the best-fit line is nonlinear" (p. 5). A relationship between an independent variable and the dependent variable was considered linear if *p*<.05 (Garson, 2012b). A curve estimation was used to assess whether a linear relationship existed between independent variables; results indicated that there is linear relationship between the independent variables (i.e., psychological distress, physical activity, acculturation, and self-rated health) and cardiovascular disease risk (APPENDIX K, See table 7).

Multicollinearity. Another assumption of multiple regression is that multicollinearity is not present (Garson, 2012a). According to Vogt (2005) "In multiple regression analysis, Multicollinearity exists when two or more independent variables are highly correlate; this makes it difficult if not impossible to determine their separate effects on the dependent variable" (p. 198). Multicollinearity was assessed using Variance Inflation Factor (VIF) results for all independent variables. According to Garson (2012a), a VIF value > 4 is an indicator of multicollinearity. VIF result indicates multicollinearity is not an issue in this study, given that VIF values were <4 (Results can be found in APPENDIX K Table 8).

Assessment of Univariate Outliers[1] using Box Plots. Outliers were assessed for all variables in the model using Box Plots. Tukey's (1977) original publication stated that observations that were 1.5 greater were considered outliers. However, a subsequent publication by Hoaglin and Iglewicz (1987) suggests that utilizing a 1.5 multiplier for identification of outliers was unreliable, given that 50% of the time it labels observations as outliers when indeed they are not. Therefore, it has been suggested that a 2.2 multiplier be used in a formula to assess outliers (Hoaglin & Iglewicz, 1987) if data are normally distributed. Data in this study was not normally distributed; subsequently this formula cannot be utilized. It is recommended that a factor of three, which SPSS labels with an * be used as an indicator of outliers (How2stats, n.d.). Therefore, for the purposes of the analysis of outliers, only observations with an * will be considered outliers. Physical activity was the only variable that had outliers; the box plot indicated that cases 2, 12, 13, 14, 37, 124, 125, 142, 143, 144, 156, 219, 220, 224, 225, and 228 were outliers. Outlier cases were eliminated. Pearson's zero-order correlation was used again to assess whether physical activity continued to be correlated with cardiovascular disease risk after outlier cases were eliminated. Pearson's zero-order correlation indicated that physical activity continued to be associated with CVD risk.

Assessment of Multivariate Outliers using Mahalanobis Distance. The mahalanobis distance was utilized to identify multivariate outliers, given that it is considered one of the most preferred test used for this purpose (Vogt, 2005). One of the most common cut off values used to identify multivariate outliers are values great than or equal to 1 (Garson, 2012a). The mahalanobis distance indicated that there was 1 case that was > 1.00; subsequently this case was eliminated.

Missing Data. Steps to address missing data were taken after all assumptions were assessed and appropriate steps were taken to correct violations. Cases with missing data for acculturation were eliminated since the acculturation score is made up of dichotomous variables and cannot be imputed. Since data are missing completely at random, data were imputed using the regression method in AMOS. The following variables were imputed: Psychological Distress (Kessler's 6 Scale), Education, and Physical Activity using regression method in AMOS.

Revision of Objective 3. Objective 3 asked two questions: what are the risk and protective factors that reduce or increase the risk of heart disease for people with diabetes?; and what are the risk and protective factors that reduce or increase access to health care for people with diabetes? However, Pearson's zero-order correlations revealed that only one construct was associated with access to health care, and it was a weak relationship ($r=.22$, $p\leq.001$) (i.e., psychological distress). Furthermore, it made little theoretical sense to pursue an assessment of this association or identification of possible mediating relationships. Therefore, objective three will focus on answering only one question: What are the risk and protective factors that reduce or increase the risk of heart disease for people with diabetes?

Power Analysis. Power was re-assessed given a newly revised hypothesized model was presented after Pearson's zero-order correlations was conducted and prior to running the model power analysis. With an anticipated effect size (f^2) of 0.3, a desired statistical power level of 0.8, 12 latent variables, 14 observed variables, and a probability level of 0.05, the minimum sample size to detect effect is 200.The recommended minimum sample size for model structure is 644 (Soper, 2016a). The sample size for this model is 226; thus, it is sufficient to detect a statistical effect, but not to assess model structure.

Results of Revised Objective 3. The statistical software Analysis of Moment Structures (AMOS) 24 was used to answer the central question and examine the hypothesis for this study. Furthermore, to assess whether psychosocial factors mediate the relationship between individual characteristics and cardiovascular disease, the Sobel test was used (Baron & Kenny, 1986; Preacher, 2017). Literature was used to guide and establish the directions of the relationships between moderators and mediators, moderators and outcome variable, and mediators and outcome variables. The proposed model and hypothesized pathways to be tested can be found in Appendix H: Figure 1 and Table 9. Multivariate normality was not assumed; therefore, the bootstrap method was utilized.

Model Fit Results. Numerous indices were selected to assess the fit of the data to the proposed model. This fit includes: Chi, including: chi-square (χ^2), Root Mean Square Error Approximation (RMSEA), Comparative Fit Index (CFI), and Tucker-Lewis Index (TLI). In addition to χ^2, other indicators will be used, given that χ^2 is sensitive to sample size. One such indicator is RMSEA, considered to be a robust measure to assess model fit. A value of .06 or less is considered a good model fit (Byrn, 2010). Results indicated an RMSEA value of .08, indicating an acceptable fit (Browne & Cudeck, 1993). The TLI (Tucker & Lewis, 1973) and the CFI were also used to determine the model fit. CFI compares the hypothesized model with the independence model (Byrn, 2010) with values >.95 indicative of a good fit (Hu & Bentler, 1999). Results provided a CFI value of .93, also indicative of a mediocre model fit. As for the TLI, Hu and Bentler (1999) also indicate that a TLI value >.95 is indicative of a good fit. Results provided a TLI value of .88. Overall, it seems there is a mediocre fit between the data and the hypothesized model. Furthermore, the Bollen-Stine bootstrap method was used to assess the data fit to the hypothesized model (Bollen & Stine, 1993). The Bollen-Stine bootstrap method indicated a poor model fit to the data (Bollen-Stine bootstrap $p<.01$)

Multivariate Results of Cardiovascular Disease Risk. Among Latinos with diabetes there were numerous variables associated with cardiovascular disease risk. There were five characteristics significantly associated with CVD risk: sex, age, psychological distress, physical activity, and acculturation. On average, Latinas have less risk of CVD than Latinos ($\beta = -.23$, $p \leq .001$). Age of Latinos with diabetes is positively associated with CVD risk: suggesting that as age increases, the risk of CVD also increases ($\beta = .13$, $p \leq .05$). A positive association between psychological distress and CVD risk was also found: ($\beta = .19$, $p \leq .01$). An increase in psychological distress results in an increase of CVD risk. A negative association was found between physical activity and CVD risk: suggesting that as physical activity increases CVD risk decreases ($\beta = -.24$, $p \leq .001$). A positive relationship was found between acculturation and CVD risk: as ($\beta = .22$, $p \leq .01$). This implies that higher levels of acculturation is associated with increased CVD risk. Individual model parameters were assessed for statistical significance. The Bias-corrected confidence intervals were used using a 95% confidence interval. Bootstrap results supported these findings (See APPENDIX K, Table 11 and 12). The strongest predictor of cardiovascular disease risk was physical activity given that it had the largest coefficient. The independent variables in the model explained 22% of the variance in cardiovascular disease risk.

Multivariate Results by Education, Sex, Age, and Marital Status. Among Latinos with diabetes, a positive association was found between education and acculturation; as level of education increased so did levels of acculturation. Sex and marital status were not associated with any of the moderators in the model (i.e., psychological distress, self-rated health, physical activity). Furthermore, among Latinos with diabetes, age was associated with three characteristics: psychological distress (β= -.14, p $\leq$.05.), self-rated health (β= -.16, p $\leq$.05), and physical activity (β= -.15, p $\leq$.05). A negative relationship was found between age and psychological distress; as age increased psychological, distress decreased. A negative relationship was found between age and self-rated health; as age increased, self-rated health decreased. A negative relationship was found between age and physical activity; as age increased physical activity decreased. Boot strap results did not support the relationship between age and psychological distress, nor did it support the relationship between age and physical activity (See APPENDIX K, Table See Table 11 and 12 and Figure 3 and 4).

Multivariate Results: Relationship between Moderators. Among Latinos with diabetes, psychological distress was associated with self-rated health: as psychological distress increased self-rated health decreased (β= -.31, p $\leq$ .001.). Among Latinos with diabetes, a positive association was found between education and acculturation; (β= .50, p $\leq$ .001), as education levels increase so did acculturation levels. Bootstrap results corroborate both of these findings (See APPENDIX K, See Table 11 and 12).

Mediation Results. The Sobel test was used to assess mediating relationships. Among Latinos with diabetes, age had a significant indirect effect on CVD risk through psychological distress (Sobel test statistic= -3.76, $p < .01$). Furthermore, age had a significant indirect effect on CVD risk through physical activity (Sobel test statistic=4.16, $p < .01$). Education did not have a significant indirect effect. Nevertheless, it is important to remember that bootstrap results did not find a significant association between age and physical activity. Bootstrap results also revealed that there was not a significant association between age and physical activity.

Chapter VI

Discussion

The purpose of this study was to assess how socioeconomic, psychological, and cultural factors affect health outcomes of Latinos with diabetes. The research was guided by three objectives; interpretations of the results of these objectives will be discussed. This will be proceeded by a discussion of the limitation of this study. Following the discussion of the limitations will be a discussion of implication for research, policy, and practice. This dissertation will be concluded with a summarization of major findings and conclusions.

Discussion of Objective 1: What are the experiences of Latinos with diabetes accessing and utilizing health care services?

The existing literature demonstrated that Latinos have lower levels when it comes to access and utilization of health care services (Ortega, Rodriguez, & Bustamante, 2015). Aspects that are considered important in accessing health care include: having a usual source of care, not having a delay in care, being able to afford health care services and medications, not being worried about affording medication and health bills, being able to find health care provider and services, having and being able to afford health insurance coverage (Office of Disease Prevention and Health Promotion, 2014; U.S. Department of Health & Human Services, Agency for Healthcare Research and Quality, 2011a).

Has Usual Source of Care. Latinos in this study over all do not seem to have an issue accessing health care services, and most indicated that they have a usual source of care. Most indicated that they received treatment from a doctor’s office, HMO, or clinic or health center. Numerous studies assessed the importance of usual source of care in utilizing health care services or preventing costlier services (e.g., hospitalization) (DeVoe, Tillotson, &

Wallace,2009; Gill, 1997). In a study by DeVoe, Tillotson, and Wallace, (2009) found that 95% of individuals with diabetes in the United States have a usual source of care; however, 8% of Latinos indicated that they had no usual source of care or health insurance. This study revealed that 5.20% (*n*=34, weighted *N*= 171,281, 5%) had no usual source of care. This is a positive finding, given that Latinos with diabetes who have a usual source of care were found to be better informed about the disease (González, Vega, Rodríguez, Tarraf, & Sribney, 2009) and are more likely to receive recommended diabetes-specific exams (Devoe, Tillotson, & Wallace, 2009).

Reasons for Not Having Usual Source of Care. Barriers to health care services have been widely documented in the literature (Brems, Johnson, Warner, & Roberts, 2006); some barriers to care mentioned in the literature include: language, availability of care, and travel distance (Escarce & Kapur, 2006; Seijo, Gomez, & Frudenberg, 1991). Given that most participants had a usual source of care, questions about why participants did not have a usual source did not apply for most. Among the few who indicated that they did not have a usual source of care the following reasons were given: not knowing where to go, doctor moved or is unavailable, care is too far, participant does not like doctors, participant felt they did not need doctors.

Reasons for Delayed Care. Very few participants indicated that delayed care was a result of: inability to get an appointment soon (8.6%), doctor's office not being open (4.30%), inability get through by phone (4.90%), wait time too long in doctor's office (8.30%), lack of transportation (4.60%). However, when participants were asked if medical care was delayed due to cost, 13.80% (*n*=90, *N*=182,753, 13%) acknowledged this as a reason.

Ability to Afford Health Care Services and Medications. It is important to assess patients ability to pay for diabetes treatment; given that, not having financial resources may be a barrier to diabetes management (Nam, Chesla, Stotts, Kroon, & Janso, 2011), especially since the cost of diabetes management is burdensome and may make it difficult to access and afford health care services and prescribed medications. According to the National Diabetes Association (2013), Latinos spent approximately $5,930 per-capita on health care. Diabetes medications can be costly. For example, a vial of insulin can range from $25 to$226 depending on what drug store is used and what type of insulin is used. Furthermore, drug adherence is an important factor in diabetes metabolic control (Schectman, Nadkarni, & Voss, 2002) and other health outcomes associated with diabetes (Cramer, Benedict, Muszbek, Keskinaslan, & Khan, 2008).

The majority of participants in the current study indicated that they did not have problems affording medical care, prescription medications, follow-up care, and specialist. However, around 8 to 14% of Latinos with diabetes acknowledge that they needed these specific type of services, but were unable to afford these services. The most troublesome being the ability to afford medications—approximately 14% indicated that they needed but could not afford prescribed medications (n=94, 14.4%, N=537,876, 15.50%). This was followed by inability to afford specialty care medications (n=65, 10.0%, N=368,767, 10.70%), and inability to afford follow-up care (n=57, 8.70%, N=304,789, 8.80%).

Worried About Affording Medication and Health Bills. According to Escarce and Kapur (2006), people with low socioeconomic status have a difficult time affording medical care, even when they have insurance. In regards to being able to pay for medical bills; in the current study, only 40.20% indicated they were not worried at all; this was followed by 31.10% who indicated that they were very worried and 27.60% who indicated that they somewhat worried.

Latinos who have financial difficulty purchasing prescribed medication may turn to alternative and harmful strategies to reduce costs of medications. Almost 20% (*n*=124, 19.0%, *N*=710, 633, 20.50%) of participants in this study indicated that they asked for lower costing medications. Almost 10% indicated that they took less medications to save money (*n*=61, 9.40%, *N*=350,658, 10.10%) or that they delayed refilling prescriptions to save money (*n*=71, 10.90%, *N*=410,134, 11.90%). There is some evidence of Latinos buying medication from other countries. In a study by Sleath, Blalock, Bender, Murray, Cerna, and Cohen (2009), 30% Latinos indicated that they had bought or someone else had brought them medications (i.e., vitamins, antibiotics, pain medicine, herbal medicine) from another country. With 12.9% indicating the reason for doing so was to save money, only 1 person in this study bought medications for diabetes. Among Latinos with diabetes in this study, very few indicated that they bought medications to from other countries to save money (*n*=30, 4.60%, *N*=175,951, 5.10%).

Ability to Find Health Care Provider and Services. Participants in this study do not seem to have a problem finding a health care provider; only 4% indicated this as a problem (*n*=29,4.40%, *N*=156,998,4.50%). Less than 3% (*n*=16,2.50%, *N*=86,253, 2.50%) indicated they were not accepted as a new patient. Similarly, Livingston Minushkin, and Cohn (2008) reported that only two percent indicated that they had problems finding a health care provider because they did not know where to go

Medical Bills. The narrative changes when it comes to participants' ability to afford health care services and private health insurance. Almost a quarter of participants did indicate that they were paying medical bills over time, while a little over 20% others indicated they were having trouble paying medical bills or were unable to do so. Another 12% (n=79, 12.10%, N=157,675, 11.20%) indicated that they were unable to pay medical bills. This is somewhat lower than what other researchers have found. Doty, Beutel, Rasmussen and Collins (2015) reported that 33 percent of all Latinos have medical bill problems (or debt).

Health Insurance Coverage. Health insurance coverage is an important factor associated with access to health care (National Center for Health Statistics, 2017; Escarce & Kapur, 2006). Latinos continue to have the highest percentage of uninsured adults ages 18 to 64 (National Center for Health Statistics, 2016); however, there are signs of a decrease in the percentage of Latinos without health insurance (i.e., 2011 [42.1%], 2012[41.3%], 2013 [41.1%], 2014 [34.1%], 2015 [27.2%]). Among Latinos with diabetes, the findings of this study suggest that the majority of participants were insured. However, 16.30% indicated they were not covered by health insurance. Escarce and Kapur (2006) state that having health insurance not only reduces out of pocket expenses, but it is one of the most significant predicators of utilization of health care services.

Devoe, Tillotson, and Wallace (2009) found that individuals with diabetes who were insured and report having a usual source of care had a higher likelihood of receiving seven tests recommend for diabetes prevention (e.g., A1C screening, foot exam, dilated eye exam). Almost three-quarters of participants indicated that they did not know if they were covered by a government funded insurance program or refused to answer, while a little more than 30% indicated that they were covered by private health insurance. Latinos’ perception of being able to afford private health insurance was not assessed for all participants, less than 5% of those who responded reported that they were very confident in being able to afford private health insurance.

Discussion of Objective 2: How do Latino subgroups experiences with diabetes complications differ when considering biological, psychological and cultural factors?

Educational Differences Among Latinos with Diabetes Subgroups. Non-U.S. citizens had lower levels of education in comparison to U.S. citizens. Those who were born outside of the U.S. (or U.S. territory) had lower levels of education in comparison to their U.S. born counterparts. Furthermore, this study also found that among Latinos with diabetes, Mexicans had lower levels of education in comparison to Central and South Americans, Puerto Ricans, Mexican Americans, and Others. In terms of language, those who were interviewed in Spanish had lower levels of education in comparison to those who were interviewed in English. Those interviewed in English had a higher level of education than those who were interviewed in two languages (i.e., Spanish and English). Education is an important socioeconomic gradient; it is also an important factor as it facilitates access to health care (Zimmerman, Woolf, & Haley, 2015). Furthermore, education has been found to be associated with health (Ross & Wu, 1995), higher levels of education are associated with better health outcomes (i.e., more likely to use preventive services, less likely to be obese, less likely to smoke) (Cutler & Lleras-Muney, 2010). It is widely known that Latinos as a group have one of the highest dropout rates and are less likely to complete college (Aud, Fox, & KewalRamani, 2010; KewalRamani, Gilbertson, Fox & Provasnik, 2007). Aud et al. (2010) report the percentage of dropouts by ethnicity (i.e., Other Central Americans [29%], Salvadorans [26%], Mexicans [22%], Puerto Rican [15%], Cuban [6%], South American [8%]), with the dropout rate being higher for those born outside of the United States.

When it comes to the attainment of a bachelor's degree, Latinos have the lowest percentage (11%) as compared to Whites (33%) and Blacks (17%); yet among subgroups, Mexicans and Salvadorans have the lowest college attainment rate (i.e., 8%). (Aud et al., 2010). However, Latinos subgroups are often combined into a single group, and little attention is given to how Latino subgroups differentiate country or territory of origin. Results of this study indicated that Latinos with diabetes in this study are significantly different in terms of level of education, with Mexicans having a lower level of education than other Latino subgroups (i.e., Central and South Americans, Puerto Ricans, Mexican Americans, and Others). This finding supports previous research, given that Mexicans have one the highest high school dropout rates, and have one of the lowest college attainment rates (Aud et al., 2010).

Furthermore, findings also suggest that Latinos' level of education differed based on the language they used in the interview, with those interviewed in English having higher levels of education. Among Latinos in the U.S., 25% speak English, 36% speak both Languages, and 38% speak only Spanish (Krogstad & Gonzalez-Barrera, 2015). Researchers have focused on the importance of English Language proficiency and its effect on academic achievement (Graham, 1987). A study by Stamps and Bohon (2006) found that English proficient (i.e., speak English very well) Latinos had higher education attainment in comparison to those who speak it well and those who do not speak it at all. Hakimzadeh and Cohn (2007) write that the ability to speak and read English is important in higher education; among Latinos who are college graduates, 62% indicated they speak English very well, which is higher than those who received a high school diploma (34%) and those who did not complete college 11%).

Similarly, differences in level of education were found to be different based on U.S. citizenship status and place of birth (U.S. born vs. non-U.S. born) with those who were U.S. citizens and born in the U.S. or U.S. territory having higher levels of education. Although there is limited research on how citizenship status and place of birth (U.S. born vs. non-U.S. born) affects education attainment, there is some research that has looked at this relationship. Stamps and Bohon (2006) found that Latinos who were U.S. citizens had more educational attainment than their non-U.S. citizen Latino counterparts. Native born Latinos ages 18 to 24 are more likely to report being enrolled in school in comparison to their foreign-born counterparts (Lopez, 2009). Lopez (2009) writes that even though Latino immigrants find that a college education is important for their future, they have financial commitments to their families that make it difficult to pursue higher education. Finally, Zhang, Hong, Takeuchi and Mossakowski (2012) found that Latinos with limited English proficiency were more likely to be: Mexican, immigrants, non-U.S. citizens, and have low levels of education.

Differences in Psychological Distress Among Latinos with Diabetes. Among Latinos with diabetes in this study, psychological distress was higher for those who were U.S. citizens. Furthermore, a positive association was found between years residing in the U.S. and psychological distress. There were no differences in psychological distress scores based on nativity (U.S. born vs. Non-U.S. born), country or territory of origin, nor language of interview. Similar to this study's findings, Zhang et al. (2012) found that psychological distress was higher amongst Latinos who were: U.S. citizens (vs. non-U.S. citizens, yet migration status was not associated with psychological distress nor was it associated with limited English proficiency. Studies have found differences in the prevalence of psychiatric disorders among Latino subgroups, with U.S. born Latinos being more likely than foreign born Latinos to meet criteria for one of the numerous psychiatric disorders assessed (Alegría, Mulvaney-Day, Torres, Polo, Cao, & Canino, 2007).

Among Latinos with diabetes, differences were found based on the citizenship status, those who were non-U.S. citizens had lower levels of psychological distress in comparison to U.S. born citizens. Furthermore, among non-U.S. born Latinos, length of residence was associated with psychological distress, longer length of residency in the U.S. resulted in higher levels of psychological distress. Similarly, Alegría et al. (2007) found that prevalence of psychiatric disorders was higher among Latinos who were U.S. residents for a longer time; however, this association became insignificant once researchers controlled for age.

Differences in Cardiovascular Risk Among Latinos with Diabetes Subgroups. Latinos with diabetes differed in cardiovascular disease risk based on country or territory of origin, nativity (i.e., U.S. born vs. Non-U.S. born), and language of interview. Comparison based on nativity (i.e., U.S. born vs. non-U.S. born) revealed that there was a difference, with those born outside the U.S. or U.S. territory having lower cardiovascular disease risk. Those who were interviewed in English had a higher cardiovascular disease risk than those interviewed in two languages (Spanish and English). Assessment of cardiovascular disease based on citizenship status was unable to be performed since there was not sufficient sample size to do a comparison. No significant relationship was found between years in the U.S. and Cardiovascular disease risk.

Latinos have a higher risk of cardiovascular disease as a result of their history of high blood pressure, obesity, and diabetes (American Heart Association, 2015b). According to the Centers for Disease Control and Prevention (2015h), disease of the heart is the second leading cause of death among Latinos; with Puerto Ricans (171.5 per 100,000) having the highest number of deaths in comparison to other Latino subgroups (e.g., Mexicans= 129.2 per 100,000; Cubans=153.9 per 100,000). Although this study did not find significant differences based on country or territory of origin, there is evidence that Latino subgroups differ when being compared for traditional cardiovascular disease risk factors (i.e., hypocholesteremia and hypertension, diabetes mellitus, obesity, smoking, physical activity) individually (Rodriguez, Allison, Daviglus, Isasi, Keller et al., 2014). For example, Puerto Ricans and Cubans are more likely to smoke (Perez-Stable, Ramirez, Villareal, Talavera, Trapido, Suarez, Marti et al., 2001).

Supporting this is a more current report by Martell, Garrett, and Caraballo (2016): among Latino subgroups, Puerto Ricans (28.5%) represented the highest percentage of Latinos who reported smoking within the last 30 days from 2010 to 2013; this group was followed by Cubans (19.8%), Mexicans (19.1%) and Central or South Americans (15.6%). A similar trend was reported in a report entitled *Hispanic Community Health Study, Study of Latinos* (HCHS/SOL) (2013) (percentage of smokers= Puerto Rican, 33.8%; Cuban, 27.2%; Mexican, 16.7%; Central American, 14.3%; South American, 13.3%; and Dominican, 11.4%). In this report, it was reported that Puerto Ricans had the highest percentage (19.2%) of participants with diabetes (Mexican, 18.9%; Dominican, 18.4%; Central American, 17.8%; Cuba, 14.0%; and South American, 10.7%). Undesirable cholesterol levels were highest among South Americans (48.0%) (Central American, 47.3%; Cuban, 47.8%; Mexican, 43.3%; Dominican, 36.7%; and Puerto Rican, 36.4%; Cubans (60.6%) had the highest percentage of participants being treated for hypertension (Puerto Ricans, 59.4%; Dominican, 54.6%; South American, 50.8%; Mexican, 50.3%; and Central America, 43.0%). Furthermore, the literature shows that there are differences in the prevalence of hypertension and diabetes among Latino subgroups based on country or territory of origin, with prevalence found to be higher among foreign born Puerto Ricans[33] (Pabon-Nau, Cohen, Meigs, & Grant, 2010).

Differences were also found among Latino subgroups (based on country of origin) when a composite of numerous cardiovascular disease risk factors was created. Daviglus, Talavera, Avilés-Santa, Allison et al., (2012, p. 1779) found that the “prevalence of having 3 risk factors or more was highest among Puerto Rican men and women and lowest among South American men and women and having no risk factors was highest among South American men and South

[33] “A small number of people of Puerto Rican origin—51,000—were born outside of the U.S. or Puerto Rico and were not U.S. citizens by birth. They are considered foreign born.” (Brown & Patten, 2013, para.4)

American Women." In this study, no significant differences were found between cardiovascular disease risk and language. A study by Daviglus et al., (2012) found that those whose preferred language was Spanish had a lower prevalence of having 3 risk factors or more in comparison to those whose preferred language was English. Similar to this study, Daviglus et al., (2012) also found that foreign born Latinos had a lower prevalence of having 3 risk factors or more, and were more likely to have no risk factors.

Differences in Physical Activity Among Latino with Diabetes Subgroups. There were no differences in level of physical activity when comparing Latinos on U.S. citizenship status and nativity (U.S. born vs. Non-U.S. born). There was no association between years in the U.S. and physical activity. Differences in level of physical activity (i.e., median or mean ranks) were found when comparisons were made based on country or territory of origin and language of interview; however, further analysis revealed[34] no differences.

Participating in physical activity plays an important role in the prevention and management of diabetes and cardiovascular disease (Carnethon, 2009; American Heart Association, 2014). Numerous benefits result from participating in physical activity; these benefits include but are not limited to lowering blood pressure, cholesterol, and risk of heart disease and stroke (NDA, 2016). Utilizing data from the Behavioral Risk Factor Surveillance System (BRFSS), Chowdhury, Balluz, Okoro, and Strine (2006) found that Latinos are more likely to be physically inactive than non-Latino Whites.

Differences in the amount of time spent participating in physical activity have been reported (Arredondo, Sotres-Alvarez, Stoutenberg, Davis, Crespo, Carnethon et al. 2016; Neighbors, Marquez, & Marcus, 2008). Daviglus et al., (2012) found that Central Americans had

[34] Pairwise comparisons were performed using Dunn's (1964) procedure with Bonferroni correction for multiple comparisons for variables on which groups were found to be statistically significantly different.

the highest percentage of participation in physical activity (40% of mean total physical activity), while Cubans had the lowest (Cubans=29.7%; Dominican= 37.1%; Mexican= 42.1%; Puerto Rican= 41.1%; Central American= 43.2%; South American= 37.0%). While this study did not find differences in level of physical activity based on country or territory of origin, HCHS/SOL (2013) report stated that Central Americans (91.7 minutes per day) reported more time in work related physical activity than other Latino subgroups (Mexican, 88.0 minutes per day; South American, 68.1 minutes per day: Dominican, 66.3 minutes per day; and Puerto Rican, 63.5 minutes per day) and Cubans reporting least amount of time (63.5 minutes per day). In terms of recreational physical activity, Puerto Ricans (28.3 minutes per day) participated in more time in comparison to other Latino subgroups based on country or territory of origin, and Cubans reported the least amount of time (17.7 minutes per day) (Mexican, 23.3 minutes per day; South American, 22.0 minutes per day; Central American, 19.8 minutes per day; and Dominican, 18.0 minutes per day) (HCHS/SOL, 2013).

Furthermore, studies have found a positive association between English language proficiency and participation in physical activity (Crespo et al., 2001; Salinas, Hilfinger Messias, Morales-Campos, & Parra-Medina, 2014). Crespo et al. (2001) used data from the Third National Health and Nutrition Examination Survey (NHANES III), and found that Mexican Americans' prevalence of physical inactivity was higher among those who preferred to speak Spanish in comparison to those who preferred to speak English. Future studies should monitor these differences given that there is support in the literature. Furthermore, a study by Ahmed, Smith, Flores, Pamies, et al., (2005) found that Latinos who were non-U.S. citizens where more likely to be physically inactive than their U.S. citizen counterparts. However, this study did not find differences in levels of physical activity based on citizenship status.

Body Mass Index Differences among Latinos with Diabetes. Differences in this study were found based on: citizenship status, nativity (U.S. born or Non-U.S. born), and language of interview. Latinos with diabetes in this study were found not to be different when BMI scores were compared based on country of origin. There was no relationship between years in the United states and BMI scores. Non-U.S. citizens also had lower BMI scores than U.S. citizen Latinos. Furthermore, Latinos born outside of the U.S. (or U.S. territory) also had lower BMI scores in comparison to their U.S. born counterparts. Differences were found when participants were compared on Language of interview with those interviewed in Spanish having a lower BMI.

BMI is a measure used to assess body fat in adults, with measures of <18.5 indicative of being underweight, while BMI measure greater than 30 indicative of obesity (National Heart, Lung, and Blood Institute, n.d.). Higher levels of BMI have been found to be associated with numerous diseases (e.g., hypertension, diabetes mellitus, and dyslipidemia), including diabetes (Bays, Chapman, & Grandy, 2007; Ganz, Wintfeld, Li, Alas, Langer, & Hammer, 2014; Weinstein, Sesso, Lee, Cook, Manson, Buring, & Gaziano, 2004). Among Latinos subgroups based on country or territory of origin, Puerto Ricans had the highest percentage of obesity (46.8%), while South Americans had the lowest (30.3%); yet researchers mention that obesity was high amongst all Latino subgroups (Abreu, Arredondo, Avilés–Santa, Barr, Beck, Birnbaum–Weitzman et al., 2013).

In this study, BMI differences were not found when participants were compared on country of origin. Krueger, Coleman-Minahan, and Rooks (2014) found that Puerto Ricans and Mexicans have the highest annual increase in BMI (Krueger, Coleman-Minahan, & Rooks, 2014). Furthermore, as previously mentioned, differences were found when it came to nativity.

Latinos born outside of the U.S. (or U.S. territory) also had lower BMI scores in comparison to their U.S. born counterparts. The literature also points to BMI differences among U.S. born and foreign born Latinos, with foreign born Latinos having lower BMI in comparison to U.S. born Latinos (Albrecht, Roux, Kandula, Osypuk, Ni, & Shrager, 2013). In addition, this study also found that participants who were interviewed in Spanish had lower BMI. Contrastingly, Khan, Sobal and Martorell (1997) found a relationship between increased preference for the English language and a decrease in BMI. There was no relationship between years in the United States and BMI scores. Studies have found that length of residence is an indicator of obesity, Koya and Egede (2007) found that those who had spent 15 years or more in the U.S. were more likely to be obese. Similarly, in a study of Latino participants by Isasi, Ayala, Sotres-Alvarez, Madanat, Penedo, Loria et al. (2015), length of residency was associated with obesity.

Differences in Self-Rated Health Among Latinos with Diabetes. There were no differences in self-rated health based on U.S. citizenship status and nativity (U.S. born or Non-U.S. born). Differences were found when comparisons were based on country or territory of origin and language. Yet further analysis (i.e., post hoc) revealed no differences based on country or territory of origin. Differences were found between those who were interviewed in Spanish and those who were interviewed in two languages (i.e., Spanish and English); self-rated health was higher among those who were interviewed in both Spanish and English. Moreover, there was no association found between length of time in the U.S. and self-rated health.

Self-rated health is a construct that has a long history of empirical support for its association with morbidity and mortality (Burström, & Fredlund, 2001; DeSalvo, Bloser, Reynolds, & Muntner, 2006; Idler & Benyamini, 1997; Mossey & Shapiro, 1982). There has been a growing interest amongst researchers regarding Latinos' perception of their health, as well as how it compares to other Latino subgroups and non-Latino Whites (Benjamins, Hirschman, Hirschtick, & Whitman, 2012; Dubard & Gizlice, 2008; Johnson, Carroll, Fulda, Cardarelli, & Cardarelli, 2010; Lee, Schwarz, & Goldstein, 2014). White and Scarinci (2015) compared self-rated health among foreign born Latinas using data from two samples: a national sample (National Health Interview Survey) and data from a study conducted in the city of Birmingham, AL. A higher percentage of foreign-born Latinas from the Birmingham study rated their health as fair or poor in comparison to Latinas in the NHIS study (47.6% vs 17.9% respectively), thus suggesting differences based on geographic location. Furthermore, language is also an important factor to consider in the literature when assessing self-rated health (DuBard & Gizlice, 2008; Kandula, Lauderdale, & Baker, 2007; Viruell-Fuentes, Morenoff, Williams, & House, 2011).

DuBard, and Gizlice, (2008) found that Latinos who spoke Spanish reported worse self-rated health in comparison to their English-speaking counterparts. Similar findings were reported by Angel and Guarnaccia (1989) who found that Latinos interviewed in Spanish were less likely to evaluate their health as good or excellent. Similarly, this study found that those who were interviewed in Spanish had lower self-rated health than those who were interviewed in two languages (i.e., Spanish and English). Interestingly enough, differences were not found between those who were solely interviewed in either Spanish or English. Immigrant Latinos seem to have better health outcomes than U.S. born Latinos; however, length of residence also affects health status, with Latinos who were in the United States a longer length of time reporting worse health status (Cho, Frisbie, Hummer, & Rogers, 2004), yet this study did not find such association.

Studies have shown that Latino immigrants report worse self-rated health than U.S. born Latinos (Angel & Guarnaccia, 1989). However, this study did not find a difference based on country or territory of origin and nativity (U.S. born vs. Non-U.S. born). Benjamin, Hirschman, Hirschtick, and Whiteman (2012) write that there are not many studies available that examine how self-rated health varies among ethnic groups. However, the researchers compared self-rated health outcomes between Mexicans and Puerto Ricans and found that there were no significant differences.

Differences in Internet Based Health Literacy Among Latinos with Diabetes. No differences in level of internet based health literacy based on country or territory of origin were identified. There was no association between length of residency and internet based health literacy. However, differences were found based on citizenship status, nativity (U.S. born vs. Non-U.S. born), and language of interview. Non-U.S. born citizens had less internet based health literacy when compared to U.S. born citizens. Latinos born outside of the U.S. (or U.S. territory) also had lower scores on internet based health literacy meaning less internet based health literacy. Differences in internet based health literacy were found between those who were interviewed in two languages and English, with those who were interviewed in two languages (i.e., Spanish and English) having lower levels of internet based health literacy. Differences were also found between those who were interviewed in Spanish and English, with those who were interviewed in Spanish having lower levels of internet based health literacy.

In this study, measures of health literacy were not available; however, questions regarding internet use for health related actions were available (e.g., use of internet to find information about health). In a review of the literature, researchers have found that low literacy is associated with less use internet technology (Kim & Xie, 2015). Furthermore, Jensen, King, Davis, and Guntzviller (2010) found that individuals with low health literacy were less likely to utilize internet technology. In the past, researchers have written about the digital divide between

Latinos and non-Latino Whites; however, currently this digital divide seems to be dissipating. According to Lopez, Gonzalez-Barrera and Patten (2013), Latinos have comparable rates to non-Latino Whites and Blacks when it comes to cellphone and smartphone ownership, using a mobile device to go online, and use of social networking sites. Furthermore, the researchers report that in terms of going online, Latinos' rates fluctuate depending on income, age, and language. Latinos are less likely than non-Latino Whites to go online and look for health information (Lorence, Park, & Fox, 2006; Peña-Purcell, 2008).

Peña-Purcell (2008) found that Latinos were less likely than non-Latino Whites to use the internet to find health information, and Latinos also felt that bringing health information to their doctor's attention had a negative impact on the patient-physician relationship. However, differences were found based on citizenship status, nativity (U.S. born vs. Non-U.S. born), and language of interview. There were no direct measures of health literacy in the data set; therefore, the relationship between health literacy and the utilization of internet-based technology could not be assessed.

Differences in Access to Health Care Services Among Latinos with Diabetes. Differences based on access to health care where not found based on nativity (i.e., U.S. born vs. Non-U.S. born), country or territory of origin, nor language of interview. Furthermore, there was no association between access to health care and length of residency in the United States. The only difference found was based on citizenship status; those who were non-U.S. citizens had more access to health care than those who were U.S. citizens.

The Institute of Medicine (1993, p.4) defines access to health care as "the timely use of personal health services to achieve the best possible health outcomes." Among Latinos with diabetes, there were no differences found in their access to health care services by nativity. It is important to note that access to health care is often measured by insurance coverage status, given that health insurance is a determinant of access to health care (National Center for Health Statistics, 2017). Latinos who are non-U.S. citizens are less likely to have health insurance coverage (Carrasquillo, Carrasquillo, & Shea, 2000; Escarce & Kapur, 2006; The Henry J. Kaiser Family Foundation, 2013; Krogstad & Lopez, 2014), yet this study found that they had more access to health care than their U.S. citizen counterparts. Among those who are Medicaid enrollees, Latinos who are U.S. citizens have the highest percentage of enrollment (i.e., U.S. born enrollees, 82%; Naturalized citizens, 5%; non-citizens, 13%) (The Henry J. Kaiser Family Foundation, 2013). On the contrary, this study found that non-U.S. citizens had more access to health care in comparison to U.S. citizens.

Overall, this sample is not similar to other national samples. Livingston (2009) reported that among Latino adults, 83 percent report having a usual source of care. Yet, usual source of care is much lower among Latinos who are non-U.S. citizens or have legal permanent resident status (57%) (Livingston, 2009). It is important to note, the majority of participants in this study had usual source of care, and that a majority did not say they had delays in accessing health care services. The majority of participants in this study were also insured. This may be a result demographic characteristics. Alcalá, Chen, Langellier, Roby, and Ortega (2017) utilized data from the National Health Interview Survey from 2011 to 2015 and found that differences do exist in terms of insurance coverage, with Mexicans and Central American being less likely to be insured than non-Latino Whites. Furthermore, DuBard and Gizlice (2008) found that Latinos who spoke Spanish had less access to care than their Latino counterparts who spoke English. Yet, this study found no differences based on language of interview. Carrasquillo, Carrasquillo, and Shea (2000) utilized data from the Census Bureau survey and found that insurance coverage differed by citizenship status and country of origin, with Latinos from Guatemala (58%), El Salvador (55%), and Mexico (55%) having higher percentages of people being uninsured in comparison to other Latinos subgroups (Cuba=17%; Dominican Republic=36%).

This study did not find differences based on country or territory of origin. In a study of Latinos from Mexico, Bustamante, Fang, Garza, Carter-Porkas et al. (2012) found that those who were undocumented were less likely to have a usual source of care and less likely to have seen a doctor within the past year. It is important to note that after the passage of ACA, health insurance coverage has improved for Latinos by 4%; however, Latinos continue to have the highest uninsured rates (Chen, Vargas-Bustamante, Mortensen, & Ortega, 2016).

Discussion of Objective 3: What are the risk and protective factors that reduce or increase the risk of heart disease for people with diabetes?

Discussion of Multivariate Results of Cardiovascular Disease Risk. This study found that among Latinos with diabetes, there were five salient characteristics associated with cardiovascular disease: sex, age, psychological distress, physical activity, and acculturation.

Sex and Cardiovascular Disease. Findings of this study suggest that gender differences exist when it comes to cardiovascular disease risk with Latina females with diabetes having a lower risk of cardiovascular disease risk when compared to Latino males. According to Benjamin et al. (2017), mortality due to cardiovascular disease has decreased for men and women in the U.S. from 1979 to 2014 in the general population. Yet, the report states that the prevalence of cardiovascular from disease 2011 to 2014 is higher among Latino females than males (33.3% vs. 31.3%). However, mortality due to cardiovascular disease was higher among Latino males than Latina females for the year 2014 (24,875 vs. 21,571 respectively). The Hispanic Community Health Study/Study of Latinos (HCHS/SOL) (2013) compared the number of cardiovascular disease risk factors for men and women, results indicated that a higher percentage of men had 3 or more cardiovascular disease risk factors in comparison to women (Age 18-44 (Males 12%, Females, 5%), Age 45-64 (Males 27.7%, Females, 26.8%), Age 68-78 (Males 44.2%, Females, 43.8).

Age and Cardiovascular Disease. Furthermore, among Latinos with diabetes, age was positively associated with cardiovascular disease risk. This suggests that among Latinos with diabetes, an increase in age results in an increase in cardiovascular disease risk. “Aging is an inevitable part of life and unfortunately poses the largest risk factor for cardiovascular disease” (North & Sinclair, 2012, p. 1097). Risk of most cardiovascular diseases increase with age (Balfour, Ruiz, Talavera, Allison & Rodriguez, 2016). Among Latinos, the percentage of individuals reporting 3 or more risk factors increased with each age in each group for both males and females, with those in the age group 65 to 75 having the highest percentage of Latinos having 3 or more risk factors (HCHS/SOL, 2013).

Psychological Distress and Cardiovascular Disease. A positive relationship was identified between psychological distress and CVD risk among Latinos with diabetes. Literature is available supporting the relationship between cardiovascular disease risk and psychological distress (Dimsdale, 2008; Hamer, Molly, & Stamatakis, 2008). Thus, it is important to have a holistic view of health, one that acknowledges the importance of the synergy between mental health and physiological health.

There is a copious amount of literature documenting the relationship between mental health illness and cardiovascular disease, in particular anxiety and depression (Bradley & Rumsfeld, 2015; Castañeda, Buelna, Giacinto, Gallo, Sotres-Alvares, Gonzalez et al., 2016; Cohen, Edmondson, & Kronish, 2015; Elderon & Whooley, 2013; Roest, Martens, de Jong, &

Denollet, 2010; Wassertheil-Smoller, Applegate, Berge, Chang, Davis, Grimm et al., 1996; Wassertheil-Smoller, Arredondo, Cai, Castaneda, Choca, Gallo et al., 2014; Watkins, Koch, Sherwood, Blumenthal, Davidson, O'Connor, & Sketch, 2013). Assessment of the relationship between psychological distress and cardiovascular disease risk factors among Latinos is not as plentiful as for the general public. However, association between mental health illnesses and cardiovascular disease among Latinos has been documented (Castañeda, Buelna, Giacinto, Gallo, Sotres-Alvares, Gonzalez et al., 2016; Wassertheil-Smoller, Arredondo, Cai, Castaneda, Choca, Gallo et al., 2014). Specific types of psychological distress (i.e., depression and anxiety) were found to be associated with cardiovascular disease and cardiovascular disease risk; more specifically, anxiety was higher for those who reported a history of cardiovascular disease, while depression increased as the number of cardiovascular disease risks increased (Wassertheil-Smoller, Arredondo, Cai, Castaneda, Choca, Gallo et al., 2014) Yet, the comorbidity and the consequences of two of the most debilitating diseases, diabetes and cardiovascular disease, continue to be unrecognized and untreated (Rumsfeld & Ho, 2005; McGuire & Doering, 2015).

Latinos find the subject of mental health uncomfortable to discuss, mostly because of the stigma associated with mental illness and mental health treatment (Interian, Maritne, Guarnaccia, Vega, & Escobar, 2007). Latinos put more emphasis on physical ailments than mental health ailments (Kouyoumdjian, Zamboanga, & Hansen, 2003). Vega, Rodriguez, and Ang (2010) found that Latinos with high levels of stigma were less likely to disclose their depression diagnosis with family or friends, less likely to take depression medication, and less likely to manage their depression. Furthermore, Latinos are less likely to utilize health services in comparison to non-Latino Whites (Cabassa, Zayas, Hansen, 2006).

Physical Activity and Cardiovascular Disease. Another salient factor associated with CVD risk was physical activity. An increase in physical activity was associated with a decrease in CVD risk. There is a large amount of evidence documenting the protective nature of physical activity against cardiovascular disease. Empirical studies suggest that participation in physical activity improves one's health and guards against cardiovascular disease and cardiovascular disease risks (Bassuk & Manson, 2005; Carnethon, 2009; Warburton, Nicol, & Bredin, 2006) suggesting an inverse relationship between physical activity and cardiovascular disease (Carnethon, 2009).

This study supported what is widely accepted: physical activity serves as a protective factor against cardiovascular disease. Participating in physical activity is protective and guards against numerous risk factors for cardiovascular disease including but not limited to: diabetes, hypertension, obesity, and depression (Warburton, Nicol, & Bredin, 2006). It is recommended that adults participate in 150 minutes a week of vigorous-intensity aerobic physical activity, or 75 minutes of intense-vigorous physical activity (U.S. Department of Health and Human Service [U.S. DHHS], 2008b). Yet, there are reports that Latinos do not meet the required guidelines. According to the National Center for Health Statistics (2014), Latinos are more likely to be physically inactive than their White counterparts, with 58.6% of Latinos not meeting the federal guidelines for physical activity. However, there is some evidence of improvement. In a study by Arredondo, Sotres-Alvarez, Stoutenberg, Davis, Crespo, Carnethon, Castañeda et al., (2016), researchers utilized an accelerometer to assess the average time Latinos spent participating in moderate to vigorous physical activity; on average Latinos spend 23.8 minutes per day, which translates to 166.6 minutes per week.

However, personal and environmental barriers to participating in leisurely physical activity exist (Juarbe, Turok, & Pérez-Stable, 2002). Bautista, Reininger, Gay, Barroso, and McCormick (2011) assessed perceived barriers to physical activity by Latinos; among those who belonged to the non-exercisers group, the three top perceived barriers included lack of self-discipline, lack of interest in exercise, and lack of time. Latinos in urban communities often encounter barriers that prevent them from participating or engaging in physical activities such as traffic conditions, fear of crime and safety concerns, and lack of recreational facilities (Day, 2006).

***Acculturation and Cardiovascular Disease*.** The last factor associated with CVD risk was acculturation. Acculturation continues to be of interest for researchers focused on cardiovascular disease among Latinos (Rodriguez et al, 2014). Latino health literature has often found that acculturation is associated with participating in less healthy behaviors and worse health outcomes (Abraido-Lanza, Chao, & Flores, 2005; Edelman, Christian, A., & Mosca, 2009; Neuhouser, Thompson, Coronado, & Solomon, 2004). Given the literature on the negative effect acculturation has on health outcomes, a positive relationship between acculturation and cardiovascular disease risk was expected. Consistent with other studies, this study showed that higher levels of acculturation were associated with an increase in cardiovascular disease risk. A study by Daviglus, Talavera, Aviles-Santa, Allison, Cai, Criqui et al., (2012) found that acculturation was associated with higher risk of cardiovascular disease among Latinos.

Rodriguez et al. (2014) writes that despite the limitations resulting from challenges associated with measuring acculturation, data supports the relationship between acculturation and cardiovascular disease. Furthermore, researchers have found that in some cases acculturation holds a positive or negative relationship with cardiovascular disease risk factors. For example, most research among Latinos points to a positive relationship between acculturation and obesity (e.g., Abraido-Lanza, Chao, & Flórez, 2005; Goel, McCarthy, Phillips, & Wee, 2004; Slattery, Sweeney, Edwards, Herrick, Murtaugh, Baumgartner, et al., 2006). Yet, in other studies acculturation seems to be associated with behavior that guards against cardiovascular disease. One example is physical activity; studies have found an inverse relationship between acculturation and physical activity (e.g., Abraido-Lanza, Chao, & Flórez, 2005). However, proxy measures of acculturation are problematic; often times, epidemiological studies are forced to either avoid assessing acculturation, or utilizing proxies for acculturation.

Discussion of Multivariate Results: Relationship between Moderators. The final model revealed that there were only two relationships between moderators. A negative relationship was found between psychological distress and self-rated health: as psychological distress increased self-rated health decreased. The importance of the relationship between psychological distress and self-rated health have been of interest for researchers (Cano, Scaturo, Sprafkin, Lantinga, Fiese, and Brand, 2003; Cockerham, Kunz, & Lueschen, 1988; Iversen, Sam, & Helvik, 2014; Tessler & Mechanic, 1978). Although an older study, Tessler and Mechanic utilized four data sets to assess whether a relationship between psychological distress and self-rated health existed. Researchers stated that despite differences in manner in which psychological distress was measured, an association was found between the two constructs.

Furthermore, a positive relationship was also detected between self-rated health and physical activity; that is, better assessment were report on self-rated health as the level of physical activity increased. Studies show an association between self-rated health and physical activity; however, most studies postulate that physical activity improves self-rated health (Kaleta, Makowiec-Dąbrowska, Dziankowska-Zaborszczyk, & Jegier, 2006; Kerr, Sallis, Saelens, Cain, Conway, Frank, & King, 2012; Kim, Kim, Park, & Kim, 2010; Södergren, Sundquist, Johansson, & Sundquist, 2008; Tsai, Ford, Li, Zhao, & Balluz, 2010), not the other way.

Discussion of Mediation Results. The results point out the importance of age among Latinos with diabetes. Among Latinos with diabetes, age had a significant direct effect on the decrease of psychological distress, and a significant indirect effect on decreasing cardiovascular disease risk through psychological distress. Therefore, this finding could possibly suggest that mental health is an important factor to consider when attempting to reduce the risk of cardiovascular disease risk. Although age is a moderating variable that cannot be modified, health care professional can address the mental health needs of Latinos throughout the life cycle. However, it is important to note that further analysis did not support the relationship between age and psychological distress. Nevertheless, psychological distress was found to be significantly and positively associated with cardiovascular disease. This finding continues to highlight the importance of addressing the mental healthcare needs of Latinos with diabetes and cardiovascular disease.

Furthermore, age had a significant indirect effect on CVD risk through physical activity. Among Latinos with diabetes, age had a significant direct effect on the decrease of physical activity level, and a significant indirect effect on the decrease of cardiovascular disease risk through physical activity. This finding could suggest that ensuring that individuals with diabetes engage and participate in physical activity is one strategy to decrease the risk of cardiovascular disease, particularly as Latinos age in order to decrease cardiovascular disease risk. It is important to note that further analysis did not support the relationship between age and physical activity. Yet, physical activity was negatively associated with cardiovascular disease, thus suggesting the importance of ensuring Latinos are aware of the protective nature of physical activity.

As previously stated, a theoretical framework guides all aspects of an empirical research study from inception to conclusion of a research study; it helps identify limitations and guides generalization of a study based on a theoretical framework (Herek, 2011). The following theories were used at the inception of the study: Ecological Systems Perspective, A Framework of Preventative Strategies by Haddon and Baker (1981), and Andersen's (1968) Behavior Model of Health Service Use. These will be used to conclude the study by providing an overview of the study's findings based on the previously selected theoretical framework. Major findings from the study will be discussed utilizing the selected theoretical framework.

Overview of Results with the Use of Selected Theoretical Framework

This study attempted to: assess Latinos' access to health care, identify differences among Latino subgroups based on biopsychosocial markers, and identify factors associated with cardiovascular disease. Latinos with diabetes in this study had a usual source of care and were covered by health insurance coverage, and most did not experience delays in receiving treatment nor difficulties getting medications. Differences in education, psychological distress, internet based health literacy, physical activity, BMI, access to health, self-rated health, and cardiovascular disease risk were found when comparisons were made based on citizenship status, nativity, Latino background, and language preferences. Furthermore, five salient factors were found to be directly associated with cardiovascular disease among Latinos with diabetes: age, sex, psychological distress, physical activity, and acculturation.

Ecological Systems Perspective. Mausner and Kramer (1985) state that the ecological framework is most often used in epidemiology to examine a disease because, for the most part, a disease cannot be attributed to or explained by one factor; instead a disease is a result of interactions among various factors. Andersen (1995) directs attention to the ability of the systems theory to provide an “automatic-holistic continuum” depiction of an issue; that is, systems theory allows researchers to take health care disparities among Latinos with diabetes and look at it from the context of personal, social, and biological agents, and how these agents interact with each other. This provides a holistic picture of the phenomenon.

Within the micro-system, attention is placed on individual factors such as biological factors and psychological factors (e.g., Thrifty Gene Theory, Insulin Resistance, Acculturation). Interestingly enough, five salient factors were found to be directly associated with cardiovascular disease risk among Latinos with diabetes: age, sex, psychological distress, physical activity, and acculturation. Although biological factors and psychological factors were found to be associated with cardiovascular disease, this combination of factors used to predict cardiovascular disease risk was not strong. This provides a rational for the need of other biological, psychological, and social factors that were not included in the model. Yet, given that secondary data was used, the inclusion of other important factors is limited given the constraint of selecting available variables.

A Framework of Preventative Strategies. Furthermore, there were a couple of modifiable variables that could be taken into consideration when developing prevention strategies to prevent diabetes and cardiovascular disease. Diabetes and cardiovascular disease are preventable; however, most research emphasizes what practitioners should do after a person is diagnosed with diabetes instead of investing in efforts to prevent diabetes and cardiovascular disease. Haddon and Baker (1981) explicate a framework of preventive strategies: “The fundamental tasks in injury control are 1) to prevent the agents from reaching people in amounts or at rates that exceed injury threshold, and 2) to minimize the consequence of injury" (Haddon & Baker, 1981, p.111-112). Psychological distress, physical activity, and acculturation were found to be risk (acculturation and psychological distress) and protective factors (physical activity) for cardiovascular disease risk.

Step one of Haddon and Baker's preventive framework (1981) refers to the reduction of agents that cause injury. Even though it is impossible to alter Latinos' genetically so as to reduce the likelihood of injury, in this case the injury refers to developing diabetes which will also reduce the risk of cardiovascular disease, agents such as psychological distress can be addressed. Although mental health illness may not be preventable, there are strategies to ameliorate the effect on mental health on cardiovascular disease. Depression is one psychiatric disorder researchers have been interested in, and numerous studies have assessed the relationship between diabetes and depression (e.g., Campayo et al., 2010; Carnethon et al., 2003; Eaton et al., 1996; Golden et al., 2008; Musselman et al., 2003) and cardiovascular disease (e.g., Elderon & Whooley, 2013; Penninx, 2017; Rumsfeld, 2005). Yet, Latinos are apprehensive about discussing mental health concerns. Latinos often feel stigmatized and would rather not disclose information regarding their depression or treatment for depression to friends and family (Vega, Rodriguez, & Ang, 2010). To further complicate this matter, it has been well established that "minorities have less access to, and availability of, mental health services" (U.S. Department of Health and Human Services [DHHS], 2001a, paragraph 4).

Latino education regarding cardiovascular disease needs to point out the important relationship between mental health and physiological health. Health care providers need to understand Latinos' conceptualization of mental health and the lexicons used to discuss mental health ailments. However, this sample is comprised of Latinos' who are already at risk for cardiovascular disease. Another step of Haddon and Baker (1981) is to *begin to counter damage already done and stabilizing, repairing, and rehabilitating the injured.* Consequently, the identification of modifiable risk and protective (e.g., physical activity and psychological distress) factors of cardiovascular disease can be used and considered when developing interventions to repair and prevent worse health outcomes. It is important to assess the comorbidity between cardiovascular disease and mental health. Primary health care providers should build a mutual trusting relationship with Latinos; thus, increasing the likelihood that Latinos will disclose mental health concerns. However, according to the National Alliance on Mental Health (2017) Latinos often do not discuss mental health problems, and part of the problem stems from the lack of available information regarding the signs and symptoms associated with mental health conditions.

Therefore, initiatives should attempt to educate Latinos about mental health symptoms and provide information about community mental health providers. In terms of physical activity, Psychological distress, physical activity, and acculturation were found to be risk (acculturation and psychological distress) and protective factors (physical activity) for cardiovascular disease risk. In terms of physical activity, Latinos are less likely than non-Latinos Whites to meet the recommend guidelines set forth by the U.S. DHHS (2008). Physical activity is a protective factor against cardiovascular disease and diabetes. However, given that this sample is comprised of participants with diabetes, in order to ameliorate and prevent worse health outcomes, the benefits of physical activity should be emphasized by health care providers and community organizations. If patient is concerned about neighborhood safety or lack of community facilities that provide an opportunity to engage in physical activity, alternative recommendations should be provided.

Andersen's Behavior Model of Health Service Use. Andersen (1968) proposes that predictors of care seeking can be divided into three main components and subcomponents: 1) predisposing factors, 2) enabling factors, and 3) need factors (See Figure 1 in Appendix A). In an update of the model, Andersen (1995) disclosed that the model could also be used to and perception of health. Predisposing factors include demographic factors, social structure factors and health beliefs. In this study, the data set limited predisposing factors to demographic factors (i.e., sex, education, marital status, and age). Age was found to be directly associated with self-rated health and cardiovascular disease risk. Education was found to be directly associated with acculturation.

Andersen states that for utilization of health services to take place, or improvement of self-rated health, or health outcome, enabling factors must be present. Enabling factors include: personnel and health care facilities, income, health insurance, and source of care. A measure for access to health care included usual source of care and delay in receiving health care services. Yet, access to health care services was not associated with predisposing factors, nor risk and protective factors against cardiovascular disease (psychological distress, internet based health literacy, physical activity, BMI) or the outcome variable (cardiovascular disease risk). It is important to note that utilization of health services was not the outcome variable of the model. However, future studies could include additional variables of health care utilization (i.e., doctors' visits, emergency department visits, and hospital visits) as another outcome variable. Andersen's Behavior Model of Health Service Use was a useful framework that allowed for the inclusion of important predisposing factors, enabling factors, as well as outcome variables. Theoretical frameworks are often missing from studies, especially in Latino health studies. Future models that predict Latino health outcomes should include variables that represent important cultural values as well as Latinos' views of health.

Study Limitations

There are numerous limitations that are associated with this study because it is a secondary data analysis. Subsequently, these shortcomings must be taken into consideration when extrapolating results to other Latino subgroups.

Limitation Due to Design of the Study. To begin, this study is a cross-sectional study; that is, data is collected at one point in time (Vogt, 2005). While there are numerous benefits to utilizing a cross-sectional design (e.g., data is collected all at once, multiple outcomes can be studied, inexpensive to conduct) (Salkind, 2010), cross-sectional designs fundamentally lack internal validity (Rubin and Babbie, 2011). Internal validity refers to "the degree to which one can draw valid conclusions about the causal effects of one variable on another" (Vogt, 2005, p. 157). According to Rubin and Babbie (2011), cross-sectional studies attempt to understand processes that develop or occur over time; yet, cross-sectional studies use data that is collected at one point in time. This study tries to understand the relationship between biological, psychological, and cultural factors and selected outcomes (i.e., diabetes, access to health care, cardiovascular disease); that is, processes and diseases that change over time. There is little certainty regarding the causal effect between the variables of interest. The validity of the study seems to be threatened by the likelihood of self-selection bias[35]; unlike other national samples, most participants in this study had usual source of care and were covered by health insurance.

Additionally, the results of this study are based on answers self-reported by participants. For example, participants were asked if they had ever been diagnosed with diabetes, participants

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[35] Self-Selection Bias – "A problem that may arise in the comparison of groups when the groups are formed by individuals who choose to join them and thus are not formed by a researcher assigning subject to *control or *experimental groups" (Vogt, 2005, p. 292).

answered yes or no. There is no way to validate whether indeed these participants have diabetes or not. Rubin and Babbie (2011) write that with self-report participants may "distort truth to convey a more socially desirable impression." It is possible that participants provided answers that they felt were desirable; consequently, it is unknown to what extent these answers deviate or to what extent they are representative of their actual behavior, practices, and thoughts.

Representivenes of Latino Subgroups in the U.S. According IPUMS health surveys (n.d., a,b), "the NHIS sample is designed to be representative of the civilian, non-institutionalized population living in the United States." (para. 1). However, the selected sample used for this study predominantly represents Latinos who were born in the United States or have lived in the U.S. for a long period of time (i.e., 15 years or more), and who are predominantly U.S. citizens (71.20%). Therefore, these findings cannot be extrapolated to other Latinos who have been here for shorter periods of times (i.e., recent immigrants) or are undocumented immigrants. Recent immigrants or undocumented immigrants may be reluctant to participate in research studies; Evans, Quiroz, Athey, McMicchael, Albright O'hegarty, and Caballo (2008) write that this may be in part due to Latinos' distrust and fear that the U.S. government may be involved. Undocumented immigrants may fear deportation given their immigration status. Evans et al. (2008) provide other limitations that make it difficult to recruit Latino participants (e.g., doubts regarding legitimacy of study). Furthermore, this study does not provide an accurate representation of the numerous Latino population based on their country of origin. In a Pew Report, Motel and Patten (2012) provide a list of the country of origin from which 92% percent of the Latino population derive (i.e., Mexicans, Puerto Ricans, Cubans, Salvadorans, Dominicans, Guatemalans, Colombians, Hondurans, Ecuadorians and Peruvians). Comparison using country of origin was limited given the sample size for each subgroup.

Lack of Representation of Latinos Subgroups in the Sample. In comparison to other national samples, this sample of participants have no trouble in accessing health care services and know where to go. However, the quality of health care services participants received is unknown. Follow up would be to look at their patterns of utilization of health care services, adhering to treatment, satisfaction with health care services. Interesting that most have usual source of care. However, numerous participants stated that they did not know what type of health insurance they have or if they are covered by government program. Given the review of the literature, diverse answers regarding access to health care services, type of health care services used, and the status of their health coverage were expected. However, after consideration for the sample's demographic information, the results make more sense. Most participants have been here 15 years or more (342); 249 born in the United States or District of Columbia, 56 born in a territory of the United States. An overwhelming majority (71.20%) were U.S. citizens. Most participants answered the questionnaire in English, with only 195 (29.90%) speaking only Spanish. Similarly, Krogstad and Gonzalez-Barrera (2015) report that among all Latinos 38% use Spanish only.

***Immigration and Health Insurance*.** A study has documented the health care experiences of Latinos with diabetes, Rodriguez, Chen, and Ortega (2010) reported that 47.7% of their participants reported having negative experience during their last health care visit. Immigration status has been of interest to researchers in the role it plays in attainment of health insurance (Goldman, Smith, & Snood, 2005; Vargas Bustamante, Chen, Fang, Rizzo, & Ortega, 2014) as it determines eligibility for assistance for acquiring health insurance. Having health insurance is associated with better health outcomes (Hadley, 2003). Almost half of participants in this study were born outside of the Unites States or a territory pertaining to the United States (53.10%, n=346), and 71.20% (n=464) of participants stated that they were U.S. citizens. Therefore, it is comprehensible that the majority of participants (83.40%, n=544) reported having insurance coverage. Consequently, the results should be interpreted with caution; given that, at first glance it seems that Latinos encounter no barriers to accessing and utilizing health care, and are covered by health insurance.

This sample does not represent undocumented Latinos or recent Latino immigrants. In a study by Ortega, Fang, Perez, Rizzo, Carter-Porkas, Wallance and Gelberg (2007), when compared to their counterparts born in the United States, undocumented Latinos had lower rates of health care services use. Latino research has highlighted the role that citizenship status, language, years foreign born Latinos have spent in the United States affects health care access and utilization of health care services.

Population Estimates. In addition, IPUMS recommends that weights be used given their sampling strategy to and oversampling of Latinos. The sampling weights correct for oversampling and thus provide “representative population estimates.” However, when attempting to use sampling weights, AMOS provided the following message “Amos will ignore the case weights in the file. Each case will be given a weight of 1. This will affect the results of your analysis." IBM Support (n.d., para. 2) provided the following response “Neither Amos nor SPSS Statistics will accommodate a complex sampling scenario directly (the SPSS Complex Samples module is designed to handle complex sample designs, but it does not provide anything that can be directly read into Amos).” Consequently, this affects the external validity of the study given results are not representative population estimates.

Limitations due to Measurement of Variables. This study is limited by the manner in which numerous variables were measured, as well as the lack of validity measurements used.

Factors used to indicate which participants would be selected from the data set included: age, ethnicity, and diabetes status. Participants needed to be 18 years or older, have diabetes, and be Latino. The original intention of the study was to focus on Type 2 diabetes; however, participants were not asked to indicate type of diabetes. Type 1 and Type 2 are significantly different on risk factors, usual age of diagnosis, and treatment options. This makes it difficult to generalize findings to Latinos with Type 2 diabetes. Furthermore, there were issues with the validity of measures.

With the exception of Kessler's psychological distress scale (validity discussed in methods section) and self-rated health (Schnittker, & Bacak, 2014); other measures used in this study were not validated. For example, cardiovascular disease risk (combined risk factor profile) was created based on Fang et al. (2015) who also used the same dataset. However, questions change from year to year and not all questions were available. Furthermore, acculturation is a complex construct with numerous articles from researchers critiquing the manner in which it is measured, its strengths and limitations (Cabassa, 2003). An aggregate of multiple items were used to create an acculturation proxy score based on proxies used in the literature, yet there are limitations to these proxies (Alegria, 2009). Acculturation is an important aspect to measure and researchers continue to point out the importance of it in Latino health literature (e.g., Rodriguez et al., 2014); yet the literature is filled with discussions regarding what needs to be measured and what is available, especially in national data set such as the one used in this study (See Alegria, 2009).

Another example of a measurement limitation is the variable physical activity. Three questions were aggregated to create a physical activity score (i.e., Frequency of moderate activity 10+ minutes: Times per week, Frequency of vigorous activity 10+ minutes: Times per week, Frequency of strengthening activity: Times per week). Participants were asked about the frequency of participating 10 or more minutes. It would have been more beneficial if participants were asked about the amount of time spent for each of the previously mentioned activities (i.e., minutes).

Study Implications

This study highlighted some of the differences that exist amongst Latino subgroups, and how impractical it is to provide health recommendations for one group when differences exist among Latino subgroups (e.g., genetics, culture, history of their presence in the United States). This study also highlighted the lack of representation of Latino subgroups in this sample (e.g., country of origin, recent immigrants, undocumented immigrants). This study also identified numerous risk factors associated with cardiovascular disease risk (sex, age, psychological distress, physical activity, and acculturation). Therefore, in the subsequent section numerous, implications and recommendations will be introduced; with a concentration on research, policy, and practice.

Research Implications. This section will focus on implications for future research based within the context of the limitations and findings of this study. Therefore, this section will a) advocate for the increased representation of Latinos from diverse countries of origin in epidemiological studies; b) provide an argument for the need of improved measures of acculturation; c) discuss the need to assess the Latino health paradox for each Latino subgroups; d) recommend standardization of data collected on Latino population; and e) propose that data on genetic and racial differences be included in epidemiological studies (Rodriguez et al., 2014). These recommendations are given with the consideration of biopsychosocial factors social workers and related fields should consider when developing culturally sensitive studies.

Improve Representation of Latino Subgroups in Epidemiological Studies. In the previous section it was mentioned that this study lacked representativeness of Latino subgroups; in particular, country of origin. As a result, it is recommended that future studies include Latinos from a varied number of countries of origin to represent U.S. Latino demographics. Motel and Patten (2012) provide a list of the top ten countries from which 92% percent of the Latino population originate (i.e., Mexico, Puerto Rico, Cuba, Salvador, Dominican Republic, Guatemala, Colombia, Hondurans, Ecuador, and Peru). Yet, in this study, group subgroup comparisons based on country of origin were reduced to four groups (i.e., Mexicans, Mexican Americans, Puerto Ricans, Central or South American, and other). Epidemiological studies should attempt to recruit sufficient participants that represent each country, given the heterogeneity of Latino subgroups (e.g., history, genetics, SES, immigration status, language preferences) (Rodriguez et al. 2014). This is important because when Latinos are categorized as one group who come from Spanish speaking countries, their differences are not taken into account. Taylor, Lopez, Martinez, and Velasco (2012) report that a majority (51%) of Latino self-identify by their country of origin, with only 24% reporting they use the term Latino or Hispanic. Motel and Patten (2012) report differences based on Latinos' country of origin and numerous factors (e.g., nativity, median age, SES indicators, English proficiency, citizenship status, health insurance, and homeownership). Despite their differences, this study was unable to assess differences in biopsychosocial factors, nor was it able to assess whether risks to CVD differed among Latinos based on their country of origin due to the lack of a representative sample.

Latinos are the largest minority in the United States; their health is important not only for the individuals and their families, but it is essential to the prosperity of the U.S. Future research studies, as well as national epidemiological studies and surveillance should include standardized questions asked that provide more detail and highlight the factors that make Latinos heterogeneous (e.g., race, social capital, religion, spirituality, familismo, health practices, language proficiency, generational status, geographic location, country of origin, length of residence); standardization of data among national data sets would also provide an opportunity for subgroup comparisons across datasets. Furthermore, given the importance of religion and spirituality as coping mechanism when faced with health ailments (Abraído-Lanza, Vásquez, & Echeverría, 2004; Jurkowski, Kurlanska, & Ramos, 2010; Lujan, J., & Campbell, 2006; Reyes-Ortiz, Rodriguez, & Markides, 2009), future studies should include these constructs.

Nevertheless, challenges make it difficult in recruiting Latino participants (Ford, Siminoff, Pickelsimer, Mainous, Smith Diaz et al., 2013; Haack, Gerdes, & Lawton, 2014), especially those who recently migrated or who are unauthorized immigrants. One main critique is that Latino studies seem to be predominantly based on Latinos of Mexican descent, although this may be due to the large proportion of Latinos from Mexican descent in the United States (Rodriguez et al. 2014). Researchers need to overcome barriers that make it difficult to recruit and retain Latinos in research studies. Numerous studies have been written about the barriers and how to overcome these barriers for recruitment of minorities in research studies, including Latinos (e.g., George, Duran, Norris, 2014; Martinez, McClure, Eddy, Ruth, & Hyers, 2011; Reidy, Orpinas, & Davis, 2012; Yancey, Ortega, & Kumanyika, 2006). Recommendations to overcome these barriers (e.g., mistrust, competing demands, legal status) should be considered in an attempt to provide appropriate representation of Latino subgroups. Martinez, McClure, Eddy, Ruth, and Hyers, (2012) provide a list of strategies to improve recruitment and retention of Latino families; however, these strategies may benefit the recruitment of Latinos subgroups in general. Some of the recruitment recommendations include: recruiting in Latino events, address methods of collecting data (e.g., consider literacy and access to internet technology), build rapport and trust. Building rapport and trust may be of great importance given the current political climate and the fears of undocumented Latinos. In regards to retention, recruiters should consider commitment demands; such as, work and family obligations. Martinez et al. (2012) recommend making allowance for flexible data collection schedules, proving incentives, providing support for participants (e.g., transportation), and adapting instruments to the needs of Latino participants (e.g., reading filling out questionnaires for participants).

Race and Genetics in Future Latino Research. Future studies should also focus on the difference of Latinos propensity to diabetes and cardiovascular disease based on racial and genetic differences. Bryc, Velez, Karafet, Moreno-Estrada et al. (2010) provide evidence of the genetic differences among Latino subgroups; that is, distinctions regarding the proportion of European, African, and Native American ancestry among numerous Latinos subgroups (i.e., Mexicans, Puerto Ricans, Dominicans, Ecuadorians, and Colombians). Concordance between the history of these countries and the genetic makeup is evident; for example, Puerto Ricans were found to have the highest levels of African ancestry, while Mexicans and Ecuadorians had the highest level of Native American ancestry (Bryc et al., 2010). Genetic differences may account for the differences in prevalence of diabetes and cardiovascular disease among Latino subgroups. Given their difference in genetic phenotype, empirical research should be conducted on the cultural construction of race among Hispanics, including experiences or perceived discrimination to identify the consequences of these experiences on diabetes and cardiovascular disease.

Policy Implications and Recommendations

Findings from this study merit an assessment of health care policies and introduction of health-related policy initiatives. Therefore, this section will focus on current issues with national policies that affect Latino health outcomes and access to health care. This section will first discuss the Affordable Care Act and its limitations; this will be followed with a discussion of possible policy initiatives to improve health outcomes of Latinos and their access to health care. Finally, advocacy for financial resources to support evidence-based research proposals that evaluate whether current initiatives are beneficial to the Latino population and subpopulations will be discussed.

Latinos and the Affordable Care Act. Latinos' ability to access health care services are ameliorated by the Affordable Care Act (ACA); yet others such as the Responsibility and Work Opportunity Reconciliation Act of 1996 abate it. The ACA provides measures that improve access to health coverage (e.g., provision of subsidies that provide financial assistance and improve the ability to afford private health insurance and expansion of Medicaid benefits) (Medicaid.gov, n.d.; Healthcare.gov, n.d.); this translates to improvements in access and utilization of healthcare services (Doty, Blumenthal & Collins, 2013). Doty, Blumenthal, and Collins (2014) reports a reduction in the percentage of uninsured Latinos from 36% to 23% has been documented after the first ACA open-enrollment period. Nevertheless, ACA provides policy dilemmas that affect the Latino population. Ortega, Rodriguez, Bustamante (2015) provide an overview of health policy challenges that need to be addressed in an effort to improve Latino health status and access to health care. Efforts to improve access and health status of Latinos are summarized in four points: a) assess how offering health coverage to undocumented immigrants would reduce health disparities and improve access and utilization of health care services; b) expand of Medicaid to states in which Latinos are currently living that opted out of the expansion; c) ensure that health care settings have a culturally sensitive workforce and services that meet the needs of newly insured Latinos entering private healthcare settings (e.g., translators, promotoras de salud[36], Spanish speaking healthcare providers).

Despite the decrease in the percentage of uninsured Latinos, there are numerous predicaments that are not addressed by the ACA. Furthermore, access to health care for many Latinos is significantly affected by the Personal Responsibility and Work Opportunity Reconciliation Act of 1996 (PRWORA) (Kaushal & Kaestner, 2005; Kullgren, 2003). Furthermore, the ACA continues to uphold regulations set by the PRWORA; that is, recent authorized immigrants are ineligible for Medicaid unless they meet the length of residence requirement (i.e., 5 years) (Siskin & Lunder, 2016). This makes it more difficult and creates a barrier to health insurance coverage. In this sample of Latinos with diabetes, the majority had a usual source of care and were covered by health insurance. However, findings should not be extrapolated to the entire Latino population. Given that recent immigrants were underrepresented and that this study could not account for documentation status (aside from U.S. citizenship status), it is difficult to assess whether this section of the population would have comparable access to health care. To be eligible for health care coverage through the market place set under ACA, people must fall under three categories: U.S. citizen, U.S. national, or Lawful Present immigrant (Healthcare.gov, n.d.). With 11.1 million unauthorized immigrants in the United States (Krogstad, Passel, Cohn, 2016), it is important to advocate for them given their lack resources and access to health care services. Furthermore, according to Krogstad and Lopez (2014), Latino immigrants are a little more than two times less likely to be uninsured than U.S.

[36] Promotoras de Salud “The Hispanic community recognizes promotores de salud as lay health workers who work in Spanish-speaking communities” (Centers for Disease Control and Prevention, 2015g).

born Latinos (39% vs. 17% respectively); even worse, almost half (49%) of non-U.S. citizen immigrants are uninsured.

To address these disparities among Latino subgroups, social workers and related providers should: a) be informed of current health care policies and how they affect vulnerable populations; b) evaluate current legislation affecting access, utilization, and health outcomes; c) advocate for policies that ameliorate health disparities; and d) be informed of immigration policies and how these policies directly and indirectly affect Latino health. Darnell and Lawlor (2006, p.129) explain the following regarding the role of social workers in healthcare settings:

> In an era of increasingly complex and changing rules in federal health programs, knowledge about federal health policies and expertise in eligibility have become requisite skills for social workers to effectively connect clients with available resources and advocate for improvements in the programs. Social workers are poised to help clients overcome persistent barriers to coverage that result from lack of knowledge or misinformation about public health programs.

It is imperative that social workers and related providers have knowledge of health policies and how these policies affect Latino eligibility to health care given the differences among Latino subgroups (e.g., immigration status, language proficiency, SES).

Mandate Screening of Mental Health in Primary Health Care Settings. This study also found that there was a positive association between psychological distress and risk of cardiovascular disease. Research has identified and empirically supported the relationship between psychological distress and health outcomes (i.e., diabetes and cardiovascular disease) (Anderson, Freedland, Clouse, & Lustman, 2001; Pan, Lucas, Sun, van Dam, Franco, Willett et al., 2011). Although Latinos have comparable rates of mental illness as the general population

(National Alliance on Mental Illness, n.d.), in a review of the literature Cabassa, Zayas, and Hansen (2006) identified numerous barriers Latinos encounter that make it difficult to access mental health care (e.g., health coverage, not knowing where to go, low acculturation). Latino mental health cases go unrecognized and untreated; most disclose mental health ailments to primary care providers. However, in comparison to non-Latino Whites, Latinos receive poorer services. One possible recommendation is to support policies that encourage integration between health and mental health care services in primary care services. Current policies discourage integrative health care (Russell, 2010). In an assessment of an integrated behavioral health care (IBHC) model, Bridges, Andrews III, Villalobos, Pastrana, Cavell and Gomez (2 014) found that Latinos and non-Latino Whites had comparable rates of mental health utilization, thus suggesting that Latinos could benefit from an IBHC model. Nevertheless, current policies encourage short visits to primary health providers, and offer few incentives to support implementation of integrative health care models in primary healthcare settings (Russell, 2010). Social workers and related providers should advocate for policies that support integrative health care, given that Latinos often access mental health care in a primary care setting. According to Integrative Policy Consortium (2013), there are numerous key policy issues that make it challenging to embrace an integrative healthcare system. One such dilemma, is that the U.S. government dictates the distribution of funding to institutions that educate health professionals; without stakeholders advocating for funding to go to institutions that embrace integrative health care, professionals will continue to be educated under current models that do not support integrative health care.

Policy Mandating Cultural Sensitivity Training for Health Care Providers. Given the diversity among and within Latino subgroups, it is important to advocate for policies that embrace mandating cultural sensitivity training and cultural humility to health care providers. write that there is inconsistency across medical schools in terms of what and how cultural sensitivity is taught to medical students. However, cultural sensitivity training should move beyond learning facts about Latino subgroups and instead embrace cultural humility. Foronda, Baptiste, Reinholdt, and Ousman (2016, p. 214) state:

> Cultural humility involves a change in overall perspective and way of life. Cultural humility is a way of being. Employing cultural humility means being aware of power imbalances and being humble in every interaction with every individual. This process will not happen immediately, but it is speculated that with time, education, reflection, and effort, progress can be made.

Although politically challenging, Latino patients would benefit from a policy that mandates medical providers and staff working in healthcare setting receive appropriate cultural sensitivity training that includes cultural humility in a cross-cultural curriculum.

Implications for Practice

Findings from this study suggest that among Latinos with diabetes, cardiovascular disease risk is associated with age, sex, psychological distress, physical activity, and acculturation. Social workers and related providers in health care settings should take into consideration a beneficial recommendation by Rodriguez el al. (2014), encouraging initiatives that: a) increase access to health care and offer assistance to help with the financial burden of attributed to diabetes and cardiovascular disease treatment; b) encourage diabetes and cardiovascular disease risk knowledge; and c) promote health behaviors that reduce the risk of diabetes and cardiovascular disease risk.

Social Workers' Role in Improving Access to Care and Ameliorating Financial Burden. Social workers and related providers can encourage culturally sensitive initiatives that take a biopsychosocial approach (Engle, 1977). Browne (2006) writes that a biopsychosocial approach goes beyond biological factors associated with disease and considers other determinants of health. One determinant of health is access to healthcare. In the case of Latinos with diabetes, social workers and related providers should be aware of barriers that prevent Latinos from accessing health care services. Barriers to health care services include language, level of acculturation, and immigration status (Escarce & Kapur, 2006). Therefore, social workers should be aware of resources available for Latinos who are uninsured and are unable to pay for costly diabetes and cardiovascular disease treatment. According to the American Diabetes Association (2013a), on average per year, individuals with diabetes spend $13,700 on medical expenditures, of which a little less than half is used for diabetes treatment. Furthermore, social workers and related providers in health care settings can provide Latinos with diabetes with much needed referrals that may help with the financial burden of diabetes treatment.

Encourage Development of Programs to Increase Diabetes and CVD Risk Knowledge. Rodriguez et al. (2014) recommend a professional interdisciplinary approach to deal with CVD disparities with cultural sensitivity in mind; this would complement the researcher's recommendation to implement educational programs about cardiovascular disease and diabetes to Latinos so that they are able to understand the risk factors for this disease and prevent deadly health outcomes. Latinos continue to be unaware of the risk factors associated with cardiovascular disease (U.S. Department of Health and Human Services, Public Health Services, National Institute of Health, National Heart, Lung and Blood Institute, 1996; McMahan, Cathorall, & Romero, 2007; Wagner, Lacey, Abbott, De Groot, & Chyun, 2006).

Wagner et al. (2006) utilized the Heart Disease Facts Questionnaire (HDFQ), a measure used to assess an individual's knowledge regarding diabetes and heart disease; results indicated that in comparison to Non-Latino Whites and African Americans, Latinos scored the lowest. This translates to Latinos having the least knowledge when it comes to the relationship between diabetes and cardiovascular disease. When developing these programs, social workers and related providers should take into consideration Latino health literacy and develop programs that are sensitive to the needs of the Latino population. It would be beneficial to implement these programs in places where Latinos congregate (e.g., Faith Based Organizations [FBO]). Dehaven, Hunter, Wilder, Walton, and Berry (2004) found that health programs implemented in FBOs were found to improve participant's knowledge of od diseases and also improved screening behavior.

Promote Health Behaviors that Reduce the Risk of Diabetes and Cardiovascular Disease. Social workers should develop programs that encourage healthy lifestyles to prevent diabetes and cardiovascular disease. However, social workers should address barriers to participating in health behaviors that promote a healthy lifestyle. Such barriers include environmental racism, lack of safety in low SES communities, and limited availability of healthy food. Physical and social characteristics of a neighborhood can encourage people to or impede people from participating in health behaviors that reduce the risk of diabetes and cardiovascular disease (i.e., participation in physical activity). Latinos face numerous barriers that prevent them from participating in physical activity. Some barriers include neighborhood crime, absence of community health centers, and fear of U.S. Immigration and Customs Enforcement (ICE) (Larsen, Pekmezi, Marquez, Benitez, & Marcus, 2013). According to the Food Research and Action Center (2011) Latinos have less access to affordable fresh fruits and vegetables in comparison to Whites. Availability of supermarket stores that carry fresh fruits and vegetables have been associated with less obesity, while convenience stores have been associated with higher rates of obesity (Moreland, Diez Roux, & Wing, 2006).

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APPENDIX A

Table 1. Tests to Diagnose Type 2 Diabetes.

Categories	Test and Criteria		
	Average Blood Glucose (A1c)	Oral Glucose Tolerance (OGTT)	Fasting Plasma Glucose (FPG)
Normal	Less than 5.7%	Less than 140 mg	Less than 100 mg/dl
Pre-Diabetes	5.7% to 6.4%	140 mg/dl to 199 mg/dl	100 mg/dl to 125
Diabetes	6.5% or higher	200 mg/dl or higher	126 mg/dl or higher

*Based on the American Diabetes Association (2014d) guidelines

Appendix B

Table 1. Distribution of Latino Participants by Country or Territory of Origin

Latino Background	**Frequency**	**%**
Mexican	9,131	36.66
Mexican American	7,301	29.31
Puerto Rican	1,917	7.70
Cuban/Cuban American	838	3.35
Dominican (Republic)	675	2.71
Central or South America	3,730	14.97
Other Latin American (Type not specified)	94	0.38
Other Spanish	626	2.51
Multiple Hispanic	601	2.41
Total	24,909	100.00

APPENDIX B

Table 2. Distribution of Latinos with Diabetes by Ethnicity

Hispanic Ethnicity	**Frequency**	**Percent**
Mexican	248	37.75
Mexican American	162	24.66
Puerto Rican	75	11.42
Cuban/Cuban American	29	4.41
Dominican (Republic)	25	3.81
Central or South America	70	10.65
Other Latin American (Type not specified)	3	0.46
Other Spanish	37	5.63
Multiple Hispanic	8	1.22
Total	657	100.00

Appendix C

Table 1. Coding of Variables for Demographic Variables

Variable Name	Variable Name in IHIS	Description of Variable	Coding in IHIS	Recoding of Variables	Weight to be Used
Age	AGE	Age reports the individual's age, in years since last birthday.	00-85+	Variable not Recoded Discrete and Interval-Ratio	PERWEIGHT
Sex	SEX	SEX indicates whether the person was male or female.	1 Male 2 Female	Variable not Recoded	PERWEIGHT
Marital Status	MARSTCOHAB	Marital status, including living with a partner	1 Married, spouse present 2 Married, spouse absent 3 Married, spouse in household unknown 4 Separate 5 Divorce 6 Widowed 7 Living with partner 8 Never married 9 Unknown marital status	Variable not Recoded	PERWEIGHT

Hispanic Ethnicity	HISPETH	Hispanic Ethnicity	10 Not Hispanic/Spanish Origin 20 Mexican 23 Mexican-American 30 Puerto Rican 40 Cuban/Cuban American 50 Dominican (Republic) 61 Central or South America 62 Other Latin American, type not specified 63 Other Spanish 70 Multi Hispanic	Variable not Recoded	PERWEIGHT
YEARS IN U.S.	YRSINUS	In what year did you come to the United States to stay?	0 NIU 1 Less than 1 year 2 1 year to less than 5 years. 3 5 years to less than 10 years 4 10 years to less than 15 years 5 15 years or more 9 Unknown	Variable not Recoded	PERWEIGHT

US Born	USBORN	In what country were you born?	10 No 11 No, born in U.S. territory 12 No, born outside U.S. and U.S. territories 20 Yes, born in U.S. state or DC 97 Unknown- refused 98 Unknown- not ascertained 99 Unknown- don't know	Variable not Recoded	PERWEIGHT
Citizen	CITIZEN	Are you a citizen of the United States?	1 No, not U.S. citizen 2 Yes, U.S. citizen 7 Unknown—refused 9 Unknown—don't know	Variable not Recoded	PERWEIGHT
Region Born	REGIONBR	In what region were you born?	01 United States 02 Mexico, Central America, Caribbean Islands 03 South America 04 Europe 05 Russia (and	Variable not Recoded	PERWEIGHT

			former USSR areas) 06 Africa 07 Middle East 08 Indian Subcontinent 09 Asia 10 SE Asia 11 Elsewhere 99 Unknown		
Language of Interview	INTERVLANG	For all persons, INTERVLANG reports the language in which the interview was conducted.	1 English 2 Spanish 3 English and Spanish 4 Other 5 Unknown-not ascertained	Variable not Recoded	PERWEIGHT
Variable Name	Variable Name in IHIS	Description of Variable	Coding in IHIS	Recoding of Variables	Weight to be Used
Age	AGE	Age reports the individual's age, in years since last birthday.	00-85+	Variable not Recoded Discrete and Interval-Ratio	PERWEIGHT
Sex	SEX	SEX indicates whether the person was male or female.	1 Male 2 Female	Variable not Recoded	PERWEIGHT

Appendix C

Table 2. Coding of Variables for Objective 1

Variable Name	Variable Name in IHIS	Description of Variable	Coding in IHIS	Recoding of Variables	Weight to be Used
1. Availability of Care	USUALPL	Has usual place for medical care	0 NIU 1 there is no place or No 2 Yes, Has a usual place or Yes 3There is more than one place 7 Unknown-refused 8 Unknown-not ascertained 9 Unknown-don't know	Variable not Recoded	SAMPWEIGHT
2. Source of Care	TYPPLSICK	Kind of usual place for medical care	00 NIU 10 Clinic or health center 20 Doctor's office or HMO 30 Hospital emergency room 40 Hospital outpatient department 55 At home 56 Other Places 60 Doesn't go to one place most often 97 Unknown-refused	Variable not Recoded	SAMPWEIGHT

			98 Unknown-not ascertained 99 Unknown-don't know		
3. Delay due to lack of availability of appointments	DEALYAPPT	Delayed care because couldn't get appointment soon	0NIU 1No 2Yes 7 Unknown-refused 8 Unknown-not ascertained 9 Unknown-don't know	Variable not Recoded	SAMPWEIGHT
4. Delay due to hours	DELAYHRS	Delayed care because doctor's office not open	0NIU 1No 2Yes 7 Unknown-refused 8 Unknown-not ascertained 9 Unknown-don't know	Variable not Recoded	SAMPWEIGHT
5. Delay due to phone	DELAYPHONE	Delayed care because couldn't get through by phone	0NIU 1No 2Yes 7 Unknown-refused 8 Unknown-not ascertained 9 Unknown-don't know	Variable not Recoded	SAMPWEIGHT
6. Delay due to wait	DEALYWAIT	Delayed care because wait too long in	0NIU 1No 2Yes 7 Unknown-refused	Variable not Recoded	SAMPWEIGHT

		doctor's office	8 Unknown-not ascertained 9 Unknown-don't know		
7. Delay due to transportation	DELAYTRANS	Delayed care because lacked transportation	0NIU 1No 2Yes 7 Unknown-refused 8 Unknown-not ascertained 9 Unknown-don't know	Variable not Recoded	SAMPWEIGHT
8. Delay due to cost	DELAYCOST	Medical care delayed due to cost, past 12 months	0NIU 1No 2Yes 7 Unknown-refused 8 Unknown-not ascertained 9 Unknown-don't know	Variable not Recoded	PERWEIGHT
9. Need for Care	YBARCARE	Needed but could not afford medical care, past 12 months	0NIU 1No 2Yes 7 Unknown-refused 8 Unknown-not ascertained 9 Unknown-don't know	Variable not Recoded	PERWEIGHT
10. Access to Medication	YBARMEDS	Needed but couldn't afford prescription medication,	0NIU 1No 2Yes 7 Unknown-refused	Variable not Recoded	SAMPWEIGHT

		past 12 months	8 Unknown-not ascertained 9 Unknown-don't know		
11. Access to Mental Health	YBARMENTAL	Needed but couldn't afford mental health care, past 12 months	0NIU 1No 2Yes 7 Unknown-refused 8 Unknown-not ascertained 9 Unknown-don't know	Variable not Recoded	SAMPWEIGHT
12. Access to Follow-up Care	YBARFOLLOW	Needed but couldn't afford follow-up care, past 12 months	0NIU 1No 2Yes 7 Unknown-refused 8 Unknown-not ascertained 9 Unknown-don't know	Variable not Recoded	SAMPWEIGHT
13. Access to Specialist	YBARSPECL	Needed but couldn't afford specialist, past 12 months	0NIU 1No 2Yes 7 Unknown-refused 8 Unknown-not ascertained 9 Unknown-don't know	Variable not Recoded	SAMPWEIGHT
14. Worried about Bills	WORMEDBILL	Worried about paying medical bills	0NIU 1No 2Yes 7 Unknown-refused	Variable not Recoded	SAMPWEIGHT

			8 Unknown-not ascertained 9 Unknown-don't know		
15. Lower Cost of Medication	YCHEAPMEDYR	Asked doctor for lower cost medications, pas 12 months	0NIU 1No 2Yes 7 Unknown-refused 8 Unknown-not ascertained 9 Unknown-don't know	Variable not Recoded	SAMPWEIGHT
16. Medication from another country	YFORNMEDYR	Bought medication from other country to save money, past 12 months	0NIU 1No 2Yes 7 Unknown-refused 8 Unknown-not ascertained 9 Unknown-don't know	Variable not Recoded	SAMPWEIGHT
17. Skipped Medications	YSKIMPMEDYR	Took less medication to save money, past 12 months	0NIU 1No 2Yes 7 Unknown-refused 8 Unknown-not ascertained 9 Unknown-don't know	Variable not Recoded	SAMPWEIGHT
18. Trouble finding doctor	TRUBFINDRYR	Had trouble finding general	0NIU 1No 2Yes 7 Unknown-refused	Variable not Recoded	SAMPWEIGHT

		doctor, past 12, months	8 Unknown-not ascertained 9 Unknown-don't know		
19. New Patient not Accepted	NONWPATYR	Told not accepted as new patient, past 12 months	0NIU 1No 2Yes 7 Unknown-refused 8 Unknown-not ascertained 9 Unknown-don't know	Variable not Recoded	SAMPWEIGHT
20. Health Coverage Not Accepted	NOHCTAKEYR	Told health care coverage not accepted, past 12 months	0NIU 1No 2Yes 7 Unknown-refused 8 Unknown-not ascertained 9 Unknown-don't know	Variable not Recoded	SAMPWEIGHT
21. Able to find Doctor	ABLEFINDRYR	Able to find general doctor despite trouble, past 12 months	0NIU 1No 2Yes 7 Unknown-refused 8 Unknown-not ascertained 9 Unknown-don't know	Variable not Recoded	SAMPWEIGHT
22. Too expensive	NOUSLYCOST	Why no usual source of care: Too expensive or no insurance	0NIU 1No 2Yes 7 Unknown-refused	Variable not Recoded	SAMPWEIGHT

			8 Unknown-not ascertained 9 Unknown-don't know		
23. Didn't get around to it	NOUSLY DELAY	Why no usual source of care: Didn't get around to it	0NIU 1No 2Yes 7 Unknown-refused 8 Unknown-not ascertained 9 Unknown-don't know	Variable not Recoded	SAMPWEIGHT
24. Doesn't know where to go	NOUSLY DKWHE R	Why no usual source of care: Doesn't know where to go	0NIU 1No 2Yes 7 Unknown-refused 8 Unknown-not ascertained 9 Unknown-don't know	Variable not Recoded	SAMPWEIGHT
25. Previous doctor moved or is unavailable	NOUSLY DRMOV	Why no usual source of care: Previous doctor moved or is unavailable	0NIU 1No 2Yes 7 Unknown-refused 8 Unknown-not ascertained 9 Unknown-don't know	Variable not Recoded	SAMPWEIGHT
26. Care too far away or inconvenien t	NOUSLY FAR	Why no usual source of care: Care too far away or	0NIU 1No 2Yes 7 Unknown-refused	Variable not Recoded	SAMPWEIGHT

		inconvenient	8 Unknown-not ascertained 9 Unknown-don't know		
27. Speak a different language	NOUSLYLANG	Why no usual source of care: Speak a different language	0NIU 1No 2Yes 7 Unknown-refused 8 Unknown-not ascertained 9 Unknown-don't know	Variable not Recoded	SAMPWEIGHT
28. Doesn't like doctors	NOUSLYNOLIKE	Why no usual source of care: Doesn't like doctors	0NIU 1No 2Yes 7 Unknown-refused 8 Unknown-not ascertained 9 Unknown-don't know	Variable not Recoded	SAMPWEIGHT
29. Doesn't need a doctor	NOUSLYNONEED	Why no usual source of Care: Doesn't need a doctor	0NIU 1No 2Yes 7 Unknown-refused 8 Unknown-not ascertained 9 Unknown-don't know	Variable not Recoded	SAMPWEIGHT
30. Paying bills over time	HIPAYMEDBILL	Currently Paying Bills over time	0NIU 1No 2Yes 7 Unknown-refused	Variable not Recoded	PERWEIGHT

			8 Unknown-not ascertained 9 Unknown-don't know		
31. Confidence in paying private health insurance	HIPCON AFFORD R	Confidence in affording private health insurance plan	0NIU 1 Very confident 2 Somewhat confident 3Not too confident 4 Not confident at all 7 Unknown-refused 8 Unknown-not ascertained 9 Unknown-don't know	Variable not Recoded	PERWEIGHT
32. Problems paying or unable to pay medical bills	HIPROBP AYR	Problems paying or unable to pay medical bills, past 12 months	0NIU 1No 2Yes 7 Unknown-refused 8 Unknown-not ascertained 9 Unknown-don't know	Variable not Recoded	PERWEIGHT
33. Unable to pay medical bills	HIUNAB LEPAY	Unable to pay medical bills	0NIU 1No 2Yes 7 Unknown-refused 8 Unknown-not ascertained 9 Unknown-don't know	Variable not Recoded	PERWEIGHT

34. Health Insurance Coverage	HINOTCOVE	Health insurance coverage status	0NIU 1Not Covered 2Covered 7 Unknown-refused 8 Unknown-not ascertained 9 Unknown-don't know	Variable not Recoded	PERWEIGHT
35. Public Assistance	HIPUBCOVE	Has any Medicaid/other public assistance/State sponsored plan or CHIP (recode)	0NIU 1No 2Yes 9Unknown/refused	Variable not Recoded	PERWEIGHT
36. Private Health Insurance	HIPRIVATEE	Covered by Private Health Insurance	0NIU 1Not Covered 2Covered 7 Unknown-refused 8 Unknown-not ascertained 9 Unknown-don't know	Variable not Recoded	PERWEIGHT

Variables concerning demographic information and variables utilized for the purposes of objective 1 were not recoded, this was due to the fact that only univariate analysis were conducted for descriptive purposes.

Appendix C

Table 3 Coding for Objective 2, 2a, and 3

VARIABLE NAME	QUESTION	CODING	RECODING	WEIGHT	Imputed	Universe
Kessler 6 (K6) Higher scores mean more psychological distress.				SAMPWEIGHT	The following variables will be aggregated to create a score for psychological distress: AEFFORTR2, AHOPELESSR2, ANERVOUSR2, ARESTLESSR2, ASADR2, and AWORTHLESSR2.	
AEFFORT AEFFORT2	Felt everything an effort, past 30 days (adults)	0 None of the time 1 A little of the time 2 Some of the time 3 Most of the time 4 All of the time 6 NIU *7 Unknown –Refused *8 Not Ascertained *9 Unknown- Don't know	Not Recoded	SAMPWEIGHT	Yes New variable created for imputation, codes did not change AEFFORTR2 The following codes were deleted for imputation:7,8,9	Sample adults age 18+
AHOPELESS AHOPELESSR2	How often felt hopeless, past 30 days (adults)	0 None of the time 1 A little of the time 2 Some of the time 3 Most of the time	Not Recoded	SAMPWEIGHT	Yes	Sample adults age 18+

		4 All of the time 6 NIU *7 Unknown –Refused *8 Not Ascertained *9 Unknown- Don’t know			New variable created for imputation, codes did not change AHOPELESSR2 The following codes were deleted for imputation:7,8,9	
ANERVOUS ANERVOUSR2	How often felt nervous, past 30 days (adults)	0 None of the time 1 A little of the time 2 Some of the time 3 Most of the time 4 All of the time 6 NIU *7 Unknown –Refused *8 Not Ascertained *9 Unknown- Don’t know	Not Recoded	SAMPWEIGHT	Yes New variable created for imputation, codes did not change ANERVOUSR2 The following codes were deleted for imputation:7,8,9	Sample adults age 18+
ARESTLESS ARESTLESSR2	How often felt restless, past 30 days (adults)	0 None of the time 1 A little of the time 2 Some of the time 3 Most of the time 4 All of the time 6 NIU *7 Unknown –Refused *8 Not Ascertained *9 Unknown- Don’t know	Not Recoded	SAMPWEIGHT	Yes New variable created for imputation, codes did not change ARESTLESSR2 The following codes were deleted for imputation:7,8,9	Sample adults age 18+
ASAD ASADR2	How often felt sad, past 30 days (adults)	0 None of the time 1 A little of the time 2 Some of the time 3 Most of the time 4 All of the time	Not Recoded	SAMPWEIGHT	Yes New variable created for imputation, codes did not change	Sample adults age 18+

		6 NIU *7 Unknown –Refused *8 Not Ascertained *9 Unknown- Don't know			ASADR2 The following codes were deleted for imputation:7,8,9	
AWORTHLESS AWORTHLESSR2	How often felt sad, past 30 days (adults)	0 None of the time 1 A little of the time 2 Some of the time 3 Most of the time 4 All of the time 6 NIU *7 Unknown –Refused *8 Not Ascertained *9 Unknown- Don't know	Not Recoded	SAMPWEIGHT	Yes New variable created for imputation, codes did not change AWORTHLESSR2 The following codes were deleted for imputation:7,8,9	Sample adults age 18+
Body Mass Index	QUESTION	CODING	RECODING	WEIGHT	Imputed	Universe
Body Mass Index (BMI) Higher scores mean higher BMI	BMI calculation based on height and weight	Not applicable	Not applicable 99.80→99.8 99.99	SAMPWEIGHT	New variable created for imputation: BMIR2 The following codes were deleted for imputation: 99.99	Sample adults age 18+
Physical Activity				SAMPWEIGHT	The following variables will be aggregated to create a score for physical activity: MOD10FWK2, VIG10FWK2, and STRONGFWK2	
MOD10FWK	Frequency of moderate	00 Not in universe	100 Not in universe	SAMPWEIGHT	New variable created for recoding and imputation:	Sample adults age 18+

	activity 10+ minutes: Times per week	94 Less than once per week 95 Never 96 Unable to do this activity *97 Unknown *98 Unknown-not Ascertained *99 Unknown-don't know	0 Less than once per week 0 Never 0 Unable to do this activity *97 Unknown *98 Unknown-not Ascertained *99 Unknown-don't know		MOD10FWKR2 DELETED: 97,98,99	
VIG10FWK	Frequency of vigorous activity 10+ minutes: Times per week	00 Not in universe 94 Less than once per week 95 Never 96 Unable to do this activity *97 Unknown *98 Unknown-not Ascertained *99 Unknown-don't know	100 Not in universe 0 Less than once per week 0 Never 0 Unable to do this activity *97 Unknown *98 Unknown-not Ascertained *99 Unknown-don't know	SAMPWEIGHT	New variable created for recoding and imputation: VIG10FWKR2 DELETED: 97,98,99	Sample adults age 18+
STRONGFWK	Frequency of strengthening activity: Times per week	00 Not in universe 94 Less than once per week 95 Never 96 Unable to do this activity *97 Unknown	100 Not in universe 0 Less than once per week 0 Never 0 Unable to do this activity	SAMPWEIGHT	New variable created for recoding and imputation: STRONGFWKR2. DELETED: 97,98,99	Sample adults age 18+

		*98 Unknown-not Ascertained *99 Unknown-don't know	*97 Unknown *98 Unknown-not Ascertained *99 Unknown-don't know			
Social Economic Position	QUESTION	CODING	RECODING	WEIGHT	Imputed	Universe
EARNIMP1 Higher scores mean higher income. .	EARNIMP1 is a variable that includes imputed values to replace missing data for the original variable, EARNINGS, a recoded variable reporting total personal earnings in the previous calendar year	0 NIU 1 $01 to $4,999 2 $5,000 to $9,999 3 $10,000 to $14,999 4 $15,000 to $19,999 5 $20,000 to $24,999 11 $25,000 to $29,999 12 $30,000 to $34,999 21 $35,000 to $39,999 22 $40,000 to $44,999 31 $45,000 to $49,999 32 $50,000 to $54,999 41 $55,000 to $59,999 42 $60,000 to $64,999 51 $65,000 to $69,999 52 $70,000 to $74,999 61 75,000 to $79,999 62 $80,000 to $84,999 63 $85,000 to $89,999 64 $90,000 to $94,999 65 $95,000 to $99,999 67 $100,000 to $104,999 68 $105,000 to 109,999	This variable was not recoded and it was not used in SEM model given that NIU were coded as missing. Variable selected was imputed when selected.	PERWEIGHT	Not Applicable	Persons age 18+ worked for pay last year, or whose employment status is imputed as employed for pay NIU:378

		69 $110,000 to $114,999 70 $115,000 and over				
EDUCREC1	QUESTION	CODING	RECODING	WEIGHT	Imputed	Universe
EDUCREC1 EDUCREC2 Higher scores mean more education.	Education attainment recode, nonintervalled	0 NIU 1 Never attended/Kindergarten only 2 Grade 1 3 Grade 2 4 Grade 3 5 Grade 4 6 Grade 5 7 Grade 6 8 Grade 7 9 Grade 8 10 Grade 9 11 Grade 10 12 Grade 11 13 Grade 12 14 1 to 3 years of college 15 4 years of college/ Bachelor’s degree 16 5+ years of college 97 Unknown--refused 98 Unknown—not ascertained 99 Unknown—not known	Not Recoded There were no NIU	PERWEIGHT	Created new variable EDUCREC2 for recoding and imputation purpose	Persons age 5+.
Acculturation	QUESTION	CODING	RECODING	WEIGHT	Not Imputed	Universe

Higher scores mean higher level of acculturation					Acculturation variable is a summation of the following variables: YRSINUS2; CITIZEN2; USBORN2; INTERVLANG2	
YRSINUS YRSINUS2	In what year did you come to the United States	0 NIU 1 Less than 1 year 2 1 year to less than 5 3 5 years to less than 10 years 4 10 years to less than 15 years 5 15 years or more 9 Unknown	1 Less than 1 year 2 1 year to less than 5 3 5 years to less than 10years 4 10 years to less than 15 years 5 15 years or more *6 Born in the US *9 Unknown 0 NIU (None present when frequencies were run)	PERWEIGHT *NIU resulting from being born in the U.S. were coded as 6		All persons not born in one of the 50 U.S. States or D.C.

CITIZEN CITIZEN2	Are you a citizen of the United States?	1 No, not U.S. Citizen 2 Yes, U.S. Citizen 7 Unknown-refused 9 Unknown- don't know	1 No, not U.S. Citizen 2 Yes, U.S. Citizen *7 Unknown-refused *9 Unknown-don't know	PERWEIGHT		All persons
USBORN USBORN2	Born in the United States	11 No, born in U.S. territory 12 No, born outside U.S. and U.S. territories 20 Yes, born in U.S. State or DC 97 Unknown-refused 98 Unknown-not ascertained 99 Unknown-don't know	2 No, born in U.S. territory 1 No, born outside U.S. and U.S. territories 3 Yes, born in U.S. State or DC *97 Unknown-refused *98 Unknown-not ascertained *99 Unknown-don't know	PERWEIGHT		All persons
INTERVLANG INTERVLANG2	Reports the language in which the interview was conducted	1 English 2 Spanish 3 English and Spanish 4 Other *5 Unknown-not ascertained	3 English 1 Spanish 2 English and Spanish 4 Other *5 Unknown-not ascertained	PERWEIGHT		All persons

Cardiovascular Disease Risk	QUESTION	CODING	RECODING	WEIGHT	Imputed	Universe
Cardiovascular Disease Risk (CVD Risk) Higher scores mean higher CVD Risk					Score based on Fang et al., 2015 Score was created with the summation of the following variables: DIABETICEV2, HYP2TIME3, CHOLHIGHYR3, SMOKEV3 Imputation will not be used since score is created of dichotomous variables.	
DIABETICEV DIABETICEV2	Ever told had diabetes	0 NIU 1 No not mentioned 2 Yes or mentioned 3 Borderline 7 Unknown-refused 8 Unknown-not ascertained 9 Unknown-don't know	*6 NIU 0 No not mentioned 1 Yes or mentioned 3 Borderline *7, 8, 9, = 99	SAMPWEIGHT	Not Applicable	Sample adults age 18+
HYP2TIME HYP2TIME3	Ever told had hypertension on 2+ visits	0 NIU 1 No 2 Yes *7 Unknown-refused *8 Unknown-not ascertained *9 Unknown-don't know	6 NIU 0 No 1 Yes *7, 8, 9, = 99	SAMPWEIGHT		Sample adults age 18+ who were ever told they had hypertension/ high blood pressure
CHOLHIGHYR CHOLHIGHYR3	Had high cholesterol,	0 NIU 1 No	6 NIU 0 No	SAMPWEIGHT	For 2002-2007 and 2014, the question was only asked of	Sample adults age 18+ who

	past 12 months	2 Yes *7 Unknown-refused *8 Unknown-not ascertained *9 Unknown-don't know	1 Yes *7, 8, 9, = 99		sample adults who answered yes to a question about whether they had ever been told by a doctor or other health professional that they had high cholesterol (CHOLHIGHEV). How do you code NIU? CHOLHIGHEV) not available for 2014	were ever told they had high cholesterol
SMOKEV SMOKEV3	Ever smoked 100 cigarettes in life	0 NIU 1 No 2 Yes *7 Unknown-refused *8 Unknown-not ascertained *9 Unknown-don't know	6 NIU 0 No 1 Yes *7 Unknown-refused *8 Unknown-not ascertained *9 Unknown-don't know	SAMPWEIGHT		Sample adults age 18+
SMOKFREQNOW This question was eliminated and was not used to create the CVD risk score since there were 416 NIU	Smoke every day, some days, or not at all	0 NIU 1 Not at all 2 Some Days 3 Every day *7 Unknown-refused *8 Unknown-not ascertained *9 Unknown-don't know	6 NIU 0 Not at all 1 11Some Days 2 Every day *7 Unknown-refused *8 Unknown-not ascertained *9 Unknown-don't know	SAMPWEIGHT	This question was only asked to those who answered yes to Have you ever smoked 100 cigarettes in life? How do you code NIU?	Sample adults age 18+ who ever smoked at least 100 cigarettes in their lives. NIU: 416

Internet Based Health Literacy (IBHL)	QUESTION	CODING	RECODING	WEIGHT	Imputed	Universe
Internet Based Health Literacy (IBHL) Higher Scores mean Higher IBHL					Score created by summing the following variables: PCAPPTHPYRR2, PCCHATHELYRR2, PCEMAILHPYRR2, PCLOOKHELYRR2, PCRXFILLYRR2.	
PCAPPTHPYR PCAPPTHPYR2	Scheduled appointment with health provider on internet, past 12 months	0 NIU 1 No 2 Yes *7 Unknown-refused *8 Unknown-not ascertained *9 Unknown-don't know	6 NIU 0 No 1 Yes *7 Unknown-refused *8 Unknown-not ascertained *9 Unknown-don't know	SAMPWEIGHT		Sample adults age 18+.
PCCHATHELYR PCCHATHELYR2	Used online chat groups to learn about health topics in past 12 months	0 NIU 1 No 2 Yes *7 Unknown-refused *8 Unknown-not ascertained *9 Unknown-don't know	6 NIU 0 No 1 Yes *7 Unknown-refused *8 Unknown-not ascertained *9 Unknown-don't know	SAMPWEIGHT		Sample adults age 18+.
PCEMAILHPYR PCEMAILHPYRR2	Communicate with health care provider using e-mail,	0 NIU 1 No 2 Yes *7 Unknown-refused	6 NIU 0 No 1 Yes	SAMPWEIGHT		Sample adults age 18+.

	past 12 months	*8 Unknown-not ascertained *9 Unknown-don't know	*7 Unknown-refused *8 Unknown-not ascertained *9 Unknown-don't know			
PCLOOKHELYR PCLOOKHELYRR2	Looked up health information on Internet, past 12 months	0 NIU 1 No 2 Yes *7 Unknown-refused *8 Unknown-not ascertained *9 Unknown-don't know	6 NIU 0 No 1 Yes *7 Unknown-refused *8 Unknown-not ascertained *9 Unknown-don't know	SAMPWEIGHT		Sample adults age 18+.
PCRXFILLYR PCRXFILLYRR2	Refilled Prescription on Internet, past 12 months	0 NIU 1 No 2 Yes *7 Unknown-refused *8 Unknown-not ascertained *9 Unknown-don't know	6 NIU 0 No 1 Yes *7 Unknown-refused *8 Unknown-not ascertained *9 Unknown-don't know	SAMPWEIGHT		Sample adults age 18+.
Access to Health Care Higher scores mean less access to health care.					Score created by summing the following scores: DELAYCOSTR2 DELAYAPPTR2 DELAYHRSR2 DELAYPHONER2 DELAYTRANSR2 DELAYWAITR2 USUALPL3	

					YBARCARER2	
DELAYCOST DELAYCOSTR2	Medical care delayed due to cost, past 12 months	0 NIU 1 No 2 Yes *7 Unknown-refused *8 Unknown-not ascertained *9 Unknown-don't know	6 NIU 1 No 0 Yes *7 Unknown-refused *8 Unknown-not ascertained *9 Unknown-don't know	SAMPWEIGHT		All Persons
DELAYAPPT DELAYAPPTR2	Delayed care because couldn't get appointment soon	0 NIU 1 No 2 Yes *7 Unknown-refused *8 Unknown-not ascertained *9 Unknown-don't know	6 NIU 1 No 0 Yes *7 Unknown-refused *8 Unknown-not ascertained *9 Unknown-don't know	SAMPWEIGHT		Sample adults age 18+
DELAYHRS DELAYHRSR2	Delayed care because doctor's office not open	0 NIU 1 No 2 Yes *7 Unknown-refused *8 Unknown-not ascertained *9 Unknown-don't know	6 NIU 1 No 0 Yes *7 Unknown-refused *8 Unknown-not ascertained *9 Unknown-don't know	SAMPWEIGHT		Sample adults age 18+
DELAYPHONE DELAYPHONER2	Delayed care because couldn't get	0 NIU 1 No 2 Yes *7 Unknown-refused	6 NIU 1 No 0 Yes	SAMPWEIGHT		Sample adults age 18+

	through by phone	*8 Unknown-not ascertained *9 Unknown-don't know	*7 Unknown-refused *8 Unknown-not ascertained *9 Unknown-don't know			
DELAYTRANS DELAYTRANSR2	Delayed care because lacked transportation	0 NIU 1 No 2 Yes *7 Unknown-refused *8 Unknown-not ascertained *9 Unknown-don't know	6 NIU 1 No 0 Yes *7 Unknown-refused *8 Unknown-not ascertained *9 Unknown-don't know	SAMPWEIGHT		Sample adults age 18+
DELAYWAIT DELAYWAITR2	Delayed care because wait too long in doctor's office	0 NIU 1 No 2 Yes *7 Unknown-refused *8 Unknown-not ascertained *9 Unknown-don't know	6 NIU 1 No 0 Yes *7 Unknown-refused *8 Unknown-not ascertained *9 Unknown-don't know	SAMPWEIGHT		Sample adults age 18+
USUALPL USUALPL3	Has usual place for medical care	0 NIU 1 There is no place or No 2 Yes, has usual place or Yes 3 There is more than one place *7 Unknown-refused	6 NIU 0There is no place or No 1 Yes, has usual place or 1Yes There is more than one place	SAMPWEIGHT		Sample adults age 18+

		*8 Unknown-not ascertained *9 Unknown-don’t know	*7 Unknown-refused *8 Unknown-not ascertained *9 Unknown-don’t know			
YBARCARE YBARCARER2	Needed but couldn’t afford medical care, past 12 months	1 No 2 Yes *7 Unknown-refused *8 Unknown-not ascertained *9 Unknown-don’t know	1No 0 Yes *7 Unknown-refused *8 Unknown-not ascertained *9 Unknown-don’t know	PERWEIGHT		All Persons

*Labeled as missing data

Appendix D

Table 1. Tests to be Completed for Objective 2 and 3

	Citizenship Status[1]	**Place of Birth**[2]	**Ethnicity**[3]	**Language Of Interview**[4]	**Years in the U.S.**[5, 6]
Psychological Distress [6]	1 Independent Variable with 2 levels Continuous Dependent Variable Test to be Completed: 2 independent sample t-test	1 Independent Variable with 2 levels Continuous Dependent Variable Test to be Completed: 2 independent sample t-test	1 Independent Variable with 2 or more levels Continuous Dependent Variable Test to be Completed: One-way Analysis of Variance (ANOVA)	1 Independent Variable with 2 or more levels Continuous Dependent Variable Test to be Completed: One-way Analysis of Variance (ANOVA)	One Continuous Independent Variable Continuous Dependent Variable Test to be Completed: Pearson Correlation
Socioeconomic Status (i.e., Education)[6]	1 Independent Variable with 2 levels Continuous Dependent Variable Test to be Completed: 2 independent sample t-test	1 Independent Variable with 2 levels Continuous Dependent Variable Test to be Completed: 2 independent sample t-test	1 Independent Variable with 2 or more levels Continuous Dependent Variable Test to be Completed: One-way ANOVA	1 Independent Variable with 2 or more levels Continuous Dependent Variable Test to be Completed: One-way ANOVA	One Continuous Independent Variable Continuous Dependent Variable Test to be Completed: Pearson Correlation

Access to Health Care[6]	1 Independent Variable with 2 levels Continuous Dependent Variable Test to be Completed: 2 independent sample t-test	1 Independent Variable with 2 levels Continuous Dependent Variable Test to be Completed: 2 independent sample t-test	1 Independent Variable with 2 or more levels Continuous Dependent Variable Test to be Completed: One-way ANOVA	1 Independent Variable with 2 or more levels Continuous Dependent Variable Test to be Completed: One-way ANOVA	One Continuous Independent Variable Continuous Dependent Variable Test to be Completed: Pearson Correlation
Physical Activity[6]	1 Independent Variable with 2 levels Continuous Dependent Variable Test to be Completed: 2 independent sample t-test	1 Independent Variable with 2 levels Continuous Dependent Variable Test to be Completed: 2 independent sample t-test	1 Independent Variable with 2 or more levels Continuous Dependent Variable Test to be Completed: One-way ANOVA	1 Independent Variable with 2 or more levels Continuous Dependent Variable Test to be Completed: One-way ANOVA	One Continuous Independent Variable Continuous Dependent Variable Test to be Completed: Pearson Correlation
Cardiovascular Disease Risk [6]	1 Independent Variable with 2 levels Continuous Dependent Variable	1 Independent Variable with 2 levels Continuous Dependent Variable	1 Independent Variable with 2 or more levels Continuous Dependent Variable	1 Independent Variable with 2 or more levels Continuous Dependent Variable	One Continuous Independent Variable Continuous Dependent Variable

	Test to be Completed: 2 independent sample t-test	Test to be Completed: 2 independent sample t-test	Test to be Completed: One-way ANOVA	Test to be Completed: One-way ANOVA	Test to be Completed: Pearson Correlation
Body Mass Index (BMI) [6]	1 Independent Variable with 2 levels Continuous Dependent Variable Test to be Completed: 2 independent sample t-test	1 Independent Variable with 2 levels Continuous Dependent Variable Test to be Completed: 2 independent sample t-test	1 Independent Variable with 2 or more levels Continuous Dependent Variable Test to be Completed: One-way ANOVA	1 Independent Variable with 2 or more levels Continuous Dependent Variable Test to be Completed: One-way ANOVA	One Continuous Independent Variable Continuous Dependent Variable Test to be Completed: Pearson Correlation
Acculturation[6]	1 Independent Variable with 2 levels Continuous Dependent Variable Test to be Completed: 2 independent sample t-test	1 Independent Variable with 2 levels Continuous Dependent Variable Test to be Completed: 2 independent sample t-test	1 Independent Variable with 2 or more levels Continuous Dependent Variable Test to be Completed: One-way ANOVA	1 Independent Variable with 2 or more levels Continuous Dependent Variable Test to be Completed: One-way ANOVA	One Continuous Independent Variable Continuous Dependent Variable Test to be Completed: Pearson Correlation
Internet Health Literacy[6]	1 Independent Variable with 2 levels	1 Independent Variable with 2 levels	1 Independent Variable with 2 or more levels	1 Independent Variable with 2 or more levels	One Continuous Independent Variable

	Continuous Dependent Variable Test to be Completed: 2 independent sample t-test	Continuous Dependent Variable Test to be Completed: 2 independent sample t-test	Continuous Dependent Variable Test to be Completed: One-way ANOVA	Continuous Dependent Variable Test to be Completed: One-way ANOVA	Continuous Dependent Variable Test to be Completed: Pearson Correlation
Self-Rated Health[6]	1 Independent Variable with 2 levels Continuous Dependent Variable Test to be Completed: 2 independent sample t-test	1 Independent Variable with 2 levels Continuous Dependent Variable Test to be Completed: 2 independent sample t-test	1 Independent Variable with 2 or more levels Continuous Dependent Variable Test to be Completed: One-way ANOVA	1 Independent Variable with 2 or more levels Continuous Dependent Variable Test to be Completed: One-way ANOVA	One Continuous Independent Variable Continuous Dependent Variable Test to be Completed: Pearson Correlation

1U.S. vs. non-U.S. citizen, 2 Nominal Groups

2 U.S. vs. non-U.S. born, 2 Nominal Groups

3Mexican, Mexican-American, Puerto Rican, Other, Central or South American, Nominal, 5 Groups

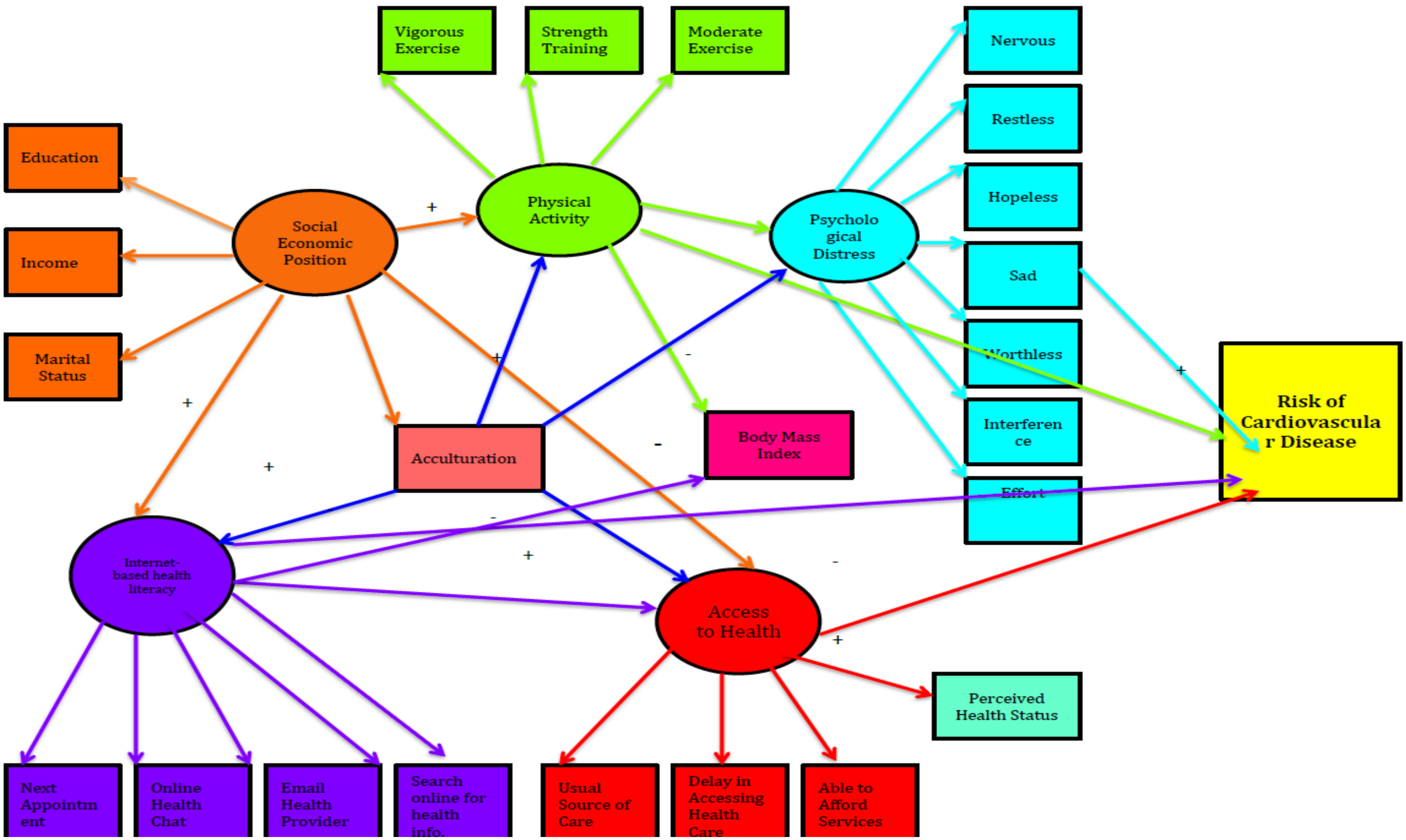
4 Spanish, English, Both, 3 Nominal groups

5 1= Less than 1 year; 2=1 year to less than 5; 3= 10 to less than 15; and 4= 15 years or more, Nominal, 4 groups

6 Variable is continuous

Appendix E
Objective 3

Figure 1. Objective 3 Original Proposed Model



APPENDIX F (Tables 1-6)

Table 1. Marital Status of Participants

	n=	**%**	**N=**	**%**
	Unweighted		**Weighted**	
Married	310	47.60	675,305	48.00
Separated	38	5.80	97,046	6.90
Divorced	98	15.00	191,124	13.60
Widowed	78	12.00	174,157	12.40
Living with partner	40	6.10	92,908	6.60
Never married	88	13.50	177,331	12.60
Total	652	100.00	1,407,871	100.00

Table 2. Number of Years in the US[1]

	n=	%	N=	%
	Unweighted		**Weighted**	
NIU[2]	250	38.30	537,331	38.20
1 year to less than 5 years	5	.80	12,827	.90
5 years to less than 10 years	14	2.10	31,055	2.20
10 years to less than 15 years	36	5.50	88,668	6.30
15 years or more	342	52.50	726,378	51.60
Total	647	99.20	1,396,259	99.20
Missing	5	.80	11,612	.80
Total	652	100	1,407,871	100.0

[1]Among those not born in the US
[2]NIU: 249 were born in the US; 1 unknown.
PERWEIGHT was used to run the frequency as recommended

Table 3. Hispanic Ethnicity

	n=	%	N=	%
	Unweighted		**Weighted**	
Mexican	246	37.70	511,940	36.40
Mexican-American	160	24.50	341,764	24.30
Puerto Rican	74	11.30	178,060	12.60
Cuban/Cuban American	29	4.40	61,393	4.40
Dominican (Republic)	25	3.80	60,087	4.30
Central or South American	70	10.70	159,023	11.30
Other Latin American, type not specified	3	.50	3,908	.30
Other Spanish	37	5.70	76,623	5.40
Multiple Hispanic	8	1.20	15,073	1.10
Total	652	100.0	1,407,871	100.0

PERWEIGHT was used to run the frequency as recommended

Table 4. Citizenship Status

	n=	%	N=	%
	Unweighted		Weighted	
No, not U.S. Citizen	187	28.70	393,631	28.00
Yes, U.S. Citizen	464	71.20	1,011,348	71.80
Total	651	99.80	1,404,979	99.80
Unknown Refused	1	.20	2,892	.20
Total	652	100.0	1,407,871	100.0

PERWEIGHT was used to run the frequency as recommended

Table 5. Place of Birth

	n=	%	N=	%
	Unweighted		Weighted	
No, born in U.S. territory	56	8.60	138,754	9.90
No, born outside U.S. and U.S. territories	346	53.10	731,786	52.00
Yes, born in U.S. state or DC	249	38.20	534,439	38.00
Total	651	99.80	1,404,979	99.80
Unknown-refused	1	.20	2,892	.20
Total	652	100.0	1,407,871	100.0

PERWEIGHT was used to run the frequency as recommended

Table 6. Language Spoken

	n=	%	N=	%
	Unweighted		**Weighted**	
English	367	56.30	806,592	57.30
Spanish	195	29.90	404,628	28.70
English and Spanish	90	13.80	196,651	14.00
Total	652	100.0	1,407,871	100.0

PERWEIGHT was used to run the frequency as recommended

APPENDIX G (Tables1-39)

Table 1. Does Participant Have a Usual Place for Medical Care?

	n= *	% *	N= **	% **
	Unweighted		**Weighted**	
There is no place or No	34	5.20	171,281	5.00
Yes, has a usual place or Yes	609	93.40	3,239,938	93.70
There is more than one place	3	.50	24,056	.70
Total	646	99.10	3,435,275	99.30
Unknown-refused	1	.20	1,433	.00
Unknown-not ascertained	5	.80	22,492	.70
Total	6	.90	23,925	.70
Total	652	100.00	3,459,200	100.00

SAMPWEIGH was used to run frequency as recommended

Table 2. What Type of Usual Place Does Participant have for Medical Care?

	n= *	% *	N= **	% **
	Unweighted		**Weighted**	
NIU[1]	40	6.10	195,206	5.60
Clinic or health center	251	38.50	1,285,909	37.20
Doctor's office or HMO	330	50.60	1,781,174	51.50
Hospital emergency room	9	1.40	62,485	1.80
Hospital outpatient department	17	2.60	94,846	2.70
Other places (1985: Includes known HMOs)	3	.50	26,964	.80
Doesn't go to one place most often	2	.30	12,616	.40
Total	652	100.00	3,459,200	100.00

[1]NIU: 34 have no usual source of care; 1 Unknown-Refused, 5 Unknown not ascertained
SAMPWEIGH was used to run frequency as recommended

Table 3. Why No Usual Source of Care: Too Expensive or No Insurance

	n=	%	N=	%
	Unweighted		Weighted	
NIU	618	94.80	3,287,919	95.00
No	13	2.00	69,319	2.00
Yes	21	3.20	101,962	2.90
Total	652	100.00	3,459,200	100.00

SAMPWEIGH was used to run frequency as recommended

Table 4. Why No Usual Source of Care: Did Not Get Around To It

	n=	%	N=	%
	Unweighted		Weighted	
NIU	618	94.80	3,287,919	95.00
No	33	5.10	166,870	4.80
Yes	1	.20	4,411	.10
Total	652	100.00	3,459,200	100.00

SAMPWEIGH was used to run frequency as recommended

Table 5. Why No Usual Source of Care: Other Reason?

	n=	%	N=	%
	Unweighted		Weighted	
NIU	618	94.8		
No	34	5.2		
Total	652	100.00		

SAMPWEIGH was used to run frequency as recommended

Table 6. Had Trouble Finding General Doctor, past 12 Months

	n=	%	N=	%
	Unweighted		Weighted	
No	617	94.60	3,278,510	94.80
Yes	29	4.40	156,998	4.50
Total	646	99.10	3,435,508	99.30
Unknown-not ascertained	5	.80	22,492	.70
Unknown-don't know	1	.20	1,200	.00
Total	6	.90	23,692	.70
Total	652	100.00	3,459,200	100.00

SAMPWEIGH was used to run frequency as recommended

Table 7. Able To Find General Doctor Despite Trouble, Past 12 Months

	n=	%	N=	%
	Unweighted		Weighted	
NIU	623	95.60	3,302,202	95.50
No	12	1.80	70,249	2.00
Yes	17	2.60	86,749	2.50
Total	652	100.00	3,459,200	100.00

SAMPWEIGH was used to run frequency as recommended

Table 8. Told Not Accepted as New Patient, Past 12 Months

	n=	%	N=	%
	Unweighted		**Weighted**	
No	630	96.60	3,349,255	96.80
Yes	16	2.50	86,253	2.50
Total	646	99.10	3,435,508	99.30
Unknown-not ascertained	5	.80	22,492	.70
Unknown-don't know	1	.20	1,200	.00
Total	6	.90	23,692	.70
Total	652	100.00	3,459,200	100.00

SAMPWEIGH was used to run frequency as recommended

Table 9. Why No Usual Source of Care: Does not Know Where to Go?

	n=	%	N=	%
	Unweighted		**Weighted**	
NIU[1]	618	94.80	3,287,919	95.00
No	32	4.90	158,422	4.60
Yes	2	.30	12,859	.40
Total	652	100.00	3,459,200	100.00

SAMPWEIGH was used to run frequency as recommended

[1]NIU: 611 has a usual source of care, 1unknown-refused, 1there is more than one place of care, 5 unknown not ascertained

Table 10. Why No Usual Source of Care: Previous Doctor Moved or is Unavailable

	n=	%	N=	%
	Unweighted		**Weighted**	
NIU[1]	618	94.80	3,287,919	95.00
No	33	5.10	163,154	4.70
Yes	1	.20	8,127	.20
Total	652	100.00	3,459,200	100.00

SAMPWEIGH was used to run frequency as recommended

[1]NIU: 611 has a usual source of care, 1unknown-refused, 1there is more than one place of care, 5 unknown not ascertained

Table 11. Why No Usual Source of Care: Care Too Far Away or Inconvenient

	n=	%	N=	%
	Unweighted		**Weighted**	
NIU[1]	618	94.80	3,287,919	95.00
No	34	5.20	171,281	5.00
Total	652	100.00	3,459,200	100.00

SAMPWEIGH was used to run frequency as recommended

[1]NIU: 611 has a usual source of care, 1unknown-refused, 1there is more than one place of care, 5 unknown not ascertained

Table 12. Why No Usual Source of Care: Speak a Different Language

	n=	%	N=	%
	Unweighted		**Weighted**	
NIU[1]	618	94.80	3,287,919	95.00
No	34	5.20	171,281	5.00
Total	652	100.00	3,459,200	100.00

SAMPWEIGH was used to run frequency as recommended

[1]NIU: 611 has a usual source of care, 1unknown-refused, 1there is more than one place of care, 5 unknown not ascertained

Table 13. Why No Usual Source of Care: Speak a Different Language

	n=	%	N=	%
	Unweighted		**Weighted**	
NIU[1]	618	94.80	3,287,919	95.00
No	33	5.10	166,707	4.80
Yes	1	.20	4,574	.10
Total	652	100.00	3,459,200	100.00

SAMPWEIGH was used to run frequency as recommended

Table 14. Why No Usual Source of Care: Does Not Need Doctors

	n=	%	N=	%
	Unweighted		**Weighted**	
NIU[1]	618	94.80	3,287,919	95.00
No	23	3.50	108,055	3.10
Yes	11	1.70	63,226	1.80
Total	652	100.00	3,459,200	100.00

SAMPWEIGH was used to run frequency as recommended

[1]NIU: 611 has a usual source of care, 1unknown-refused, 1there is more than one place of care, 5 unknown not ascertained

Table 15. Delayed Care: Participant Could Not Get An Appointment Soon?

	n=	%	N=	%
	Unweighted		**Weighted**	
No	590	90.50	3,086,803	89.20
Yes	56	8.60	348,472	10.10
Total	646	99.10	3,435,275	99.30
Unknown-refused	1	.20	1,433	.00
Unknown-not ascertained	5	.80	22,492	.70
Total	6	.90	23,925	.70
Total	652	100.00	3,459,200	100.00

SAMPWEIGH was used to run frequency as recommended

Table 16. Delayed Care: Doctor's Office Not Open

	n=	%	N=	%
	Unweighted		**Weighted**	
No	618	94.80	3,273,214	94.60
Yes	28	4.30	162,061	4.70
Total	646	99.10	3,435,275	99.30
Unknown-refused	1	.20	1,433	.00
Unknown-not ascertained	5	.80	22,492	.70
Total	6	.90	23,925	.70
Total	652	100.00	3,459,200	100.00
SAMPWEIGH was used to run frequency as recommended				

Table 17. Delayed Care: Could Not Get Through By Phone

	n=	%	N=	%
	Unweighted		Weighted	
No	614	94.20	3,244,919	93.80
Yes	32	4.90	190,356	5.50
Total	646	99.10	3,435,275	99.30
Unknown-refused	1	.20	1,433	.00
Unknown-not ascertained	5	.80	22,492	.70
Total	6	.90	23,925	.70
Total	652	100.00	3,459,200	100.00

SAMPWEIGH was used to run frequency as recommended

Table 18. Delayed Care: Wait Too Long in Doctor's Office

	n=	%	N=	%
	Unweighted		Weighted	
No	591	90.60	3,137,757	90.70
Yes	54	8.30	284,238	8.20
Total	645	98.90	3,421,995	98.90
Unknown-refused	1	.20	1,433	.00
Unknown-not ascertained	5	.80	22,492	.70
Unknown-don't know	1	.20	13,280	.40
Total	7	1.10	37,205	1.10
Total	652	100.00	345,9200	100.00

SAMPWEIGH was used to run frequency as recommended

Table 19. Delayed Care: Lack of Transportation

	n=	%	N=	%
	Unweighted		**Weighted**	
No	616	94.50	3,305,611	95.60
Yes	30	4.60	129,664	3.70
Total	646	99.10	3,435,275	99.30
Unknown-refused	1	.20	1,433	.00
Unknown-not ascertained	5	.80	22,492	.70
Total	6	.9	23,925	.70
Total	652	100.00	3,459,200	100.00

SAMPWEIGH was used to run frequency as recommended

Table 20. Medical Care Delayed: Due To Cost, Past 12 Months

	n=	%	N=	%
	Unweighted		**Weighted**	
No	562	86.20	1,225,118	87.00
Yes	90	13.80	182,753	13.00
Total	652	100.00	1,407,871	100.00

PERWEIGHT was used to run the frequency as recommended

Table 21. Needed But Was Unable To Afford Medical Care, Past 12 Months

	n=	%	N=	%
	Unweighted		**Weighted**	
No	588	90.20	1,283,637	91.20
Yes	64	9.80	124,234	8.80
Total	652	100.00	1,407,871	100.00

PERWEIGHT was used to run the frequency as recommended

Table 22. Needed But Could Not Afford Prescribed Medication, Past 12 Months

	n=	**%**	**N=**	**%**
	Unweighted		**Weighted**	
No	552	84.70	2,897,399	83.80
Yes	94	14.40	537,876	15.50
Total	646	99.10	3,435,275	99.30
Unknown-refused	1	.20	1,433	.00
Unknown-not ascertained	5	.80	22,492	.70
Total	6	.90	23,925	.70
Total	652	100.00	3,459,200	100.00

SAMPWEIGH was used to run frequency as recommended

Table 23. Needed But Could Not Afford Mental Health Care, Past 12 Months

	n=	**%**	**N=**	**%**
	Unweighted		**Weighted**	
No	632	96.90	3,371,535	97.50
Yes	13	2.00	63,039	1.80
Total	645	98.90	3,434,574	99.30
Unknown-refused	1	.20	1,433	.00
Unknown-not ascertained	6	.90	23,193	.70
Total	7	1.10	24,626	.70
Total	652	100.00	3,459,200	100.00

SAMPWEIGH was used to run frequency as recommended

Table 24. Needed But Could Not Afford Follow-up Care, Past 12 Months

	n=	%	N=	%
	Unweighted		**Weighted**	
No	588	90.20	3,129,785	90.50
Yes	57	8.70	304,789	8.80
Total	645	98.90	3,434,574	99.30
Unknown-refused	1	.20	1,433	.00
Unknown-not ascertained	6	.90	23,193	.70
Total	7	1.10	24,626	.70
Total	652	100.00	3,459,200	100.00

SAMPWEIGH was used to run frequency as recommended

Table 25. Needed But Could Not Afford Specialist, Past 12 Months

	n=	%	N=	%
	Unweighted		**Weighted**	
No	580	89.00	3,065,807	88.60
Yes	65	10.00	368,767	10.70
Total	645	98.90	3,434,574	99.30
Unknown-refused	1	.20	1,433	.00
Unknown-not ascertained	6	.90	23,193	.70
Total	7	1.10	24,626	.70
Total	652	100.00	3,459,200	100.00

SAMPWEIGH was used to run frequency as recommended

Table 26. Asked Doctor For Lower Cost Medication, Past 12 Months

	n=	%	N=	%
	Unweighted		**Weighted**	
NIU	79	12.10	422,423	12.20
No	448	68.70	2,324,944	67.20
Yes	124	19.00	710,633	20.50
Total	651	99.80	3,458,000	100.00
Unknown-don't know	1	.20	1,200	.00
Total	652	100.00	3,459,200	100.00

SAMPWEIGH was used to run frequency as recommended

Table 27. Bought Medication from Other Country to Save Money, Past 12 Months

	n=	%	N=	%
	Unweighted		**Weighted**	
No	615	94.30	3,258,623	94.20
Yes	30	4.60	175,951	5.10
Total	645	98.90	3,434,574	99.30
Unknown-refused	1	.20	1,433	.00
Unknown-not ascertained	6	.90	23193	.70
Total	7	1.10	24,626	.70
Total	652	100.00	3,459,200	100.00

SAMPWEIGH was used to run frequency as recommended

Table 28. Took Less Medication to Save Money, Past 12 Months

	n=	%	N=	%
	Unweighted		**Weighted**	
NIU	79	12.10	422,423	12.20
No	512	78.50	2,686,119	77.70
Yes	61	9.40	350,658	10.10
Total	652	100.000	3,459,200	100.00

SAMPWEIGH was used to run frequency as recommended

Table 29. Delayed Refilling Prescription to Save Money, Past 12 Months

	n=	%	N=	%
	Unweighted		**Weighted**	
NIU	79	12.10	422,423	12.20
No	502	77.00	2,626,643	75.90
Yes	71	10.90	410,134	11.90
Total	652	100.00	3,459,200	100.00

SAMPWEIGH was used to run frequency as recommended

Table 30. Worried About Paying Medical Bills

	n=	%	N=	%
	Unweighted		**Weighted**	
Very worried	203	31.10	1,140,778	33.00
Somewhat worried	180	27.60	957,634	27.70
Not at all worried	262	40.20	1,336,162	38.60
Total	645	98.90	3,434,574	99.30
Unknown-refused	1	.20	1,433	.00
Unknown-not ascertained	6	.90	23,193	.70
Total	7	1.10	24,626	.70
Total	652	100.00	3,459,200	100.00

SAMPWEIGH was used to run frequency as recommended

Table 31. Currently Paying Medical Bills Over Time

	n=	%	N=	%
	Unweighted		**Weighted**	
No	492	75.50	1,082,718	76.90
Yes	160	24.50	325,153	23.10
Total	652	100.00	1,407,871	100.00

PERWEIGHT was used to run the frequency as recommended

Table 32. Problems Paying or Unable to Pay Medical Bills, Past 12 Months

	n=	%	N=	%
	Unweighted		**Weighted**	
No	512	78.50	1,121,201	79.60
Yes	140	21.50	286,670	20.40
Total	652	100.00	1,407,871	100.00

PERWEIGHT was used to run the frequency as recommended

Table 33. Unable To Pay Medical Bills

	n=	%	N=	%
	Unweighted		**Weighted**	
NIU	512	78.50	1,121,201	79.60
No	60	9.20	125,646	8.90
Yes	79	12.10	157675	11.20
Total	651	99.80	1,404,522	99.80
Unknown-don't know	1	.20	3,349	.20
Total	652	100.00	1,407,871	100.00

PERWEIGHT was used to run the frequency as recommended

Table 34. Confidence In Affording Private Health Insurance Plan

Response	n= *	% *	N= **	% **
NIU	428	65.60	916,634	65.10
Very confident	28	4.30	63,868	4.50
Somewhat confident	48	7.40	111,554	7.90
Not too confident	45	6.90	90,837	6.50
Not confident at all	96	14.70	212,838	15.10
Total	645	98.90	1,395,731	99.10
Unknown-don't know	7	1.10	12,140	.90
Total	652	100.00	1,407,871	100.00

PERWEIGHT was used to run the frequency as recommended

Table 35. Told Health Care Coverage Not Accepted, Past 12 Months

	n=	**%**	**N=**	**%**
	Unweighted		**Weighted**	
No	619	94.90	3,313,303	95.80
Yes	27	4.10	122,205	3.50
Total	646	99.10	3,435,508	99.30
Unknown-not ascertained	5	.80	22,492	.70
Unknown-don't know	1	.20	1200	.00
Total	6	.90	23,692	.70
Total	652	100.00	3,459,200	100.00

SAMPWEIGH was used to run frequency as recommended

Table 36. Health Insurance Coverage Status

	n=	%	N=	%
	Unweighted		**Weighted**	
Not covered	106	16.30	222,690	15.80
Covered	544	83.40	1,178,392	83.70
Total	650	99.70	1,401,082	99.50
Unknown-don't know	2	.30	6,789	.50
Total	652	100.00	1,407,871	100.00

PERWEIGHT was used to run the frequency as recommended

Table 37. Covered By Private Health Insurance

	n=	%	N=	%
	Unweighted		**Weighted**	
No	449	68.90	964,861	68.50
Yes, information	187	28.70	406,441	28.90
Yes, but no information	14	2.10	29,780	2.10
Total	650	99.70	1,401,082	99.50
Unknown-don't know	2	.30	6,789	.50
Total	652	100.00	1,407,871	100.00

PERWEIGHT was used to run the frequency as recommended

Table 38. Has any Medicaid/Other Public Assistance/State Sponsored Plan or CHIP

	n=	%	N=	%
	Unweighted		**Weighted**	
Yes	188	28.80	395,393	28.10
Unknown/refused	464	71.20	1,012,478	71.90
Total	652	100.00	1,407,871	100.00

PERWEIGHT was used to run the frequency as recommended

Table 39. Confidence In Affording Private Health Insurance Plan

	n=	%	N=	%
	Unweighted		**Weighted**	
NIU	428	65.60	916,634	65.10
Very confident	28	4.30	63,868	4.50
Somewhat confident	48	7.40	111,554	7.90
Not too confident	45	6.90	90,837	6.50
Not confident at all	96	14.70	212,838	15.10
Total	645	98.90	1,395,731	99.10
Unknown-don't know	7	1.10	12,140	.90
Total	652	100.00	1,407,871	100.00

PERWEIGHT was used to run the frequency as recommended

Appendix H (Tables 1-6)

Table 1. Sample Size: Participants Per Group for Student's t-test

	Citizenship Status[1]	Place of Birth[2]
Psychological Distress	U.S. citizen:441 Non-U.S. citizen:181	U.S. born:291 Non-U.S. born:332
Education	U.S. citizen:459 Non-U.S. citizen: 186	U.S. born:301 Non-U.S. born:344
Access to Health Care	U.S. citizen:460 Non-U.S. citizen:184	U.S. born:343 Non-U.S. born: 301
Physical Activity	U.S. citizen:457 Non-U.S. citizen: 184	U.S. born: 298 Non-U.S. born: 343
Cardio Vascular Disease Risk[3]	U.S. citizen:175 Non-U.S. citizen:53	U.S. born: 122 Non-U.S. born:106
BMI	U.S. citizen:450 Non-U.S. citizen: 175	U.S. born: 293 Non-U.S. born: 332
Acculturation	U.S. citizen: Non-U.S. citizen:	U.S. born:305 Non-U.S. born:341
Internet Based Health Literacy	U.S. citizen:457 Non-U.S. citizen: 185	U.S. born: 300 Non-U.S. born: 342
Self-Rated Health	U.S. citizen: 464 Non-U.S. citizen: 187	U.S. born: 305 Non-U.S. born: 346

1 Citizenship Status: 2 Nominal Groups (i.e., U.S. vs. non-U.S. born)

2 Place of Birth: 2 Nominal Groups (i.e., U.S. Born vs. Non-U.S. born)

3Not Enough sample size to conduct a t-test based on citizenship status

Appendix H

Table 2. Student's t-test Assumption Results

Variable Name	**Outliers Present**				**Normality Present for each group of the Independent Variable** **Shapiro-Wilks**				**Homogeneity of Variance** **** Before outliers were taken out** **Levene's**		**Homogeneity of Variance** **After Outliers were eliminated**	
	Citizenship Status		Born in U.S. Territory		Citizenship Status		Born in U.S. Territory		Citizenship Status	Born in U.S. Territory	Citizenship Status	Born in U.S. Territory
	Not U.S. Citizen	U.S. Citizen	U.S. Born	Non-U.S. Born	Not U.S. Citizen	U.S. Citizen	U.S. Born	Non-U.S. Born	Citizenship Status	Born in U.S. Territory	Citizenship Status	Born in U.S. Territory
Psychological Distress	Yes	No	No	No	.75 .001	.77 .001	.77 .001	.75 .001	14.88 .001	1.50 .22	19.22 .001	1.50 .22
Education	No	No	No	No	.96 .001	.95 .001	.94 .001	.96 .001	.45 .50	37.46 .001	.45 .50	37.46 .001
Access to Health Care	Yes	Yes	Yes	Yes	.56 .001	.56 .001	.53 .001	.59 .001	3.51 .06	3.76 .05	22.39 .001	.50 .48
Physical Activity	Yes	Yes	Yes	Yes	.67 .001	.58 .001	.56 .001	.66 .001	3.66 .06	10.38 .001	4.89 .03	7.92 .01
Cardio Vascular Disease Risk	N/A	N/A	Yes	No	N/A	N/A	.79 .001	.81 .001	N/A	5.25 .02	N/A	4.450 .03

BMI	No	Yes	Yes	No	.97 .001	.85 .001	.96 .001	.79 .001	2.38 .123	2.56 .110	1.46 .227	9.88 .002
Acculturation	No	No	No	Yes	.90 .001	.79 .001	.92 .001	.55 .001	203.59 .001	4.01 .05	3.887 .049	4.01 .048
Internet Based Health Literacy	Yes	Yes	Yes	Yes	.27 .001	.53 .001	.56 .001	.35 .001	41.68 .001	46.69 .001	109.78 .001	108.99 .001
Self-Rated Health	No	No	No	No	.88 .001	.91 .001	.90 .001	.90 .001	.38 .54	.05 .83	.38 .54	.05 .83

Appendix H

Table 3. Outliers Taken Out for Student's t-test Based on Citizenship Status

Psychological Distress	Access to Health Care	Physical Activity	BMI	Internet Based Health Literacy
36	36	13	191	2
	37	17	392	19
	85	39		215
	97	127		217
	202	189		218
	218	220		225
	225	298		348
	311	385		388
	337	489		437
	341	547		508
	343	598		526
	363	609		542
	373	630		544
	374	636		576
	388			579
	512			590
	514			606
	515			647
	516			648
	561			649
	566			652
	567			
	578			
	581			
	610			
	629			

	630			
	635			
	638			
	641			
	651			

Appendix H

Table 4. Outliers Taken Out for Student's t-test Based on Place of Birth

Access to Health Care	**BMI**	**Internet Based Health Care**	**Physical Activity**	**Acculturation**	**Cardiovascular Disease Risk**
36	392	136	13	222	158
37	191	200	17	261	351
218		225	39	618	359
227		340	127	327	482
236		378	189	640	550
392		379	220	617	595
512		382	254	634	619
514		383	298	312	623
515		386	385	443	647
561		395	482	286	
566		590	489	195	
567			547	148	
578			598	354	
581			604	645	
608			609	480	
610			621	534	
615			630		
629			636		
630					
638					
641					
649					
651					

Appendix H

Table 5. Student's t-test Results Based on Citizenship Status

	Not U.S. Citizen	**U.S. Citizen**	***t***	***df***		***CI***		**Boot Strap Method**			
	Mean	**Mean**			***p***	**Lower**	**Upper**	**Lower**	**Upper**	***P***	**Direction**
Psychological Distress	3.06	4.33	-3.08	455.80	<.01	-2.09	-.46	-2.03	-.43	.003	Same direction
Education	8.46	12.94	-11.30	643	<.01	-5.26	-3.70	-5.21	-3.78	.001	Same direction
Access to Health Care	6.80	6.66	2.72	509.70	.02	.037	.23	.04	.24	.009	Same direction
Physical Activity	2.44	2.70	-.81	430.55	.418	-.88	.37	-.87	.35	.415	Same direction
Cardiovascular Disease	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BMI	29.98	31.29	-2.44	621	.02	-2.37	-.26	-2.35	-.19	.013	Same direction
Acculturation	8.30	12.23	-31.76	590.45	.001	-4.17	-3.69	-4.16	-3.70	.001	Same direction
Internet Based Health Literacy	.04	.28	-7.56	604.55	<.01	-.30	-.18	-.30	-.17	.001	Same direction
Self-assessed health status	2.74	2.61	1.47	649	.143	-.05	.31	-.06	.34	.171	Same direction

Appendix H

Table 6. Student's t-test Results Based on Place of Birth

	Born Outside of U.S. Territory	**Born Inside U.S. or U.S. Territory**	***t***	***df***	***p***	***CI***		**Bootstrap**			
	Mean	**Mean**				**Lower**	**Upper**	***P***	**Lower**	**Upper**	**Direction**
Psychological Distress	3.74	4.28	-1.24	621	.22	-1.40	.31	.195	-1.40	.32	Same direction
Education	9.94	13.61	-10.19	643.58	*p*<.01	-4.38	-2.97	.001	-4.39	-2.92	Same direction
Access to Health Care	6.69	6.72	-.54	619	.06	-.14	.08	.576	-.13	.07	Same Direction
Physical Activity	2.44	2.61	-.52	537.20	.60	-.78	.45	.617	-.78	.38	Same direction
Cardiovascular Disease	3.03	3.25	-2.48	215.10	*p*<.01	-.40	-.05	.010	-.41	-.04	Same direction
BMI	30.10	31.85	-3.60	527.62	*p*<.01	-2.71	-.80	.001	-2.77	-.79	Same direction
Acculturation	9.04	13.53	-47.04	624.56	*p*<.01	-4.68	-4.3	.001	-4.66	4.30	Same direction
Internet Based Health Literacy	.12	.40	-5.73	444.30	*p*<.01	-.376	-.18	.001	-.37	-.19	Same direction
Self-assessed health status	2.72	2.57	1.85	649	.07	-.01	.31	.066	-.01	.34	Same direction

APPENDIX I

Table 1. Results for ANOVA Assumptions Based on Language and Ethnicity

	Outliers								Normality			Normality					Homogeneity of Variance	
	Spanish	English	Both	Mex.	Mex. American	Puerto Rican	Other	Central or South American	Spanish	Both	English	Mexican	Mexican American	Puerto Rican	Other	Central Or South American	Language	Ethnicity
Psychological Distress	No	No	No	Yes	No	No	No	No	.74 <.01	.77 <.01	.77 <.01	.73 <.01	.76<.01	.82 <.01	.75 <.01	.78 <.01	2.53 .08	1.85 .12
Education	No	No	No	No	No	No	No	No	.94 <.01	.96 .01	.94 <.01	.96 <.01	.94 <.01	.95 .01	.95 <.01	.91 <.01	9.55 <.01	8.74 <.01
Access to Health Care	No	Yes	Yes	Yes	Yes	Yes	Yes	No	.57 <.01	.57 <.01	.55 <.01	.57 <.01	.55 <.01	.48 <.01	.57 <.01	.66 <.01	1.57 .21	3.08 .02
Physical Activity	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	.62 <.01	.58 <.01	.60 <.01	.71 <.01	.64 <.01	.60 <.01	.48 <.01	.47 <.01	7.52 <.01	1.53 .19
Cardio Vascular Disease Risk	Yes	No	No	Yes	No	No	No	No	.80 <.01	.83 <.01	.79 <.01	.82 <.01	.77 <.01	.73 <.01	.79 <.01	.87 .02	1.73 .18	2.06 .09
BMI	No	No	Yes	Yes	No	No	No	Yes	.98 .02	.96 .01	.85 <.01	.76 <.01	.97 <.01	.92 <.01	.95 <.01	.87 <.01	7.21 <.01	1.06 .38
Acculturation	No	No	No	No	Yes	No	No	No	.89 <.01	.83 <.01	.69 <.01	.87 <.01	.55 <.01	.89 <.01	.82 <.01	.91 <.01	45.97 <.01	24.59 <.01

Internet Based Health Literacy	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	.22 <.01	.24 <.01	.59 <.01	.41 <.01	.54 <.01	.42 <.01	.54 <.01	.43 <.01	82.52 <.01	2.38 .05
Self-Rated Health	No	No	No	No	No	No	No	No	.87 <.01	.87 <.01	.90 <.01	.90 <.01	.90 <.01	.89 <.01	.90 <.01	.91 <.01	.40 .67	1.96 .100

APPENDIX I (Tables 1-19)

Table 2: Ethnicity: Median for Kruskal-Wallis H Test (Similar Distribution)

	Psychological Distress		Education		Physical Activity		BMI		Self-Rated Health	
	N=	Median	N=	Median	N=	Median	N=	Median	N=	Median
Mexican	237	1	245	9	242	1	234	29.50	246	3
Mexican American	152	2	160	14	157	0	154	31.22	160	2
Puerto Rican	71	4	73	13	72	0	72	30.04	74	2
Other	96	1	98	14	101	0	97	30.42	102	3
Central or South American	68	2	70	14	70	0	69	29.84	70	3
Total	624	2	646	13	642	0	626	30.14	652	3

Table 3. Language: Median for Kruskal-Wallis H Test (Similar Distribution)

	Psychological Distress		Education		Physical Activity		BMI		Self-Rated Health	
	N=	Median	N=	Median	N=	Median	N=	Median	N=	Median
Spanish	185	1	193	7	191	.00	184	28.96	195	2
Both	84	2	89	9	90	.00	84	29.01	90	3
English	355	2	364	14	361	.00	358	31.02	367	3
Total	624	2	646	13	642	.00	626	30.14	652	3

Table 4 Ethnicity: Mean Ranks for Kruskal-Wallis H Test (Dissimilar Distribution)

	Access to Health	**Mean Rank**	**Acculturation**	**Mean Rank**	**Internet Based Health Literacy**	**Mean Rank**	**CVD Risk**	**Mean Rank**
Mexican	245	323.94	243	228.12	245	310.53	77	99.71
Mexican American	157	318.05	160	475.74	157	343.50	62	125.02
Puerto Rican	73	335.36	74	378.46	72	316.81	35	130.30
Other	101	322.34	100	336.38	100	327.49	36	123.51
Central or South American	69	318.84	69	228.70	69	311.28	18	92.75
Total	645		646		643		228	

APPENDIX I

Table 5. Language: Mean Rank for Kruskal-Wallis H-Test (Dissimilar Distribution)

	Internet Based Health Literacy		Access to Health Care		Cardiovascular Disease Risk		Acculturation	
	N	Mean Rank	N	Mean Rank	N	Mean Rank	N	Mean Rank
Spanish	190	277.99	192	319.50	62	105.30	192	118.47
Both	89	275.16	90	320.36	37	91.31	90	235.55
English	364	356.42	363	325.51	129	125.57	364	453.39
Total	643		645		228		646	

APPENDIX I

Table 6. Kruskal-Wallis Results Based on Ethnicity

	Is distribution of Independent Variable similar for all groups?	**Decision**	**Total n**	**Test Statistic**	**Degrees of Freedom**	**Asymptotic Sig. (2-sided test)**	**Post Hoc**
Psychological Distress	Yes	Retain the null hypothesis	624	6.85	4	.14	Not Applicable
Education	Yes	Reject the null hypothesis	646	70.95	4	*<.01	Complete
Access to Health Care	No	Retain the null hypothesis	645	.83	4	.94	Not Applicable
Physical Activity	Yes	Reject the null hypothesis	642	9.79	4	*.04	Complete
Cardio Vascular Disease Risk	No	Reject the null hypothesis	228	12.25	4	.02	Need to do post hoc
BMI	Yes	Retain the null hypothesis	626	6.12	4	.19	Not Applicable
Acculturation	No	Reject the null hypothesis	646	206.38	4	<.01	Need to do post
Internet Based Health Literacy	No	Retain the null hypothesis	643	7.06	4	.13	Not Applicable
Self-Rated Health	Yes	Reject the null	652	9.76	4	*.05	Complete

		hypothesis					

APPENDIX I

Table 7. Post Hoc Between Education and Ethnicity

	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj. Sig.
Mexican – Central and South American	-85.20	25.17	-3.39	<.01	*.01
Mexican and Puerto Rican	-87.25	24.77	-3.52	<.01	*<.01
Mexican and Other	-125.70	22.20	-5.66	<.01	*<.01
Mexican and Mexican American	-145.68	18.88	-7.72	<.01	*<.01
Central and South American – Puerto Rican	2.05	31.07	.07	.95	1.000
Central and South American – Other	40.50	29.07	1.39	.16	1.000
Central and South American – Mexican	60.48	26.62	2.27	.02	.23
Puerto Rican – Other	-38.45	28.71	-1.34	0.18	1.00
Puerto Rican – Mexican	58.43	26.23	2.23	.03	.26
Other – Mexican	19.98	23.82	.84	402	1.00

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Table 8. Post Hoc Between Physical Activity and Ethnicity

	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj. Sig.
Other – Puerto Rican	33.76	26.18	1.29	.20	1.00
Other – Mexican	53.59	21.65	2.46	.01	.13
Other – Central or South American	-53.99	26.40	-2.05	.04	.41
Other – Mexican	59.54	20.11	2.96	<.01	*.03
Puerto Rican – Mexican	19.83	24.16	.82	.41	1.00
Puerto Rican – Central or South American	-20.23	28.49	-.71	.48	1.00
Puerto Rican – Mexican	25.77	22.79	1.13	.26	1.00
Mexican – Central or South American	-.40	24.40	-.02	.99	1.00
Mexican American – Mexican	5.95	17.40	.34	.73	1.00
Central or South American – Mexican	5.545	23.04	.24	.81	1.00

APPENDIX I

Table 9. Post Hoc Between Cardiovascular Disease Risk and Ethnicity

	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj. Sig.
Central and South American – Mexican	6.95	15.67	445	.66	1.00
Central and South American – Other	30.76	17.28	17.28	.78	.75
Central and South American – Mexican American	32.27	16.02	16.02	.04	.44
Central and South American – Puerto Rican	37.55	17.36	17.36	.03	.301
Mexican – Other	-23.80	12.08	12.08	.05	.49
Mexican – Mexican American	-25.31	10.21	10.21	.01	.13
Mexican—Puerto Rican	-30.59	12.20	12.20	.01	.12
Other – Mexican American	1.51	12.54	12.54	.90	1.00
Other – Puerto Rican	6.79	14.21	14.21	.63	1.00
Mexican – Puerto Rican	-5.28	12.65	12.65	.68	1.00

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Table 10. Post Hoc Between Self-Rated Health and Ethnicity

	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj. Sig.
Puerto Rican –Other	-21.37	27.54	-776	.44	1.00
Puerto Rican – Mexican American	25.22	25.36	.995	.32	1.00
Puerto Rican – Mexican	54.88	23.91	2.30	.02	.22
Puerto Rican – Central or South American	-73.11	30.07	-2.43	.02	.15
Other – Mexican American	3.85	22.85	.17	.87	1.00
Other – Mexican	33.51	21.24	1.58	.12	1.00
Other – Central or South American	-51.74	27.99	-1.85	.07	.65
Mexican American – Mexican	29.66	18.32	1.62	.11	1.00
Mexican – Central or South American	-47.89	25.85	-1.85	.06	.639
Mexican – Central or South American	-18.23	24.43	-.75	.46	1.00

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Table 11. Post Hoc Between Acculturation and Ethnicity

	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj. Sig.
Mexican – Central or South American	-.65	24.72	-.03	.98	1.00
Mexican – Other	-108.26	21.53	-5.03	<.01	<.01
Mexican— Puerto Rican	-150.34	24.06	-6.25	<.01	<.01
Mexican- Mexican American	-247.624	18.451	-13.420	<.01	<.01
Central or South American – Other	107.61	28.36	3.79	<.01	<.01
Central or South American – Puerto Rican	149.69	30.33	4.94	<.01	<.01
Central or South American— Mexican American	246.98	26.10	9.46	<.01	<.01
Other – Puerto Rican	42.08	27.79	1.51	.13	<.01
Other— Mexican American	139.36	23.10	6.032	<.01	1.000
Puerto Rican – Mexican	97.28	25.478	3.82	<.01	.001

APPENDIX I

Table 12. Kruskal-Wallis H-test Results

	Is distribution of Independent Variable similar for all groups?	Decision	Total n	Test Statistic	Degrees of Freedom	Asymptotic Sig. (2-sided test)	Post Hoc
Psychological Distress	Yes	Retain the null hypothesis	624	1.37	2	.50	Not Applicable
Education	Yes	Reject the null hypothesis	646	169.96	2	*<.01	Complete
Access to Health Care	No	Retain the null hypothesis	645	.27	2	.88	Not Applicable
Physical Activity	Yes	Reject the null hypothesis	642	9.15	2	*.01	Complete
Cardio Vascular Disease Risk	No	Reject the null hypothesis	228	11.44	2	<.01	Complete
BMI	Yes	Reject the null hypothesis	626	13.771	2	*<.01	Complete
Acculturation	No	Reject the null hypothesis	646	453.90	2	<.01	Complete
Internet Based Health Literacy	No	Reject the null hypothesis	643	59.69	2	*<.01	Complete
Self-Rated Health Score	Yes	Reject the null hypothesis	652	9.54	2	*<.01	Complete

APPENDIX I

Table 13. Post Hoc Education Based on Language

	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj. Sig.
Spanish- Both	-29.19	23. 80	-1.23	.22	.66
Spanish-English	-200.43	16.54	-12.12	<.01.	*<.01
Both – English	-171.24	21.96	-7.80	<.01	*<.01

Table 14. Post Hoc Physical Activity Based on Language

	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj. Sig.
Both- Spanish	40.68	21.70	1.87	.06	.18
Both-English	-59.70	20.00	-2.99	<.01	*<.01
Spanish-English	-19.02	15.19	-1.25	.21	.63

Table 15. Post Hoc CVD Based on Language

	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj. Sig.
Both- Spanish	13.988	12.431	1.125	.261	.782
Both-English	-34.263	11.160	-3.070	.002	.006
Spanish-English	-20.275	9.248	-2.192	.028	.085

Table 16. Post Hoc BMI Based on Language

	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj. Sig.
Spanish- Both	-11.97	23.82	-.50	.62	1.00
Spanish-English	-57.46	16.41	-3.50	.00	*<.01
Both-English	-45.49	21.93	-2.08	.04	.11

Table 17. Post Hoc Acculturation Based on Language

	Test Statistic	Std. Error	Standard Test Statistic	Sig.	Adj. Sig.
Spanish – Both	-117.08	23.15	-5.06	<.01	<.01
Spanish – English	-334.92	16.17	-20.72	<.01	<.01
Both – English	-217.84	21.34	-10.21	<.01	<.01

APPENDIX I

Table 18. Post Hoc Internet Based Health Literacy Based on Language

	Test Statistic	Std. Error	Standard Test Statistic	Sig.	Adj. Sig.
Both – Spanish	2.83	16.58	.17	.865	1.00
Both – English	-81.26	15.26	-5.32	<.01	*<.01
Spanish – English	-78.43	11.55	-6.79	<.01	*<.01

Table 19. Post Hoc Self-Rated Health Based on Language

	Test Statistic	Std. Error	Standard Test Statistic	Sig.	Adj. Sig.
Spanish – English	-34.43	15.98	-2.15	.03	.09
Spanish – Both	-67.816	22.983	-2.951	<.01	*.01
English – Both	33.38	21.22	1.57	.12	.35

Appendix J

Table 20. Kendall's Tau-b

	n=	**Tb**	**p=**
Psychological Distress	380	.10	.03
Education	395	.08	.06
Access to Health Care	394	.07	.14
Physical Activity	393	<.01	.95
Cardiovascular Disease	132	.08	.34
BMI	383	.06	.13
Acculturation	397	.47	<.01
Internet Based Health Literacy	392	.01	.89
Self-assessed Health Status	397	-.02	.63

Appendix K (Tables 1-12, Figures 1-4)

Table 1. Frequency of: Having Ever smoked 100 Cigarettes in Life

	Frequency	Percent	Valid Percent
No	411	63.00	63.51
Yes	236	36.20	36.51
Total	647	99.20	100.00
UKR	1	0.20	
UKNA	3	0.51	
DK	1	0.20	
Total	5	0.81	
Total	652	100.00	

Table 2. Frequency of: Ever Told you had Hypertension on 2+ Visits

	Frequency	Percent	Valid Percent
No	47	7.20	10.91
Yes	386	59.20	89.10
Total	433	66.40	100.00
NIU	219	33.61	
Total	652	100.00	

Table 3. Frequency of: Had High Cholesterol, Past 12 Months

	Frequency	Percent	Valid Percent
No	52	9.00	16.30
Yes	302	46.30	83.71
Total	361	55.40	100.00
98.00	3	0.51	
NIU	288	44.20	
Total	291	44.61	
Total	652	100.00	

*2 were eliminated that were not a result of NIU, but as a result of no response

Table 4. Frequency of Cardiovascular Disease Risk

	Frequency	Percent	Valid Percent
1	3	0.51	1.30
2	34	5.20	16.20
3	119	18.30	68.40
4	72	11.00	100.00
Total	228	35.00	
Missing	424	65.00	
Total	652	100.00	

Appendix K

Table 5. Percent of Valid and Missing Data After NIU Were Deleted

	Valid	%	Missing	%
Psychological Distress	214	93.90	14	6.10
Education	225	98.70	3	1.30
Access to Health Care	227	99.60	1	.40
Physical Activity	225	98.70	3	1.30
BMI	218	95.60	10	4.40
Acculturation	226	99.10	2	.90
Internet Based Health Literacy	225	98.70	3	1.30
Self-Rated Health	228	100.00	0	0

		Psychological Distress	Education	Physical Activity	BMI	Acculturation	Internet Based Health Literacy	Self-Rated Health	CVD Risk	Access to Health Care
Psychological Distress	Pearson Correlation	1.00	0.05	-0.04	0.14	0.05	0.01	-.278**	.184**	-.223**
	Sig. (2tailed)		0.44	0.61	0.05	0.44	0.90	0	0.01	.001
	n=	214	212	212	205	212	214	214	214	214
Education	Pearson Correlation	0.05	1.00	0.12	0.12	.497**	.322**	0.08	0.04	-0.01
	Sig. (2tailed)	0.44		0.09	0.07	0	0	0.24	0.57	0.84
	n=	212	225	222	215	224	222	225	225	224
Physical Activity	Pearson Correlation	-0.04	0.12	1.00	-0.02	0.05	0.01	.183**	-.279**	0.01
	Sig. (2tailed)	0.61	0.09		0.82	0.47	0.89	0.01	0	0.85
	n=	212	222	225	216	223	223	225	225	225
BMI	Pearson Correlation	0.14	0.12	-0.02	1.00	0.09	-.002	-0.05	.003	0.06
	Sig. (2tailed)	0.05	0.07	0.82		0.21	0.98	0.44	0.96	0.37
	n=	205	215	216	218	217	216	218	218	218
Acculturation	Pearson Correlation	0.05	.497**	0.05	0.09	1.00	.194**	-0.05	.188**	-0.08
	Sig. (2tailed)	0.44	0	0.47	0.21		0.004	0.45	0.01	0.22
	n=	212	224	223	217	226	223	226	226	225
Internet Based Health Literacy	Pearson Correlation	0.01	.322**	0.01	-0.002	.194**	1.00	0.07	0.09	-0.08
	Sig. (2tailed)	0.90	0	0.89	0.98	0.004		0.30	0.19	0.23
	n=	214	222	223	216	223	225	225	225	225
Self-Rated Health	Pearson Correlation	-.278**	0.08	.183**	-0.05	-0.05	0.07	1.00	-.161*	0.05
	Sig. (2tailed)	0	0.24	0.01	0.44	0.45	0.30		0.02	0.49

	n=	214	225	225	218	226	225	228	228	227
CVD Risk	Pearson Correlation	.184**	0.04	-.279**	0.003	.188**	0.09	-.161*	1.00	-0.12
	Sig. (2tailed)	0.01	0.57	0	0.96	0.01	0.19	0.02		0.07
	n=	214	225	225	218	226	225	228	228	227
Access to Health Care	Pearson Correlation	-.223**	-0.01	0.01	0.06	-0.08	-0.08	0.05	-0.12	1.00
	Sig. (2tailed)	0.001	0.84	0.85	0.37	0.22	0.23	0.49	0.07	
	n=	214	224	225	218	225	225	227	227	227

Table 6. Correlation Matrix of All Independent Variables and Dependent Variables
** Correlation is significant at the 0.01 level (2-tailed).
*Correlation is significant at the 0.05 level (2-tailed).

Table 7. Curve Estimation: Linearity

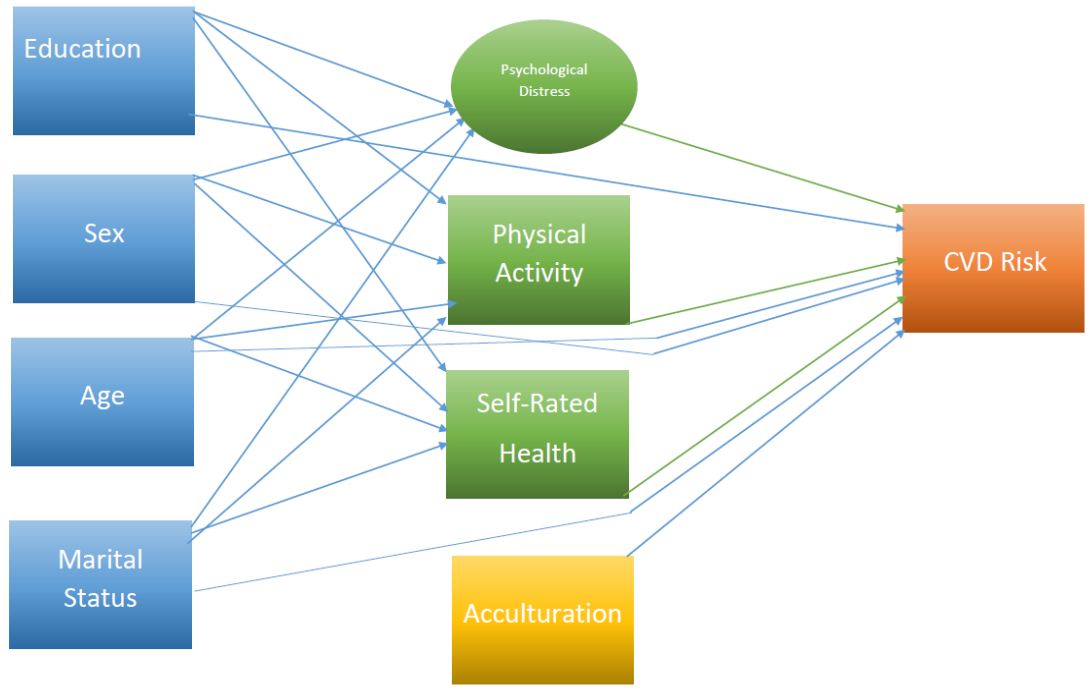
	R Squared	F	df1	df2	p=
Psychological Distress	.034	7.448	1	212	.007*
Physical Activity	.078	18.881	1	223	.000*
Acculturation	.035	8.187	1	224	.005*
Self-Rated Health	.026	6.050	1	226	.015*

Table 8. Multicollinearity using VIF for Variables used in SEM

	Tolerance	VIF
Psychological Distress	.928	1.077
Physical Activity	.995	1.005
Acculturation	.897	1.114
Self-Rated Health	.962	1.040

Appendix K

Figure 1. Proposed Original Model



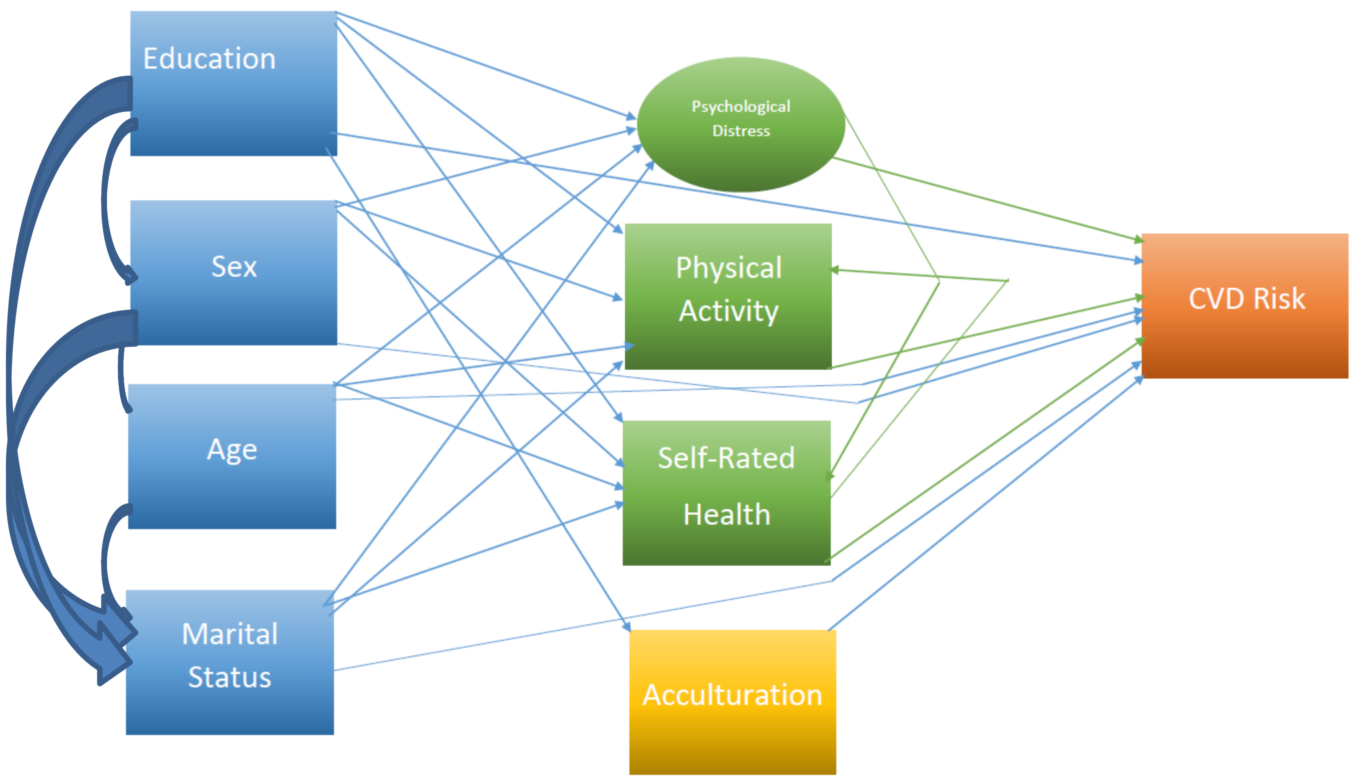
Appendix K

Table 9. Hypothesized Paths

Direct Paths	**Indirect Relationships**
Sex → Psychological Distress Sex→ Physical Activity Sex →Self-Rated Health Sex →Cardiovascular Disease Risk Marital Status → Psychological Distress Marital Status→ Physical Activity Marital Status→Self-Rated Health Marital Status →Cardiovascular Disease Risk Education → Psychological Distress Education→ Physical Activity Education→Self-Rated Health Education →Cardiovascular Disease Risk Age → Psychological Distress Age→ Physical Activity Age→Self-Rated Health Age→Cardiovascular Disease Risk Sex →CVD Risk Marital Status→CVD Risk Education→CVD Risk Psychological Distress →CVD Risk Physical Activity →CVD Risk Self-Rated Health →CVD Risk Cardiovascular Disease Risk→CVD Risk Acculturation→ CVD Risk	 Sex → Psychological Distress →CVD Risk Sex→ Physical Activity →CVD Risk Sex →Self-Rated Health →CVD Risk Sex →Cardiovascular Disease Risk Marital Status → Psychological Distress →CVD Risk Marital Status→ Physical Activity→CVD Risk Marital Status→Self-Rated Health→CVD Risk Education → Psychological Distress→CVD Risk Education→ Physical Activity→CVD Risk Education→Self-Rated Health→CVD Risk Education→Acculturation→CVD Risk Education →Cardiovascular Disease Risk Age → Psychological Distress→CVD Risk Age→ Physical Activity→CVD Risk Age→Self-Rated Health→CVD Risk Age→Cardiovascular Disease Risk

Appendix K

Figure 2. Final Model with Modifications



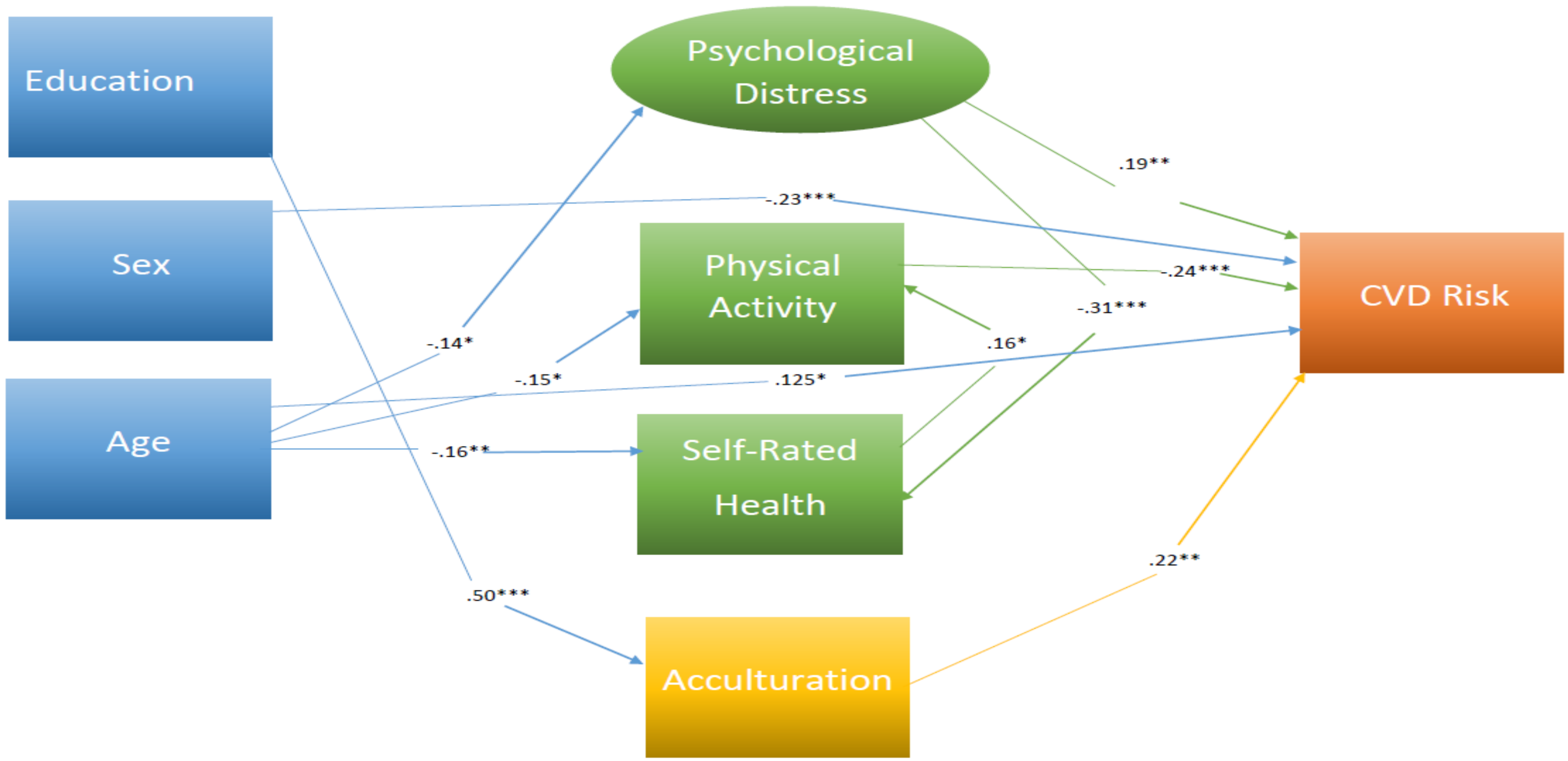
Appendix K

Table 10. Final Model with Modifications: Unstandardized and Standardized Regression Weights

	B	*SE B*	β	*p*
Education →Psychological Distress	.01	.01	0.04	.55
Sex→Psychological Distress	.09	.13	0.05	.51
Age→Psychological Distress	-.01	.01	-0.14	.04
Marital Status→Psychological Distress	-.15	.13	-0.08	.26
Education→Self-Rated Health	.01	.01	0.07	.25
Sex→Self-Rated Health	.21	.13	0.10	.11
Age→Self-Rated Health	-.02	.01	-0.16	.01
Marital Status→Self-Rated Health	.21	.13	0.10	.11
Psychological Distress →Self-Rated Health	-.34	.08	-0.31	***
Education →Physical Activity	.10	.08	0.09	.19
Sex→Physical Activity	.17	.81	0.01	.84
Age→Physical Activity	-.08	.04	-0.15	.02
Marital Status→Physical Activity	-.98	.82	-0.08	.23
Self-Rated Health→Physical Activity	.95	.40	0.16	.02
Education→Acculturation	.23	.03	0.50	***
Psychological Distress →Effort	1.00		0.71	
Psychological Distress →Hopeless	.95	.08	0.83	***
Psychological Distress →Nervous	1.14	.10	0.84	***
Psychological Distress →Restless	1.14	.10	0.83	***
Psychological Distress →Sad	.91	.09	0.75	***
Psychological Distress →Worthless	.79	.08	0.70	***
Education→CVD Risk	-.01	.01	-0.05	.49
Sex→CVD Risk	-.33	.08	-0.23	***
Age→CVD Risk	.01	.00	0.13	.04
Marital Status→CVD Risk	.07	.09	0.05	.44
Psychological Distress→CVD Risk	.15	.05	0.19	.004
Physical Activity→CVD Risk	-.03	.01	-0.24	***
Self-Rated Health→CVD Risk	-.11	.04	-0.03	.69
Acculturation→CVD Risk	.06	.02	0.22	.002

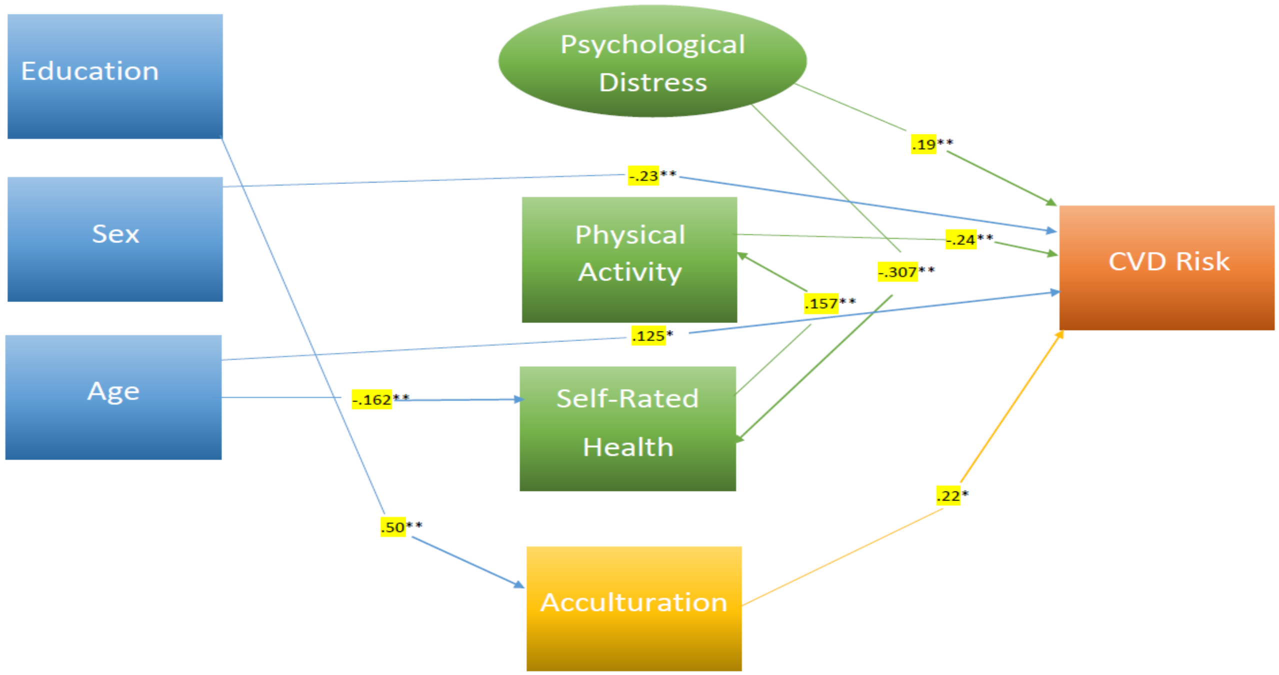
***Significant at the .001 level

Figure 3. Model of Significant Associations



***Significant at the .001 level
** Significant at the 0.01 level
* Significant at the 0.05 level
Note. Betas used in the figure are standardized

Figure 4. Model of Significant Associations After Bootstrap Method Applied



***Significant at the .001 level
** Significant at the 0.01 level
* Significant at the 0.05 level
Note. Betas used in the figure are standardized

Appendix K

Table 11. Bootstrap Bias-Corrected Percentile Method

	B	*CI* Lower	*CI* Upper	*p*=
Education →Psychological Distress	.01	-.11	.03	0.51
Sex→Psychological Distress	.09	-.22	.37	0.58
Age→Psychological Distress	-.01	-.03	.001	0.08
Marital Status→Psychological Distress	-.15	-.44	.16	0.34
Education→Self-Rated Health	.01	-.01	.04	0.30
Sex→Self-Rated Health	.21	-.07	.46	0.14
Age→Self-Rated Health	-.02	-.03	-.003	0.01
Marital Status→Self-Rated Health	.21	-.05	.46	0.13
Psychological Distress →Self-Rated Health	-.34	-.51	-.18	0.002
Education →Physical Activity	.10	-.06	.27	0.19
Sex→Physical Activity	.17	-.93	1.72	0.72
Age→Physical Activity	-.08	-.24	.004	0.07
Marital Status→Physical Activity	-.98	-2.66	.53	0.22
Self-Rated Health→Physical Activity	.95	.27	2.04	0.004
Education→Acculturation	.23	.17	.28	0.003
Psychological Distress →Effort	1.00	1.00	1.00	…
Psychological Distress →Hopeless	.95	.75	1.11	0.004
Psychological Distress →Nervous	1.14	.93	1.44	0.002
Psychological Distress →Restless	1.14	.93	4.45	0.002
Psychological Distress →Sad	.91	.75	1.10	0.003
Psychological Distress →Worthless	.79	.58	.96	0.003
Education→CVD Risk	-.01	-.03	.01	0.57
Sex→CVD Risk	-.33	-.49	-.13	0.004
Age→CVD Risk	.01	.001	.02	0.03
Marital Status→CVD Risk	.07	-.12	.23	0.49
Psychological Distress→CVD Risk	.15	.05	.25	0.004
Physical Activity→CVD Risk	-.03	-.05	-.02	0.002
Self-Rated Health→CVD Risk	-.11	-.11	.07	0.71
Acculturation→CVD Risk	.06	.02	.11	0.003

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Table 12. Standardized Regression Weights: Bootstrap Bias-Corrected Percentile Method

	β	*SE* β	Lower	Upper	*p*=
Education →Psychological Distress	.04	.01	-.09	.17	.51
Sex→Psychological Distress	.05	.15	-.13	.19	.61
Age→Psychological Distress	-.14	.01	-.30	.02	.08
Marital Status→Psychological Distress	-.08	.15	-.23	.08	.34
Education→Self-Rated Health	.07	.01	-.07	.22	.30
Sex→Self-Rated Health	.10	.14	-.04	.21	.14
Age→Self-Rated Health	-.16	.01	-.31	-.03	.01
Marital Status→Self-Rated Health	.10	.13	-.02	.22	.13
Psychological Distress →Self-Rated Health	-.31	.08	-.42	-.17	.002
Education →Physical Activity	.09	.08	-.09	.19	.26
Sex→Physical Activity	.01	.65	-.10	.11	.72
Age→Physical Activity	-.15	.06	-.32	.01	.08
Marital Status→Physical Activity	-.08	.82	-.18	.07	.26
Self-Rated Health→Physical Activity	.16	.44	.05	.25	.01
Education→Acculturation	.50	.03	.38	.59	.004
Psychological Distress →Effort	.71	.00	.60	.81	.002
Psychological Distress →Hopeless	.83	.10	.71	.91	.003
Psychological Distress →Nervous	.84	.13	.76	.90	.003
Psychological Distress →Restless	.83	.13	.73	.91	.004
Psychological Distress →Sad	.75	.09	.64	.83	.002
Psychological Distress →Worthless	.70	.10	.52	.84	.002
Education→CVD Risk	-.05	.01	-.20	.10	.57
Sex→CVD Risk	-.23	.09	-.34	-.09	.004
Age→CVD Risk	.13	.00	.02	.24	.03
Marital Status→CVD Risk	.05	.09	-.09	.16	.50
Psychological Distress→CVD Risk	.19	.05	.06	.32	.004
Physical Activity→CVD Risk	-.24	.01	-.37	-.09	.002
Self-Rated Health→CVD Risk	-.03	.05	-.16	.11	.71
Acculturation→CVD Risk	.22	.02	.07	.35	.003