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Health Disparities among Hispanic Americans with Type 2 Diabetes

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2018

Abstract

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MS, Walden University, 2012

BS, George Washington University, 1991

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

The ongoing increase in Type 2 diabetes among Hispanic Americans challenges the American public health system, particularly with health issues arising from not following appropriate health directives for the disease. This quantitative, cross-sectional, correlational study used primary data to assess the relationship between diabetes knowledge (as measured by the Diabetes Knowledge Questionnaire), health literacy level (as measured by the Short Assessment of Health Literacy–Spanish and English), education level, self-efficacy (as measured by the Diabetes Self-efficacy questionnaire), and self-reported diabetes self-care behaviors (as measured by the Summary of Diabetes Self-care Activities) among a sample of Hispanic Americans with Type 2 diabetes. A combination of the Orem's Theory of self-care and the Bandura's social cognitive theory (SCT) guided this study. The sample included 96 diabetic Hispanic Americans aged 18 and older residing in Fairfax County, VA. Multiple linear regression analysis showed a statistically significant relationship between diabetes knowledge, education level, health literacy, self-efficacy, and self-reported diabetes self-care behaviors. The score of the self-reported diabetes self-care behaviors was related at statistically significant levels to the score of diabetes knowledge ($r_s = 0.5230$, $p = 0.00$), to the score of education level ($r_s = 0.2831$, $p = 0.01$), to the score of health literacy level ($r_s = 0.6332$, $p = 0.00$), and to the score of self-efficacy ($r_s = 0.7783$, $p = 0.00$). The results of this research study could contribute to positive social change by providing the public health workforce in Fairfax County, VA with insights for developing culturally sensitive education programs that best fit the needs of Hispanics and fight against Type 2 diabetes.

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Dedication

I want to dedicate this project to my mother Tilsa E. de Diaz, my dad Nelson Sitton, and my sisters Tilsa Sitton and Minerva Sitton, you have been with me and loved me always.

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To my God, the best father anyone could have. I could not have asked for a better daddy. You are truly the only one who deserves my sincere thanks for loving me so much and giving me the opportunity to give my love back to you.

To my good friend, Mr. Kirby Banks, you told me that I could pursue this doctorate degree. Thank you for believing in me.

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Chapter 1: Introduction to the Study

Introduction

Diabetes mellitus includes a group of clinical heterogeneous disorders that have glucose (blood sugar) intolerance in common. It encompasses many causally unrelated diseases and includes many different etiologies of disturbed glucose tolerance (McCance, Huether, Brashers, & Rote, 2010). Type 2 diabetes (the most common form of diabetes mellitus) may range from predominantly insulin resistant with relative insulin deficiency to a predominantly secretory defect with insulin resistance (McCance et al., 2010). Type 2 diabetes affects Hispanics disproportionately, and researchers consider it as the fifth leading cause of death for this ethnic/racial population in the United States (Heuman, Scholl, & Wilkinson, 2013). About 12.8% of Hispanic adults in America were diagnosed with Type 2 diabetes compared to 7.6% of non-Hispanic Whites in the period of 2010 to 2012, which indicates a disproportionate occurrence of this disease among Hispanic adults (Centers for Disease Control and Prevention [CDC], 2014). The results from this research study could contribute to positive social change by providing new knowledge and better understanding about factors associated with Type 2 diabetes self-care, helping improve existing diabetes intervention strategies, and developing awareness about Type 2 diabetes among Hispanics residing in the United States. Chapter 1 includes the following sections: the background of the study, problem statement, purpose of the study, nature of the study, research questions, hypothesis, definition of term, theoretical framework, study assumptions, scope and delimitation, study limitations, and significance of the study.

Background of the Study

Type 2 diabetes is a serious public health concern in the United States, especially among Hispanics living in America (Ramal, Petersen, Ingram, & Champlin, 2012). Diabetes mellitus is a disease that results from the inefficient transport of glucose from fat, muscle, and liver cells into the cells in the body for energy use (National Institute of Health, 2014). The term *diabetes mellitus* is utilized to describe a syndrome characterized by chronic hyperglycemia (that is, an excess of glucose in the bloodstream) and other disturbances of carbohydrate, fat, and protein metabolism (Abebe & Balcha, 2012). A number of serious complications are linked to any type of diabetes mellitus, including microvascular (e.g., retinopathy, nephropathy and neuropathy) and macrovascular disease (e.g., coronary artery disease, stroke and peripheral vascular disease), and infections (Gregg et al., 2014).

Hispanics are approximately 50% more likely to die from diabetes than Whites (CDC, 2014). Among Hispanic adults, the aged-adjusted rate of diagnosed diabetes was determined to be (a) 8.5% among Central and South Americans, (b) 9.3% among Cubans, (c) 13.9% among Mexican Americans, and (d) 14.8% among Puerto Ricans. Diabetes is the leading cause of death among Mexican Americans, Puerto Ricans, and Cuban Americans (Cruz, Hernandez-Lane, Cohello, & Bautista, 2013).

Although researchers have determined that Hispanics in the United States are experiencing a disproportionate occurrence of diabetes (Nam, Chesla, Stotts, Kroon, & Janson, 2011), relations of sociocultural and behavioral factors associated with diabetes have not been fully comprehended in all of their communities. Researchers are increasingly detecting the association between social determinants of health (e.g., lack of

diabetes knowledge, low educational level, low level of health literacy) and the incidence of diabetic Hispanics in the United States (Hill, Nielsen, & Fox, 2013). Other researchers who have conducted studies about diabetes self-management in Hispanics have reported low education, limited English proficiency (Hu, Amirehsani, Wallace, & Letvak, 2013), and low self-efficacy (Kollannoor-Samuel et al., 2012) as barriers to effective self-management of their diabetes. This means that all these factors are considered barriers for diabetic Hispanic populations in the United States.

It is imperative that public health professionals (e.g., physicians, nurses, health educators) make serious considerations in evaluating the effects of certain factors (e.g., diabetes knowledge, education level and health literacy level and self-efficacy) of diabetic Hispanics when aiming to adopt positive diabetes self-managing behaviors. Poor diabetes management adherence prevents these patients from controlling their diabetes effectively and causes significant negative impacts on their quality of life (Mier et al., 2012). If innovative health strategies are not developed soon, the increasing prevalence of diabetes among Hispanics will consequently produce a significant economic burden not only on these individuals, but also on the American health care system in the near future.

Problem Statement

The problem that was addressed in this study was the prevalence of Type 2 diabetes in the American Hispanic populations and the health issues that derive from not following appropriate health directives for this disease. Diabetes mellitus is a chronic illness considered a public health issue of great concern (Ramal et al., 2012). In 2012, 29.1 million individuals were diagnosed with diabetes in the United States (American Diabetes Association [ADA], 2015). In the United States, the Hispanic population is the

fastest growing racial/ethnic group, accounting for almost 50.5 million individuals and approximately 2.5 million of these adults have Type 2 diabetes (Valen, Narayan, & Wedeking, 2012).

The ADA (2015) indicated that the risk of diagnosed Type 2 diabetes among Hispanic Americans (aged 20 years or older) was determined to be 1.7 times higher when compared with non-Hispanic Whites. Although researchers have found out that Hispanic Americans continue being affected disproportionately by diabetes, relations of sociocultural and behavioral factors linked to diabetes have not been fully understood in all of their communities and the relationship between knowledge and health outcomes is not consistent (Nam et al., 2011). Therefore, in this study I explored the predictive relationship between diabetes knowledge, health literacy level, education level, self-efficacy, and self-reported diabetes self-care behaviors of Hispanics in the United States with Type 2 diabetes.

Purpose of the Study

The purpose of this quantitative research study was to identify the relationship between diabetes knowledge, education level, health literacy level, self-efficacy, and self-reported diabetes self-care behaviors among Hispanics with Type 2 diabetes who reside in Fairfax County, VA. Results from this study could be used to assist the American public health workforce in developing culturally sensitive education programs that best fit the needs of this population. This study is significant to American public health professionals treating diabetic Hispanic patients since it could provide a more precise understanding of this population and allow guidance on how to develop the most

appropriate diabetes strategies that meet the needs of this particular population in the United States.

By examining the relationship between diabetes knowledge, health literacy level, education level, self-efficacy, and self-reported diabetes self-care behaviors among these patients, researchers could scientifically determine the existence of those factors that are preventing Hispanics with Type 2 diabetes from making appropriate changes in their diabetes self-care behaviors. This information could consequently assist the American public health workforce in developing appropriate culturally sensitive education programs that could allow them to clearly comprehend the needs of these patients and motivate them to change their current self-care behaviors into positive ones.

Research Question and Hypotheses

The research question and hypotheses that were assessed in this study will be developed based on current knowledge and the requirement for understanding the association between certain factors and the disproportionally occurrence of Type 2 diabetes among adult Hispanic Americans. Specifically, I analyzed relationships that certain factors (e.g., health literacy, diabetes knowledge, level of education, and self-efficacy) have with the diabetes self-care behaviors among Hispanics living in Fairfax County, VA. The overarching research question and hypotheses for this research study were as follows:

Research Question: What is the predictive relationship between diabetes knowledge (as measured by the Diabetes Knowledge Questionnaire), health literacy level (as measured by the Short Assessment of Health Literacy–Spanish and English), education level (as measured by the Sociodemographic survey form), self-efficacy (as

measured by the Diabetes Self-efficacy questionnaire), and self-reported diabetes self-care behaviors (as measured by the Summary of Diabetes Self-care Activities) of Hispanics in the United States with Type 2 diabetes?

Null Hypothesis (H_0): There is no statistically significant predictive relationship between diabetes knowledge (as measured by the Diabetes Knowledge Questionnaire), health literacy level (as measured by the Short Assessment of Health Literacy–Spanish and English), education level (as measured by the Sociodemographic survey form), self-efficacy (as measured by the Diabetes Self-efficacy questionnaire), and self-reported diabetes self-care behaviors (as measured by the Summary of Diabetes Self-care Activities) of Hispanics in the United States with Type 2 diabetes.

Alternative Hypothesis (H_A): There is a statistically significant predictive relationship between diabetes knowledge (as measured by the Diabetes Knowledge Questionnaire), health literacy level (as measured by the Short Assessment of Health Literacy–Spanish and English), education level (as measured by the Sociodemographic survey form), self-efficacy (as measured by the Diabetes Self-efficacy questionnaire), and self-reported diabetes self-care behaviors (as measured by the Summary of Diabetes Self-care Activities) of Hispanics in the United States with Type 2 diabetes.

Theoretical Framework for the Study

For this study, I applied a model based on a combination of the Orem's (2001) theory of self-care and Bandura's (1986) social cognitive theory (SCT). This provided a solid foundation to understand ways in which certain barriers (i.e., health literacy, diabetes knowledge, education level, and self-efficacy) contribute to the disproportionate onset of Type 2 diabetes among Hispanic Americans and develop effective approaches

for improving the lives of these patients. The theory of self-care (Orem, 2001) indicates that the concept of self-care is a human regulatory function that individuals must perform for themselves to maintain materials and conditions to keep life. This function differs from other functions (e.g., neuroendocrine regulation) in that it represents an action that is deliberately performed by individuals to regulate their own functioning and development. These performed actions are those that keep internal and external conditions needed to maintain and promote health and prevent, cure, or control untoward conditions that may be affecting an individual's life, health, or well-being. Self-care must be learned and deliberately performed in a continuous manner in accordance to the regulatory requirements of individuals associated with their stages of growth, states of health, developmental states, environmental factors, and levels of energy consumption (Orem, 2001). The theory of self-care takes into consideration elements that must be applied in circumstances when individuals need to address a health condition. According to Orem (2001), these elements include (a) self-care, (b) self-care agency, (c) therapeutic self-care demand, and (d) self-care requisites. *Self-care* refers to the practice of all activities an individual conducts on their own to maintain life, health, and well-being, whereas *self-care agency* refers to the individual's capability to meet their requirements. *Self-care requisites* are the series of actions that are necessary to have validity in regulation of their functioning, development and well-being, and finally *therapeutic self-care demand* refers to the action sequences required to meet self-care requisites. Further details on these elements will be discussed in the literature review.

SCT (Bandura, 1989) states that individuals make causal contributions to their own motivation and action within a system of triadic reciprocal causation. In this model,

action, cognitive, affective, other personal factors, and environmental events all operate as interacting determinants of each other (Bandura, 1989). SCT takes into account a person's experiences for allowing a behavioral action to occur. These past experiences influence reinforcements, expectations, and expectancies, all of which determine whether an individual will engage in a specific behavior and the reasons for that individual to engage in that behavior (Bandura, 1986). According to Bandura (1986), key constructs of SCT include (a) reciprocal determinism, (b) behavioral capability, (c) observational learning, (d) reinforcements, (e) expectations, and (f) self-efficacy. *Reciprocal determinism* refers to the interaction between the person, their environment and behaviors. *Behavioral capability* refers to an individual's ability to perform a given behavior and observational learning refers to how an individual learns new behaviors through observing others completing behaviors successfully. *Reinforcements* are responses to an individual's behavior which change the likelihood of the individual continuing or stopping the behavior and *expectations* refer to the anticipated consequences of a behavior. Finally, *self-efficacy* refers to an individual's judgment of their own capabilities to perform a certain behavior successfully. Details of the theory will be discussed at length in the literature review.

A combination of the Orem's theory of self-care and the Bandura's (1986) SCT appeared to be an appropriate theoretical framework for this research study because it aligned very well with the purpose of this research study. This combination of theories contributed to current understanding of the reasons why patients with Type 2 diabetes do not opt to take appropriate measures that promote health. Therefore, it was my goal to present how the constructs of both theories are linked to the research study variable.

Nature of the Study

A quantitative, cross-sectional, correlational research design using primary data was used in this research study to measure the relationships between diabetes knowledge, health literacy, education level, self-efficacy, and self-reported diabetes self-care behaviors among diabetic Hispanics patients. Data collected reflected the participants' report of their knowledge about diabetes, level of health literacy, level of education, and confidence in performing certain activities related to diabetes management tasks. This allowed the researcher to determine the predictive relationship between diabetes knowledge, health literacy level, education level, self-efficacy and self-reported diabetes self-care behaviors among this specific target population.

Correlational studies are often identified with survey research (i.e., a method of data collection that is commonly used in social science fields) and useful for generating and clarifying hypotheses (Frankfort-Nachmias & Nachmias, 2008). They are used to assess the relationship between variables as they exist in a determined population and, if they are cross-sectional, they do so at a single point in time in the participant's life (Aschengrau & Seage, 2008). This means that they can be used to take a "snapshot" of a population at a one point in time and measure the disease prevalence in relation to the exposure prevalence (Aschengrau & Seage, 2008). Cross-sectional studies are known for being carried out for public health planning and for etiologic research. Advantages of utilizing this type of research design include the following: (a) test findings are highly generalizable when based on a sample of the general population; (b) they can be completed in a short period of time; and (c) they are low in cost (Aschengrau & Seage, 2008).

Definition of Terms

Diabetes mellitus refers to a group of clinical heterogeneous disorders that have glucose (blood sugar) intolerance in common. It encompasses many causally unrelated diseases and includes many different etiologies of disturbed glucose tolerance. The term *diabetes mellitus* is utilized to describe a syndrome characterized by chronic hyperglycemia (i.e., an excess of glucose in the bloodstream) and other disturbances of carbohydrate, fat and protein metabolism (McCance et al., 2010).

Diabetes self-efficacy refers to self-efficacy regarding diabetes care and will be measured using the diabetes self-efficacy questionnaire; this variable will be measured continuously between 0 and 8. This is an independent variable of this analysis.

Diabetes self-management refers to activities undertaken by the individual to self-manage diabetes and was measured using the Summary of Diabetes Self-care Activities (SDSCA) as 14 individual items. This was the dependent variable of this analysis.

Diabetes knowledge refers to the patient's diabetes knowledge as measured using the Diabetes Knowledge Questionnaire (DKQ; Garcia, Villagomez, Brown, Kouzekanani, & Hanis, 2001) with 24 items and was measured as a continuous score between 0 and 24 where 24 represents the highest level of knowledge. This was an independent variable in this analysis.

Education Level refers to the education level of the subject and will be measured using an ordinal scale. This was an independent variable of this analysis.

Health literacy refers to the subjects reading comprehension of health related terms and will be measured using the Short Assessment of Health Literacy–Spanish and English (SAHL–S&E; Agency for Healthcare Research and Quality, 2014) which was

measured continuously between 0 and 18. This was an independent variable of this analysis.

Hispanic Americans refers to individuals in the United States who are of Cuban, Mexican, Puerto Rican, South or Central American, or other Spanish culture or origin, regardless of race (CDC, 2015).

Overweight refers to a BMI that ranges from 25.0 to 29.9 (CDC, 2012).

Physical activity refers to movement (e.g., climbing the stairs, dancing, gardening, and walking) of the body that uses energy (United States Department of Agriculture [USDA], 2015).

Type 2 diabetes refers to the most common form of diabetes that may range from predominantly insulin resistant with relative insulin deficiency to a predominantly secretory defect with insulin resistance (McCance et al., 2010). Insulin deficiency is a suboptimal response of insulin-sensitive tissues (especially, liver, muscle, and adipose tissue) to insulin (McCance et al., 2010).

Whites refer to individuals having origins in Europe, the Middle East, or North Africa (Census Bureau, 2000).

Study Assumptions

In this study, I made several assumptions. The first was that the research participants answered all the survey questions accurately and honestly. This is important as dishonest or unreliable answers to the survey questions will compromise study validity. Anonymity was ensured throughout the research process to ensure that subjects are most motivated to provide honest and accurate information.

This study also involved several assumptions about the relationships between self-care activities and Type 2 diabetes. Firstly, it was assumed that with the combination of dietary modification and physical activity, risk factors associated with the development of Type 2 diabetes were minimized. Type 2 diabetes is caused by a combination of genetic and environmental variables (Murea, Ma, & Freedman, 2012) and there are known and well documented behavioral and dietary factors that increase the risk of Type 2 diabetes, including age, obesity, high blood pressure, physical inactivity and family history (Marinho, Vasconcelos, Alencar, Almeida, & Damasceno, 2013). However, most studies on diabetes are correlational or observational in nature, and hence proving a causal relationship between these factors is difficult. Therefore, this assumption is important when discussing the use of behavioral factors to minimize development of Type 2 diabetes.

Following from this assumption, diabetes awareness and understanding among participants would allow them to promote consciousness on the effect of risk factors on the lives. This assumption stems from the theoretical foundation of the study, specifically that self-care must be learned and consciously applied (Orem, 2001) and that they require the knowledge from the environmental around them to do so (Bandura, 1989). A related assumption was also that to prevent or delay the reoccurrence of Type 2 diabetes complications, Hispanic adults would need to continue practicing an active lifestyle, which includes dietary modification and physical activities. Similar to above, the relationship between lifestyle risk factors is well documented but a causal relationship between these factors and Type 2 diabetes is difficult to determine. It was therefore assumed that avoiding risk factors results in a decrease in an individual's chances of

developing Type 2 diabetes. At minimum, improved awareness of Type 2 diabetes improves early detection of the condition and lower incidences of its complications (Saleh, Mumu, Ara, Begum, & Ali, 2012). After development of Type 2 diabetes, changes in diet and physical exercise have been documented to effectively manage the medical condition (Ajala, English, & Pinkney 2013; Evert et al., 2014).

The final assumption of this study was that the test findings of this proposal would make a positive impact on the lives of research participants, creating opportunities for promoting lifestyle changes not only within each family, but also within all Hispanic American communities. This assumption was important as it justifies the study within the context of bringing about positive social change in Hispanic American communities.

Scope and Delimitations

This research study focused on the association between four factors (i.e., diabetes knowledge, health literacy, education level, and self-efficacy) and the self-reported diabetes self-care behaviors among Hispanic Americans with Type 2 diabetes. In this research study, the sample population was delimited to diabetic Hispanic Americans aged 18 and older who were residing in Fairfax County, VA at the time of the survey. This study did not include Hispanic Americans from other states, and made the previously stated assumption that this population was generally representative of all Hispanic Americans. This study did not examine diabetes related self-care behavior in Hispanic Americans who did not have diabetes, as the current focus of this study is to examine factors involved in diabetes self-care after development of Type 2 diabetes, rather than self-care potentially related to minimizing the risk of Type 2 diabetes.

Although previous research has been conducted on Hispanic Americans with Type 2 diabetes, test findings from these investigations have been inconsistent (Hu et al., 2013; Jeppesen, Hull, Raines, & Miser, 2012; Kollannoor-Samuel et al., 2012; Zhao, 2014). Therefore, the intention of conducting this research study was to clarify the real association that exists between these specific factors mentioned above.

Study Limitations

Limitations in this study can be broken down into two aspects: limitations related to design and methodological weaknesses, and limitations related to biases within the study. Cross-sectional studies are effective for: (a) developing preventive surveillance programs and surveys and (b) assessing the association between exposure and illness onset for chronic illnesses in which epidemiologists lack of data on the time of onset (Dawson & Trapp, 2004). Although cross-sectional studies are inexpensive and fast to complete, they provide only a snapshot in time of the disease (which may result in misleading information when the study question is one of disease process; Dawson & Trapp, 2004).

Cross-sectional studies have previously demonstrated some limitations. For instance, in a study conducted by Mier et al. (2012), some of the limitations detected were that (a) the research data were calculated using a self-report tool, which may have introduced source biases and (b) the researchers used a relatively small sample, which may have reduced the ability to make appropriate generalization of test results to other Hispanic populations. Of these limitations, this study was particularly affected by the first; all survey instruments to be used were based on participant recall of their personal information and behavior. I addressed this threat by using validated surveys. These

surveys have previously demonstrated empirical validity in a consistent manner despite relying on personal recall from research participants. In addition, they have demonstrated good validity in comparison to other instruments (Garcia et al., 2001; Lee, Stucky, Lee, Rozier, & Bender, 2010; Lorig, Ritter, & González, 2003; Toobert, Hampson, & Glasgow, 2000). I conducted power analysis to address the second threat and to ensure that the sample size was large enough for statistical analysis. A significant limitation related to potential bias in the study was that the population chosen for the study may be biased towards certain socioeconomic or cultural groups due to the selection of participants within Fairfax County, VA only.

Significance of the Study

This research study could provide some potential social change in the Hispanic American communities where there is a high rate of Type 2 diabetes. This potential social change significance could provide the American public health workforce with insights for developing culturally sensitive education programs that best fit the needs of Hispanics and fight against Type 2 diabetes. Research participants could learn about study results and recommendations on the prevention of the occurrence of Type 2 diabetes in Hispanic Americans. Research results of this study could help Hispanic Americans with Type 2 diabetes to use recommendations related to effective self-care management order to reduce and prevent the onset of Type 2 diabetes among this particular population. These recommendations could have direct impact on positive social change through new knowledge obtained with the conduct of this research study. Additionally, the test results of this research study could help encourage public health professionals to promote social change by providing effective public health awareness about the consequences of Type 2

diabetes in Hispanic Americans. This research study could add to the body of the existing literature by providing a clear understanding on the association between four factors (diabetes knowledge, health literacy, education level, and self-efficacy) and self-reported diabetes self-care behaviors among this specific target population.

Poor diabetes management adherence among diabetic Hispanic patients contributes to the prevalence of diabetes among this minority population in the United States (Mier et al., 2012). It is imperative that public health professionals (e.g., physicians, nurses, health educators) make serious considerations in evaluating the effects of four factors (e.g., diabetes knowledge, education level, health literacy level and self-efficacy) in diabetic Hispanics when aiming to adopt positive diabetes self-managing behaviors. Poor diabetes management adherence prevents these patients from controlling their diabetes effectively and causing significant negative impacts on their quality of life (Mier et al., 2012). If diabetics do not learn useful preventative strategies to manage their disease, it will add on to the already taxing health care system in the United States.

Summary

Type 2 diabetes is a serious public health concern in the United States, especially among Hispanics. In Chapter 1, I described significant information related to this research study. For instance, Chapter 1 focused on the increasing prevalence of Type 2 diabetes among Hispanic Americans. Many factors such as knowledge about diabetes, level of health literacy, level of education, and self-efficacy are potential barriers to adequate diabetes management and effective preventative care among Hispanic Americans.

In Chapter 2, I review the relevant literature to provide additional information on the increasing prevalence of Type 2 diabetes among Hispanic Americans. The focus of the literature review in Chapter 2 is to provide more information regarding

- the types of diabetes mellitus, the etiology of Type 2 diabetes,
- the risk factors for developing Type 2 diabetes and background information focused on the associations between four main factors (i.e., diabetes knowledge, education level, level of health literacy, and self-efficacy), and
- the diabetes self-management activities performed by Hispanic Americans with Type 2 diabetes.

The methods applied in the study are described in Chapter 3. In Chapter 4, I discuss data collection and the results of the study. In Chapter 5, I interpret the test findings, discuss the limitation of the study, provide recommendations, explain implications, and present conclusions of the study.

Chapter 2: Literature Review

Introduction

Researchers consider Type 2 diabetes the fifth leading cause of death for Hispanics in the United States, affecting this ethnic/racial population drastically (Heuman et al., 2013). Between 2010 and 2012, 12.8% of Hispanic adults were diagnosed with Type 2 diabetes compared to 7.6% of non-Hispanic Whites, which indicates a disproportionate occurrence of this disease among Hispanic adults (CDC, 2014). The problem addressed in this study was the prevalence of Type 2 diabetes in the American Hispanic population and the health issues that derive from not following appropriate health directives for this disease (e.g., nephropathy, neuropathy, amputation, retinopathy, heart disease, and stroke).

The purpose of this quantitative research study was to identify the relationship between education level, health literacy level, diabetes knowledge, self-efficacy, and self-reported diabetes self-care behaviors among Hispanic Americans with Type 2 diabetes who reside in Fairfax County, VA. Results from this study could be used to assist the American public health workforce developing culturally sensitive education programs that best fit the needs of this population. This section focuses on the literature that emphasizes the need for conducting this research study and the conceptual framework applied to guide it.

Literature Search Strategy

An extensive literature search was conducted to identify, collect, and evaluate research articles for inclusion in this analysis to maximize the likelihood that all relevant articles were effectively retrieved. I conducted searches using the following databases

located at Walden University's Library Center: Academic Search Complete, ProQuest Central, ScienceDirect, CINAHL Plus, and SAGE Premier. Only peer-reviewed articles written in English from the past 5 years (i.e., 2011 through 2015) were considered in this literature search. Statistical data was retrieved online from reports by the ADA (2015) and the CDC (2014). Keywords utilized to find research included *diabetes, type 2 diabetes, diabetes mellitus, diabetes self-management, diabetes management, Hispanic Americans, Latinos, minorities, diabetes knowledge, adults, education level, diabetes education, health literacy, health care use, social determinant of health, exercise, self-management, self-efficacy, glycemic control, planning and prevention,* and *uninsured and adherence.* The search resulted in 220 from Academic Search Complete, 593 from ProQuest Central, 16,000 from Google Scholar, 670 from ScienceDirect, 283 from CINAHL Plus and 758 from SAGE Premier. I obtained these results first by applying general terms (e.g., Type 2 diabetes, Hispanic Americans, and adults), which I later narrowed down by applying other key terms (e.g., diabetes knowledge, health literacy, diabetes education, self-efficacy, and self-management). Abstracts and titles were reviewed and selected as long as key terms were mentioned.

Theoretical Foundation

Human beings depend on relevant health information to promote their own health and the health of others. Patients need relevant health information to make the best decisions about avoiding health risks, detecting and diagnosing health problems, and seeking the best available health care services (Parker & Kreps, 2005). However, health literacy deficiencies limit effective dissemination and understanding of relevant health

information in society, especially among many vulnerable populations (e.g., Hispanics) (Parker & Kreps, 2005).

In this study, I analyzed relationships that certain factors (e.g., health literacy, diabetes knowledge, level of education, English proficiency, and self-efficacy) have with the diabetes self-care behaviors among Hispanics living in Fairfax County, VA. This was accomplished by applying a model based on a combination of the Orem's (2011) theory of self-care and the Bandura's (1989) SCT.

Orem's Theory of Self-Care

Orem (2001), in the theory of self-care, indicated that the concept of self-care is a human regulatory function that individuals must perform for themselves to maintain materials and conditions to keep life. This function differs from other functions (e.g., neuroendocrine regulation) in that it represents an action that is deliberately performed by individuals to regulate their own functioning and development. These performed actions are those that keep internal and external conditions needed to maintain and promote health and prevent, cure or control untoward conditions that may be affecting an individual's life, health, or well-being (Orem, 2001). Self-care must be learned and deliberately performed in a continuous manner in accordance to the regulatory requirements of individuals associated with their stages of growth, states of health, developmental states, environmental factors, and levels of energy consumption (Orem, 2001).

Orem's self-care theory has been applied in multiple healthcare programs developed for patients with cardiac disease, pulmonary disease and mental illness (Simmons, 2009). The application of this theory was appropriate for this study because it

is crucial for diabetic patients to be actively involved in their self-care activities to improve their outcomes and have a better quality of life.

Self-care deficits and resulting health declines appear when individuals are not willing or cannot perform these functions (Chen et al., 2014). The theory of self-care takes into consideration elements that must be applied in circumstances when individuals need to address a health condition. According to Orem (2001), these elements include (a) self-care, (b) self-care agency, (c) therapeutic self-care demand, and (d) self-care requisites.

- *Self-care* is the practice of all activities individuals start and conduct on their own to maintain life, health, and well-being. It is normal that adults voluntarily care for themselves. However, the ill and disabled individual requires partial or total care from others. Self-care is an adult's continuous contribution to his or her own continued existence, health, and well-being.
- *Self-care agency* is the complex acquired capability to meet ones' requirement for care of self that is focused on regulating life processes, promoting human integrity, and enhancing well-being.
- *Therapeutic self-care demand* is the action sequences that need to be met by the individual to accomplish the self-care requisites.
- *Self-care requisites* are the insights of the sequences of action that are necessary to have validity in individuals' regulation of their functioning, development, or well-being. The three types of self-care requisites are:
    - *Universal self-care requisites:* These are the common needs to all individuals during all stages of the life cycle with adjustments

according to age, developmental state, the environment and other factors. These requisites are associated with life processes, with the maintenance of human integrity and with general well-being. For example, breathing without use of oxygen equipment at 12-18 times per minute for adults and bathe daily.

- *Developmental self-care requisites*: These are the needs that individuals have when growing up and developing as human beings. These requisites refer to those needs associated with conditions and events that occur during various stages of the life cycle (e.g., pregnancy, childhood, adolescence). For instance, when an individual is born at term or prematurely. These requisites are also associated with those events that can negatively affect their development (e.g., poor health or disability, terminal illness).
- *Health deviation self-care requisites:* These are the needs that individuals have when being injured, having an illness, and being under medical treatment. Examples of these requisites include those needs when individuals experience changes in physical function (e.g., limited movement of a joint) or in a daily behavior (e.g., loss of interest in life; Orem, 2001).

When these three prerequisites are met, individuals become capable of maintaining life processes, maintaining human functioning within a normal range, preventing injury, contributing to the effects of injury, contributing to the regulation of pathologic processes, and promoting well-being (Orem, 2001). Meeting universal and

developmental self-care requisites effectively is an ideal action for primary prevention of a disease. Meeting health deviation requisites may help in controlling a disease in its early stages (secondary prevention) and in preventing disability (tertiary prevention). It is essential that, when there is a disease, the universal and the developmental self-care requisites are met to maintain human functioning, promote development and obtain rehabilitation (Orem, 2001).

Bandura's Social Cognitive Theory

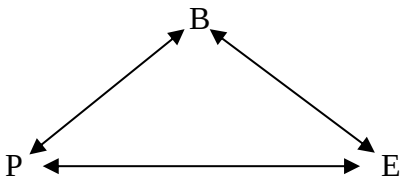
Bandura (1989), in the SCT, indicated that individuals make causal contribution to their own motivation and action within a system of triadic reciprocal causation. This means that learning occurs in a social context because of a reciprocal interaction of the individual, environment, and behavior (Bandura, 1989). In this model, action, cognitive, affective, other personal factors, and environmental events all operate as interacting determinants of each other (Bandura, 1989). SCT takes into account a person's experiences for allowing a behavioral action to occur. These past experiences influence reinforcements, expectations, and expectancies, all of which determine whether an individual will engage in a specific behavior and the reasons for that individual to engage in that behavior (Bandura, 1986). Bandura (1986), in SCT, sees an individual as a self-organizing, self-reflecting, self-regulating and proactive being and not as a reactive individual who is shaped by environmental forces or led by hidden inner impulses (Bandura, 1986). Individuals are equipped with some capabilities that allow them to cognitively influent and design their own lives (Bandura, 1986). According to Bandura (1986), these essential capabilities are:

- *Symbolizing capability:* This is the capability for individuals to use symbols for gaining new knowledge through reflective thought, finding meaning from their environment, developing guides for action, solving problems cognitively, creating innovative courses of action, and communicating with others at any distance in time and space. By symbolizing their experiences, individuals can build their lives with structure, meaning, and continuity.
- *Forethought capability:* This is the capability for individuals to plan courses of action, anticipate the likely consequences of these actions, and set goals and challenges for themselves to influence, guide, and regulate their actions. This capability allows individuals to develop alternative strategies that can be anticipated in their minds in the represent time.
- *Vicarious capability:* This is the capability for individuals to learn through vicarious experience, allowing them to learn a novel behavior without going through the trial and error process of performing it. This capability prevents them, in many circumstances, from risking costly and potentially fatal mistakes. When individuals observe a behavior that produces valued results and expectation, they become motivated to adopt the behavior and repeat it in the future.
- *Self-regulating capability:* This is the capability for individuals to provide themselves with the chance for self-directed changes in their behavior. The degree to which individuals self-regulate their own actions and behavior depends on:

    - The accuracy and consistency of their self-observation and self-monitoring.
    - The judgments they make regarding their actions, choices, and attributions.
    - The tangible reactions they make to their own behavior through the self-regulatory process.
- *Self-reflecting capability:* This represents the capability for individuals to analyze their experiences, monitor their ideas, act on them, or predict occurrences from them, access the appropriateness of their thoughts from the results previously experienced and evaluate their own thinking and behavior accordingly. Self-reflectivity involves repositioning the perspective of the same agent, instead of transforming different internal agents or selves regulating each other.

The main objective of SCT is to describe how individuals regulate their behavior through control and reinforcement to achieve a goal-directed behavior that can be maintained continuously (Bandura, 1986). According to Bandura (1986, 1977a, 1977b), key constructs of SCT include:

- *Reciprocal determinism:* This is the triadic reciprocal interaction (i.e., mutual action between causal factors) of three classes of determinants: (a) person (who has a set of learned experiences), (b) environment (external social context), and (c) behavior (responses to stimuli to accomplish goals). This triadic reciprocity is shown graphically in Figure 1.



P = person
B = behavior
E = environment

Figure 1. Triadic influence in social cognitive.

- *Behavioral capability*: This is the ability that a person has to perform a given behavior using his or her basic knowledge and skills. The use of appropriate tools and resources allows and influences an individual to perform new behaviors more easily. Humans learn from the consequences of their behavior, which also affects the environment in which they live.
- *Observational learning:* This act allows an individual to learn how to perform a new behavior by observing others completing the behavior successfully. Observational learning is governed by the processes of attention, retention, production, and motivation. It is often accomplished through peer modeling. The capacity to learn by observation enables individuals to increase their knowledge and skills based on information provided by others.
- *Reinforcements:* These are the responses to an individual's behavior that produce the likelihood of continuing or stopping the behavior. Reinforcement can be external or internal and can be positive or negative. Wanting to receive an approval from a peer is an example of an external reinforcement and

feeling content for being approved of is an example of an internal reinforcement. Reinforcement (either positive or negative) will not produce a significant impact on an individual if the reinforcement, that is offered externally, does not match with the individual's needs. The important factor of reinforcement is that it will usually lead to a change in an individual's behavior. This includes the construct of SCT that most closely connects to the reciprocal relationship between behavior and environment.

- *Expectations:* These are the anticipated consequences of an individual's behavior before performing the behavior, which can influence the successful completion of that behavior. They influence actions that are focused almost exclusively on outcome expectations. Expectancies derive mostly from previous experience and focus on the value that is given to the outcome. The outcomes individuals expect in given situation depend significantly on their judgment of the types of performances they will can produce.
- *Self-efficacy:* This is a judgment of an individual's capability to perform a certain behavior successfully. In other words, it is the confidence that an individual has on his or her ability to successfully accomplish a determined behavior. Self-efficacy may be influenced by the capabilities of each individual, other specific factors, and environmental factors (barriers and facilitators). Efficacy involves a generative capability in which subskills (e.g., cognitive, social and behavioral) need to be grouped into sets of action for many purposes. Success is frequently accomplished only after generating and testing optional types of behaviors and approaches, which requires persistent

effort. This generative process is easily aborted if self-doubters' initial efforts are deficient.

SCT defines the following four elements as sources of information in which self-efficacy can be increased: (a) performance accomplishment, (b) vicarious experience, (c) verbal persuasion, and (d) physiological states (Bandura, 1977a).

- *Performance accomplishment:* This is based on individuals' mastery experiences. Successes increase mastery expectations while repeated failures minimize them. As strong efficacy expectations are developed through repeated success, the negative impact of occasional failures is likely to be reduced. Once established, enhanced self-efficacy tends to generalize to other situations in which performance was self-debilitated by preoccupation with personal inadequacies. As a result, improvements in behavioral functioning transfer not only to similar situations, but also to activities that are substantially different from those on which the treatment was focused. Individuals are capable of meeting attainable goals by gradually challenging them with desired behaviors.
- *Vicarious experience:* This is seeing others perform threatening activities without adverse consequences can generate expectations in observers that they will improve their performance if they persist in their efforts. They persuade themselves that if others can do it, they should achieve at least some improvement in performance.
- *Verbal persuasion*: This occurs when people are led through suggestion, into believing they can cope successfully with what has overwhelmed them in the

past. When individuals receive strong encouragement, they become more confident about themselves, empowering them to make a behavior change.

- *Physiological states:* These occur when stressful situations generally produce emotional arousal that might have informative value concerning personal competency. Fear reactions generate further fear of dealing with stressful situations through anticipatory self-arousal. By bringing up fear-provoking thoughts about their weaknesses, individuals can bring themselves to elevated levels of anxiety that may exceed the fear experienced during the actual threatening situation. Diminishing emotional arousal can reduce avoidance behavior.

Self-efficacy can be increased or enhanced through positive role modeling and by learning new skills to manage threatening activities. This position has been supported by research on smoking and exercise in adults and diet and exercise in children (Thayer, Kemp, & Tingen, 2000). Self-care confidence is derived from the concept of self-efficacy, a major construct in SCT described above. The level of self-efficacy that an individual has influences adherence to goals and responses to challenges (Chen et al., 2014). If individuals are not confident when making decisions, appropriate diabetes self-care behaviors may not be performed (Chen et al., 2014). Many patients do not follow appropriately self-care recommendations from their health providers (e.g., self-monitoring of blood glucose, performing foot care, managing insulin, adhering to oral medication regimens, and engaging in physical activity) (White, Osborn, Gebretsadik, Kripalani, & Rothman, 2013). It is important to address potential barriers to self-care behavior to help patients achieve better health outcomes.

Many diabetic Hispanic patients have limited knowledge on how to perform their self-care maintenance activities (e.g., reducing their intake of fats and carbohydrates and increasing their level of exercise) (Coffman, Norton, & Beene, 2012). Diabetic patients need to perform these activities to prevent and respond to symptoms (McEwen, Lin, & Pasvogel, 2013). In addition, patients' interpretation of symptoms is often inaccurate. Coffman et al. (2012) found that approximately 97% research participants treated headaches with over-the-counter medication without considering that these headaches were possible diabetes symptoms. It is important to note that patient challenges become intensified when there are barriers (e.g., low level of health literacy) that prevent them from understanding health information that is needed to address health issues appropriately (Chen et al., 2014).

Formal education has been associated with health literacy that may affect patients' self-care decision-making, ability to obtain knowledge regarding their condition during traditional clinic-based education and their confidence in making self-care decisions (Chen et al., 2014). If patients do not gain enough knowledge, they may not perform or adhere to self-care activities. In addition, lack of knowledge may limit patient self-efficacy, and without sufficient self-efficacy, individuals may be less likely to change or start a new health behavior (e.g., exercising and eating diets rich in vegetables and lean meat) (Chen et al., 2014).

Because health literacy is influenced by educational processes, it will enhance patients' knowledge and skills that will produce greater self-efficacy and enhance diabetes self-management activities among these patients (Chen et al., 2014). Applying SCT as a framework, health professionals can improve their diabetic patients' emotional

states, fix their erroneous self-beliefs and patterns of thinking (personal factors), improve their personal skills and self-regulatory practices (behavior), and modify their home and work environments that may help them to live a much healthier and productive life (environmental factors). The combination of the Orem's theory of self-care and the Bandura's (1989) SCT provided a solid foundation to understand how certain barriers (i.e., health literacy, diabetes knowledge, education level and self-efficacy) are contributing to the disproportionally onset of Type 2 diabetes among Hispanic Americans and develop effective approaches for improving the lives of these patients.

Literature Review

In the following sections, I describe what diabetes mellitus is, the different types of diabetes mellitus and the serious complications associated with diabetes, the etiology of Type 2 diabetes, risk factors for developing Type 2 diabetes**.** I also present what previous studies have discovered in regards to the treatment and self-care management behaviors adopted by diabetic Hispanic patients with Type 2 diabetes in the United States. In addition, it is discussed what researchers have learned about the barriers these patients encounter when preventing and controlling their diabetes and knowledge gap detected as a result of the conduct of these previous research studies.

The Meaning of Diabetes Mellitus

Diabetes mellitus is a group of clinical heterogeneous disorders that have glucose (blood sugar) intolerance in common (Ozougwu et al., 2013). It encompasses many causally unrelated diseases and includes many different etiologies of disturbed glucose tolerance. The term *diabetes mellitus* is utilized to describe a syndrome characterized by chronic hyperglycemia (that is, an excess of glucose in the bloodstream) and other

disturbances of carbohydrate, fat and protein metabolism (Abebe & Balcha, 2012). A number of serious complications are linked to any type of diabetes mellitus, including microvascular (e.g., retinopathy, nephropathy and neuropathy) and macrovascular disease (e.g., coronary artery disease, stroke and peripheral vascular disease), and infections (Gregg et al., 2014).

Types of Diabetes Mellitus

The three types of diabetes mellitus are Type 1 diabetes, Type 2 diabetes and gestational diabetes. Type 1 diabetes (absolute insulin deficiency) occurs as the result of an autoimmune-mediated specific loss of beta cells in the pancreatic islets (Graham et al., 2012). Type 1 diabetes is considered the result of a genetic-environmental interaction; about 12% of individuals with newly diagnosed Type 1 diabetes have a first-degree relative with this type (Moghaddam & Rasoolzadeh, 2014). Type 2 diabetes, which is the most common form of diabetes, may range from predominantly insulin resistant with relative insulin deficiency to a predominantly secretory defect with insulin resistance (Ozougwu et al., 2013). Indeed, insulin deficiency is a suboptimal response of insulin-sensitive tissues (especially, liver, muscle, and adipose tissue) to insulin (Cantley & Ashcroft, 2015). The prevalence of Type 2 diabetes varies by ethnic group and gender (Choi, Liu, Palaniappan, Wang, & Wong, 2013). Gestational diabetes is defined as any degree intolerance with onset or first recognition during pregnancy (around the 24th week) and which is usually resolved after the baby is born; there is an increased risk for Type 2 diabetes later in life in women who develop gestational diabetes (Choi et al., 2013). Type 2 diabetes will be the focus of this research study.

Etiology of Type 2 Diabetes

Type 2 diabetes results from an environmental-genetic interaction (Murea et al., 2012). Contributing factors for developing Type 2 diabetes include genetic susceptibility (polygenic) combined with environmental determinants, insulin resistance, insulin secretion, absence of islet cell antibodies and inherited defects in beta cell mass function combined with peripheral tissue insulin resistance (Murea et al., 2012).

Risk Factors for Developing Type 2 Diabetes

The most well recognized risk factors for developing Type 2 diabetes include age, obesity, high blood pressure, physical inactivity, and family history (Marinho et al., 2013). The metabolic syndrome, which is also referred as insulin resistance syndrome, is a group of disorders (central obesity, dyslipidemia, prehypertension and a fasting blood glucose more than or equal to 100 mg/dl) that together contribute to a high risk of developing Type 2 diabetes and associated cardiovascular complications (Taylor, 2012). Minority groups (e.g., African Americans, Hispanics/Latinos, and American Indians) are predominantly at high risk for developing Type 2 diabetes and its complications (Attridge, Creamer, Ramsden, & Cannings-John, 2014). The prevalence of Type 2 diabetes in the Hispanic Americans (aged 20 years or older) is approximately twice that of non-Hispanic Whites (i.e., 11.8% *vs*. 7.1%) (Cusi & Ocampo, 2011). Hispanic American adults are 1.7 times more likely than non-Hispanic White adults to have been diagnosed with diabetes by a physician (Office of Minority Health, 2014). This minority group has higher rates of diabetes-related complications and is 1.5 times more likely to die from diabetes compared with non-Hispanic Whites (Office of Minority Health, 2014).

Treatment and Self-Management Best Practices

The aim of treatment for patients suffering from Type 2 diabetes is near-euglycemia restoration, which refers to a level of blood glucose that is normal, as well as the correction related to related metabolic disorders (Gunawardana & Piston, 2015). In a systematic review conducted by Ajala et al. (2013), the researchers found dietary measures such as high-protein diets, Mediterranean, low-GI, and low-carbohydrate to be effective for improving different markers for and treating Type 2 diabetes. When an obese individual loses weight, the body's resistance to insulin frequently reduces so that weight loss results in improved glucose tolerance. Those nonobese individuals with Type 2 diabetes should consume calories consistent with their optimal weight and personal activities (Evert et al., 2014).

The main purpose of providing diabetic patients with medical nutrition therapy (MNT) is to achieve glucose, lipid, and blood pressure goals (Gosmanov & Umpierrez, 2012). Individualized dietary strategies for preventing and controlling Type 2 diabetes should include reduced intake of fats and carbohydrates; precisely, this can be accomplished by: (a) controlling carbohydrate intake through the use of carbohydrate counting or glycemic index, (b) ensuring that saturated fat intake is less than 7% of total calories and trans-fat intake is reduced (c) eating foods that contain whole grains with the goal of achieving a dietary intake of 14 g/100 kcal and (d) limiting alcohol intake to one drink per day (Evert et al., 2014). These dietary interventions should be combined with exercise programs to achieve moderate weight loss and a lowering of the hemoglobin A1C to less than 7% (Foster-Schubert et al., 2012). Although the first approach for treating individuals with Type 2 diabetes is appropriate meal planning and exercise,

medications are commonly needed for optimal management (García-Pérez, Álvarez, Dilla, Gil-Guillén, & Orozco-Beltrán, 2013).

Diabetes control depends significantly on self-management behaviors (e.g., monitoring of blood glucose, taking medications properly, conducting foot examinations at regular intervals) and on lifestyle changes (e.g., eating foods that contain whole grain, minimizing the intake of fats and carbohydrates, increasing physical activity) executed by those affected by this chronic disease (Aponte, Boutin-Foster, & Alcantara, 2012). Since Type 2 diabetes is more prevalent among minority races and ethnicities, it is imperative to evaluate diabetes management with a cultural lens (Aponte et al., 2012). To comply with a diabetes regimen, patients are required to change their daily self-management behaviors actively; all of which can prevent secondary complications linked to Type 2 diabetes (e.g., heart disease, stroke, kidney failure, and blindness).

According to Bandura (1986), in the SCT, the self-regulating capability is one the five capabilities that helps us understand why individuals may be motivated differently from others in same circumstances. When individuals use their self-regulating capability, they become capable of self-controlling their actions by setting internal standards and by evaluating the discrepancy between the standard and their performance; both of which allow them to improve their current actions or behaviors (Bandura, 1986). Diabetic patients must take responsibility in following their diabetes self-management plan so that they can reduce their risk for diabetes complications (Aponte et al., 2012). It is important to point out that individuals with high self-efficacy can create feelings of serenity in approaching difficult tasks and activities (Bandura, 1986). On the other hand, those ones with low self-efficacy may believe that circumstances are more difficult than they really

are, narrowing their vision of how best to solve a problem (Bandura, 1986). Therefore, self-efficacy beliefs are strong determinants and predictors of the level of accomplishment that individuals finally obtain (Bandura, 1986). Motivating individuals to change and maintain those beliefs is a critical step for diabetes patients to stay healthy effectively throughout their lives.

Several recent articles have demonstrated the importance of SCT constructs in the potential success of Hispanic diabetic patients' adherence to a healthy lifestyle. The constructs studied include family's role (Ramal et al., 2012), the effectiveness of observational learning (Haltiwanger & Brutus, 2012), simplification of complex concepts (i.e., using a picture-based food guide), reduced didactic instruction, engagement in activities to reinforce key concepts and modeling of healthy behaviors (Rosal et al., 2011). Family's role is a determinant of diabetes self-management among Hispanic diabetic patients (Ramal et al., 2012). This finding is based on a study conducted by Ramal et al. (2012) on Hispanics with Type 2 diabetes living in low socioeconomic status neighborhoods in the City of San Bernardino, California. Research participants placed an importance on receiving support from the entire family unit when making dietary changes. According to Ramal et al., this means that when family and community participation is added into a diabetes intervention, it promotes the self-management activities among diabetic patients while providing hope of reducing the emerging epidemic of diabetes among those who are to be diagnosed. Similar findings were reported by Rintala, Jaatinen, Paavilainen, and Astedt-Kurki (2013). These studies have determined optimal short-term effects and some improvements in biomarkers. However, researchers have noted that there is still limited long-term self-management success for

diabetic patients (Brown et al., 2011; Coffman et al., 2012; Mier et al., 2012; Ramal et al., 2012).

Researchers have found the effectiveness of observational learning, which is one of the main constructs of SCT that focuses on performing new behaviors through peer modeling, with Type 2 diabetes (Haltiwanger & Brutus, 2012; Muzaffar, Castelli, Scherer, & Chapman-Novakofski, 2014; Sawyer & Deines, 2013). Its effectiveness was found with respect to improvement in adherence to recommendations for self-management (Haltiwanger & Brutus, 2012). Similarly, the use of an educational soap opera helped Rosal et al. (2011) introduce self-management information and desired behaviors to research participants in the context of culturally relevant situations, demonstrating that patients can learn to perform new behaviors through observational learning.

SCT refers to a continuous dynamic process that consists of human behavior, environmental factors, and personal factors influencing each other (Bandura, 1986). SCT describes three primary factors that influence the likelihood of change in an individual with respect to a health, which include outcome expectancies, goals, and self-efficacy. It must be recalled that Bandura (1986) defined self-efficacy as a generative capability by which different subskills (cognitive, social, and behavioral) are grouped into courses of action, allowing individuals to accomplish a given task through activity choice and perseverant effort (Bandura, 1986). When research participants focused on skills developed through hands-on activities, they built their self-efficacy and behavioral skills needed to incorporate the newly acquired diabetes knowledge among diabetic Hispanic participants (Rosal et al., 2011). Generative capability was put in practice among these

research participants. These authors demonstrated that patients who were in the intervention group showed a statistically significant difference in diabetes knowledge at 12 months (Rosal et al., 2011).

Barriers for Diabetic Hispanic Populations in the United States

Researchers are increasingly detecting the association between social determinants of health (i.e., conditions in which individuals are born, grow, live, work and age) and the incidence of diabetic Hispanics in the United States (Hill et al., 2013). Some of the social determinants of diabetes among Hispanic Americans are lack of diabetes knowledge, low educational level, low level of health literacy, lack of access to the health-care, limited access to outdoor place to exercise, limited access to healthy foods place and culture (Healthy People 2020, 2014).

Other studies conducted on diabetes self-management in Hispanics have reported low income, low acculturation, low education, limited English proficiency, different cultural beliefs and values, limited social support (Hu et al., 2013); lack of health insurance, money, transportation, forgetfulness and low self-efficacy (Kollannoor-Samuel et al., 2012) as barriers to effective self-management. Consequently, all these factors mentioned above are considered barriers for diabetic Hispanic populations in the United States. In the following sections, diabetes knowledge, health literacy, education level and English proficiency and self-efficacy are the specific barriers that will be discussed to demonstrate their association with the health disparities of diabetes among Hispanic Americans.

Diabetes knowledge. To maintain a good health status, patients require reliable and trustworthy sources of health information that can guide patients' choices (González,

Vega, Rodríguez, Tarraf, & Sribney, 2009). Unfortunately, Hispanic Americans suffer from significant knowledge disparities about diabetes (Zhao, 2014). Researchers have found significant disparities in knowledge among Hispanic Americans when compared to non-Hispanic Whites with respect to diabetes highlighting lack of knowledge among the former (Chen et al., 2014; Coffman et al., 2012; González et al., 2009; Zhao, 2014). Further, many diabetic patients become aware of having diabetes only when they develop one of its life-threatening complications (e.g., stroke, kidney failure). This lack of knowledge also affects how Hispanic patients perform their self-care maintenance activities (e.g., reducing their intake of fats and carbohydrates and increasing their level of exercise) (Coffman et al., 2012). If patients do not gain enough knowledge, they may not perform or adhere to self-care activities. In addition, lack of knowledge may limit patient self-efficacy, and without sufficient self-efficacy, individuals may be less likely to change or start a new health behavior (e.g., exercising and reducing the intake of fats and carbohydrates) (Chen et al., 2014). Knowledge of diabetes can educate individuals in early detection of the disease and lower the incidence of its complications (Saleh et al., 2012). Because Hispanic Americans are disproportionately affected by diabetes, it is imperative that this population obtains reliable health information about diabetes to learn more effectively how to control this disease and prevent its complications (González et al., 2009).

Recognizing the importance of knowledge, various studies have underlined the significance of raising the knowledge related to diabetes among Hispanics (Jeppesen et al., 2012; Ryan, Jennings, Vittoria, & Fedders, 2013). Diabetic patients must acquire a significant degree of new knowledge after diagnosis; they must learn to recognize

symptoms, risks and adverse consequences of hyperglycemia and hypoglycemia, engage in proper foot care and calculate carbohydrates (Jeppesen et al., 2012). Jeppesen et al. (2012) also found that patients who score well on a diabetes knowledge test, with or without an educational intervention, generally have better clinical outcomes than those who score poorly. The researchers noted higher diabetes-related knowledge (DRK) has been linked to lower blood pressure and better diabetes self-care behaviors (e.g., home glucose control, dietary regimen, and increased exercise and foot inspection). If health professionals (e.g., health care providers) promote diabetes self- management education that focuses on problem solving through enhancing self-efficacy, more effective diabetes self-management activities could be obtained from these patients. By assessing the level of diabetes knowledge among patients, health professionals will determine the level diabetes education among patients and monitor knowledge educational progress over time.

Recognizing the importance of knowledge, a number of researchers have stated the ways in which this knowledge can be increased (Cruz et al., 2013; Nam et al., 2011; Prezio et al., 2013; Ryan et al., 2013). The ADA (2015) has recommended that all diabetic patients receive diabetes self-management education (DSME) to increase diabetes awareness and knowledge. DSME must include essential themes (e.g., diabetes treatment outcomes, self-management, personal strategies to address psychosocial issues and behavioral change) to improve patients' well-being (Ryan et al., 2013). DSME is essential to increase the knowledge and skills of patients with diabetes to reduce effectively the chances of developing long-term complications (e.g., retinopathy, nephropathy, and neuropathy) that are linked to diabetes (Prezio et al., 2013). In addition

to the use of DMSE, community health workers could effectively pass key messages on diabetes to research participants through the application of the following techniques (a) the use of educational materials (e.g., training manual, flipchart, diabetes brochure); (b) the use of bingo game that increased knowledge and retention through an enjoyable experience; (c) the use of cups and spoons tool that showed correct use of portions in eating habits; and (d) the use of health basket that showed the proper-sized portions to eat daily (Cruz et al., 2013).

Although diabetes patients obtain knowledge about their diabetes, they still do not necessarily engage in healthy behaviors, as they may not have the motivation and strength to perform consistently appropriate diabetes self-management procedures (Nam et al., 2011). This means that acquiring knowledge itself may not be enough for promoting patients to manage their diabetes effectively. Consequently, it is important that public health professionals assess other factors that may be preventing diabetic patients from effectively performing healthy behaviors required to maintain a healthy life. One of these key factors is the level of health literacy among Hispanics with Type 2 diabetes.

Health literacy. In the Institute of Medicine report titled "Health Literacy: A prescription to end confusion," health literacy is defined as the basic information that individuals have to obtain, process and comprehend, and for which services are needed to make appropriate health decisions (National Network of Libraries of Medicine, 2013). When applying this definition to the health disparities of diabetes, health literacy can be referred as the knowledge and skills required to understand and use information associated with diabetes health issues (e.g., medication, disease prevention and treatment, safety and staying healthy) (National Network of Libraries of Medicine, 2013).

This definition has made emphasis on specific skills needed to use the health care system and the importance of establishing a clear communication between health care providers and their patients. Both entities play important roles in health literacy (National Network of Libraries of Medicine, 2013). Health literacy requires individuals to apply certain skills (e.g., reading, listening, analytical and decision-making) to health situations. For instance, diabetes patients need to understand doctor's recommendations, instructions on prescriptions, appointments, medical education brochures, consent forms, and ways to use complex health care systems (National Network of Libraries of Medicine, 2013).

Various researchers have found the negative effects of illiteracy and lower knowledge of diabetes on the treatment process for Hispanics (Aponte, 2013; Coffman et al., 2012; Heisler et al., 2014; Nam et al., 2011). Diabetic patients with limited general literacy have more difficulty to understand and interpret diabetes educational materials (e.g., brochures), nutritional information found on food labels, and medication labels compared to those patients with high general literacy (Aponte, 2013). In addition, health literacy affects a patient's ability to accurately search for, use diabetes information, and adopt healthier behaviors. In fact, both types of literacy have been demonstrated to influence and impact diabetes-related outcomes and costs (Aponte, 2013). Hispanic adults with low health literacy and limited English proficiency seem to make less optimal treatment decisions and lower patient satisfaction, leading to poor medication adherence and outcomes (Heisler et al., 2014). Hispanics have limited access to services because of language and literacy obstacles (Nam et al., 2011). There is a tendency for diabetes patients to interpret symptoms without obtaining biophysical test results, which may be associated with their limited level of health literacy (Coffman et al., 2012). These

researchers determined that about half the sample (46.5%) presented low level of health literacy. Specifically, 12.5% had marginal health literacy and 34% had inadequate health literacy measurements (Coffman et al., 2012). Marginal health literacy among diabetes patients has been liked to inappropriate diabetes knowledge, inadequate glycemic control and more complications associated with diabetes. It is imperative that public health professionals recognize that the level of literacy in Hispanics with Type 2 diabetes affects the ways these patients modify their self-management behaviors, so that they can control their diabetes more effectively (Coffman et al., 2012). When diabetes patients obtain adequate health literacy, health care use is increased, leading to positive diabetes self-management activities and optimal diabetes control (Coffman et al., 2012).

According to the Agency for Health Care Research and Quality Report titled "Health Literacy interventions and outcomes: An update of the literacy and health outcomes systematic review of the literature," low health literacy is associated with higher risk of mortality and more emergency visits and hospitalizations (National Network of Libraries of Medicine, 2013). In this same report, researchers determined that health literacy might not be associated with years of education or reading ability (National Network of Libraries of Medicine, 2013). Research conducted by the National Assessment of Adult Literacy (NAAL) in 2003 found that low health literacy was higher among adults who spoke a language other than English before starting school (National Network of Libraries of Medicine, 2013). In this same report, researchers demonstrated that (a) an individual who functions appropriately at home or work may have limited level of health literacy and (b) populations affected by low health literacy include

immigrants, minorities and those ones with low income (National Network of Libraries of Medicine, 2013).

Particularly, research conducted by the NAAL reported a relationship between health literacy and race or ethnicity. These researchers indicated that only 9% of White population scored at the lowest level (below basic) while 41% of Hispanic respondents scored at the below basic level. In addition, these researchers found out that adults living below the poverty level have lower average health literacy than those living above the poverty threshold (National Network of Libraries of Medicine, 2013).

The relationship between literacy and health is complex (National Network of Libraries of Medicine, 2013). The level of literacy affects health knowledge, health status, and access to health services. Literacy impacts income level, employment, education level and access to medical care. Inadequate health literacy may contribute to the disproportionate burden of diabetes related problems among disadvantaged populations (e.g., Hispanics; National Network of Libraries of Medicine, 2013). Another factor that may be creating obstacles among Hispanic diabetic patients to perform and maintain healthy behaviors continually is the level of education and English proficiency.

Education level and English proficiency. The CDC (2015) indicated that of Hispanics, the largest racial and ethnic minority group in the US approximately: (a) one in three has limited English proficiency, and (b) one in three has not completed high school. These two sociodemographic factors are preventing Hispanics in America to control effectively their Type 2 diabetes. A number of researchers have found educational level and English proficiency as the main barrier for minorities in the United States to utilize health services (Chang et al., 2013; Kim, Moran, Wilkin, & Ball-Rokeach, 2011;

Nam et al., 2011). Hispanics were more likely to have diabetes if they had less than a high school education and were less proficient in English (Chang et al., 2013). Having low level of education, being on Medicare and being married were factors linked to a higher occurrence of diabetes (Chang et al., 2013). Being older in age, being male and having higher education attainment were factors that were determined to be significantly correlates to following daily a healthful eating regimen (Mier et al., 2012).

Research participants with limited level of education were less likely to interact with professionals representing community organizations, local media, and interpersonal networks in their neighborhoods, preventing them from gaining needed diabetes knowledge and from experiencing greater health benefits (Kim et al., 2011). If these individuals with limited level of education (especially, those who have less than high school education level) make better connections with these professionals and interpersonal networks, they may remove their existing education-based obstacles, increase their diabetes knowledge, and improve their diabetes health outcomes (Kim et al., 2011). Better connections by diabetic patients with limited level of education (especially, those who have less than high school education level) with community health workers, may remove their education-based obstacles, increase their diabetes knowledge, and improve their diabetes health outcomes (Kim et al., 2011). In the light of discovering other effective approaches that may minimize the diabetes health disparities among Hispanics in the United States, it is imperative that public health professionals assess the level of self-efficacy among these diabetic patients.

Self-efficacy. It is defined, as a person's confidence in his or her ability to carry out a health behavior, is an important intermediate outcome in many behavioral

theoretical models. It is a predictor of behavioral intent. The concept of self-efficacy is closely linked to improving diabetes self-management because its strategies incorporate behavioral, personal, and environmental factors that are essential for the effective performance of recommended diabetes activities (Sarkar, Fisher, & Schillinger, 2006). Programs implemented to enhance self-efficacy in patients have improved self-management behaviors among patients having chronic diseases (McCleary-Jones, 2011). Self-efficacy influences the selection of actions and motivational level, affecting the knowledge structures obtained by individuals. An individual's belief in his or her efficacy affect the actions that individual will pursue and how long he or she will continue performing desired actions when facing with obstacles and failures (McCleary-Jones, 2011).

Equally important, prior studies have shown that improving self-efficacy may lead to better glycemic control (García, Brown, Horner, Zuñiga, & Arheart, 2015; Valen et al., 2012). Likewise, high rates of poor self-efficacy and poor communication were detected in Hispanic diabetic adults living in Miami-Dade County, Florida (Kenya et al., 2015). Self-efficacy scores indicated that many participants felt overwhelmed or that they were failing in diabetes management (Kenya et al., 2015).

In fact, educational program aimed at promoting diabetes self-management activities can be strengthened by incorporating programs designed to improve diabetes care self-efficacy (Valen et al., 2012). Not to mention that Hispanic diabetic patients with limited English proficiency demonstrated having a lack of confidence in their own motivation and ability to influence their diabetes related health outcomes (Ramal et al., 2012). In the same way, diabetic Puerto-Ricans with low income with high diabetes

related self-efficacy were less likely to experience enabling factor, doctor-access, medication-access, and forgetfulness barriers (Kollannoor-Samuel et al., 2012). Researchers, who conducted the study on diabetic Puerto-Ricans, suggested that minimizing barriers (e.g., low self-efficacy, lack of health insurance, and depression) could potentially optimize health care access and utilization among diabetic Puerto-Ricans with low income (Kollannoor-Samuel et al., 2012).

Summary and Conclusions

Diabetes mellitus is a metabolic disease that arises when the levels of glucose reach levels higher than normal ones. The prevalence of Type 2 diabetes in the Hispanic Americans (aged 20 years or older) is approximately twice that of non-Hispanic Whites. About 10.4% of adult Hispanics in comparison with 6.6% of non-Hispanic, Whites suffer from Type 2 diabetes. As it has been presented in this literature review, several research studies assessed the relationship between self-report diabetes self-care behaviors and its barriers (e.g., diabetes knowledge, health literacy, education level, English proficiency, and self-efficacy) among Hispanics with Type 2 diabetes living in the United States. All these factors affect diabetes self-management activities performed by Hispanics.

Low level of health literacy has been linked to low level of knowledge, limited glycemic control activities, and low retinopathy rates. A significant number of diabetes patients have shown a lack of confidence in their own motivation and ability to influence their diabetes related health outcomes. Lack of family support due to limited diabetes knowledge within family represents an obstacle to self-management. Further investigation is needed to understand much more clearly the relationships between factors presented in this dissertation within different sub-groups of Hispanic American

populations with Type 2 diabetes. Test findings to be discovered through the conduct of this research study may add to the knowledge already acquired concerning diabetes self-report self-care behaviors among Hispanics living in different regions of the United States. In addition, same test findings may help public health workforce create cultural sensitive interventions that best fit the meet the needs of Hispanics in the United States.

In Chapter 3, a detailed discussion of the quantitative methodology for this research study is described. Specifically, this section focuses on describing the research study procedures, study design, study setting, and sample size. In addition, data collection and analysis are explained. Finally, protection research participants are presented as well.

Chapter 3: Research Methods

Introduction

Type 2 diabetes is a serious public health concern in the United States, especially among Hispanics living in America (Ramal et al., 2012). Although many researchers have conducted studies about Type 2 diabetes among Hispanic Americans, the occurrence and the increasing prevalence are not fully understood (Nam et al., 2011). This research study could help fill this gap and improve the Type 2 diabetes management to be applied among this minority population. The purpose of this research study was to identify the relationship between diabetes knowledge, education level, health literacy, self-efficacy, and self-reported diabetes self-care behaviors among Hispanics with Type 2 diabetes who reside in Fairfax County, VA. According to the CDC (2014), approximately 12.8% of Hispanic American adults were diagnosed with Type 2 diabetes compared to 7.6% of non-Hispanic Whites, which indicates a disproportionate occurrence of this disease among Hispanic adults. Findings from this study could be used to assist the American public health workforce in developing culturally sensitive education programs that best fit the needs of this minority population. Chapter 3 focuses on describing the quantitative methodology for this research study. This includes the research study procedures, study design, study sampling, and sampling technique and sample size. In addition, in this chapter, I present data collection and analysis methods and briefly discuss threats to validity and ethical consideration for the research participants.

Research Design and Rationale

The included independent variables were diabetes knowledge, health literacy, education level, and self-efficacy in Hispanic Americans with Type 2 diabetes. The

dependent variable was self-reported diabetes self-care behavior in the same target population. In this research study, I used a series of self-report questionnaires collected from Hispanic Americans diagnosed with Type 2 diabetes.

In this research study, I used a quantitative, cross-sectional, correlational research design was used in this research study in which survey instruments were given to measure independent and dependent variables mentioned above. The scores reflected the participants' report of their knowledge about diabetes, level of health literacy, level of education, and confidence in performing certain activities related to diabetes management tasks. This allowed me to determine the predictive relationship between the independent variables and the dependent variable among this specific target population without making any causal inference.

Correlational studies are often identified with survey research (i.e., a method of data collection that is commonly used in social science fields) and are useful for generating and clarifying hypotheses (Frankfort-Nachmias & Nachmias, 2008). They are used to assess the relationship between variables as they exist in a determined population and, if they are cross-sectional, they do so at a single point in time in the participant's life (Aschengrau & Seage, 2008). This means that they can be used to take a "snapshot" of a population at one point in time and measure the disease prevalence in relation to the exposure prevalence (Aschengrau & Seage, 2008). Cross-sectional studies are known for being carried out for public health planning and for etiologic research. Advantages of utilizing this type of research design include (a) test findings are highly generalizable when based on a sample of the general population; (b) they can be completed in a short period of time; and (c) their low cost (Aschengrau & Seage, 2008). However, according

to the Institute for Work and Health (2009), correlational, cross-sectional designs may not provide definite information about cause-and-effect relationships. This is because such studies offer a snapshot of a single moment in time and they do not consider what happens before or after the snapshot occurs. These types of studies suffer from serious methodological limitations, especially with regard to their internal validity (i.e., the accuracy of the study results; Frankfort-Nachmias & Nachmias, 2008; Institute for Work and Health, 2007).

An example of the useful application of the correlational research design is the study that Mier et al. (2012) conducted to compare the level of self-care behaviors among older Hispanics with Type 2 diabetes born in the United States to that among those born in Mexico. These researchers indicated that a limitation of applying a cross-sectional study design is that causal inferences cannot be made (Mier et al., 2012). The dependent and independent variables were collected using self-report instruments, which could introduce some source biases (e.g., recall bias; Mier et al., 2012). Data collection for this study consisted of administering a series of self-report questionnaires to research participants to collect and analyze certain variables (e.g., diabetes knowledge, health literacy, education level, self-efficacy, and self-reported diabetes self-care behaviors) and determine their associations with the development of the health disparities of diabetes among Hispanic Americans. Since this study was based on the conduct of a survey research in which one specific group was asked to answer questions about their backgrounds, experiences, and attitudes, the most appropriate quantitative research design was the correlational, cross-sectional type. This research design allowed me to obtain findings that are highly generalizable when based on a sample of the general

population and to conduct the study in a short period of time and at a low cost (Aschengrau & Seage, 2008). In fact, this study was self-financed with the goal of gathering all research data within the period of 3 months.

The classical experimental research design is another type of quantitative research design that has been used to investigate some factors in the causation, prevention or treatment of a disease as Type 2 diabetes (Aschengrau & Seage, 2008). This research design is characterized by having research participants randomized to the experimental and control group and the independent variable added to the experimental group (Frankfort-Nachmias & Nachmias, 2008). An experimental research design is used in social sciences because it helps researchers understand the logic of all research designs and draw causal inferences by determining if changes in the dependent variable (i.e., outcomes) are caused by changes in the independent variable (Frankfort-Nachmias & Nachmias, 2008).

Rothschild et al. (2014) used an experimental research design (randomized controlled type) to determine if community health workers could improve glycemic control among Mexican Americans with diabetes. Because this study was conducted in a single location, there were questions of external validity and generalizability (Rothschild et al., 2014). The experimental research design presents some disadvantages, such as (a) research participants' noncompliance with the treatment regimen, (b) the requirement to keep high follow-up rates for long periods of time, (c) the great expense associated with it, and (d) the numerous ethical issues that may be involved (Frankfort-Nachmias & Nachmias, 2008). Therefore, the experimental design was not appropriate for this research plan.

Methodology

Population

The study population that I targeted for this study was diabetic Hispanic Americans aged 18 to 100 years residing in Fairfax County, VA. I gathered data from the self-report questionnaires administered to potential research participants (complying with the set inclusion criteria) who attended various community centers and churches located in Fairfax County, VA. Data was also collected via Qualtrics. All four independent variables (i.e., diabetes knowledge, health literacy, level of education, and self-efficacy) and the dependent variable (i.e., self-reported diabetes self-care behaviors) were measured as continuous variables.

Based on the 2010 U.S. Census data, over 630,000 Virginia residents were of Hispanic origin, which equates to almost 8% of the total population (University of Virginia, 2011). This signifies a 92% increase since 2000 (University of Virginia, 2011). Sixty-two percent of Hispanics live in Northern Virginia. Fifty-three percent of Hispanics in Virginia are native citizens. Thirteen percent of Hispanics were born abroad and were naturalized citizens of the United States, and 34% of Hispanics were foreign-born noncitizens (University of Virginia, 2011). Most of Virginia's foreign-born Hispanics were born in El Salvador, Mexico, Peru, Bolivia, and Guatemala (University of Virginia, 2011).

Sampling and Sampling Procedures

Sampling strategy. The study sampling method applied was the purposeful convenience sampling type, which consists of selecting research participants that meet specific criteria by any convenient contact (Frankfort-Nachmias & Nachmias, 2008).

Convenience sampling (i.e., the most common of all sampling techniques) is a nonprobability sampling technique where subjects are selected because of their accessibility and proximity to the researcher (Explorable, 2015). Research participants were selected using this sampling approach because it is the easiest way to recruit human subjects for the study. Many researchers prefer this sampling technique because it is fast, inexpensive, and easy and the subjects are readily available (Explorable, 2015). However, limitations about the generalizability of the results will be noted throughout the study.

The inclusion criteria for this study included being diabetic Hispanic Americans (male or female) residing in Fairfax County, VA and being 18 years-old or older. Participants who had gestational diabetes and had major diabetes complications (e.g., proliferative retinopathy, nephropathy, and amputations) were excluded from the study because these conditions could interfere with their ability to complete the survey accurately.

Power analysis. Researchers utilize four interrelated elements when conducting statistical analyses so that they can arrive to their conclusions (Trochim, 2006). These four elements are (a) sample size (i.e., the number of research participants involved in the research study), (b) effect size (i.e., the magnitude of the experimental effect), (c) alpha level (i.e., the odds that the observed test finding is due to change), and (d) power (i.e., the odds that researchers observe a treatment effect when it occurs; Trochim, 2006). When conducting sample size analyses, researchers should understand that sample size allows them to ensure that they have enough research participants to answer research questions with certain degree of confidence (Burkholder, 2009).

Researchers must determine an appropriate sample size that allows them to detect the effect size with statistical significance (Burkholder, 2009). High statistical power helps researchers not only ensure the likelihood of detecting a difference in the population, but also enhances the chances that test results are not produced by chance alone (Burkholder, 2009). Power is usually considered appropriate at .80, which signifies that researchers are willing to accept an 80% chance of finding a statistically significant difference when it actually does exist (Balkin & Sheperis, 2011). Another element that is significant in understanding power is the level of alpha. When researchers set the level of alpha at 0.05, they are indicating that they are willing to accept a 5% chance of error in their statistical analysis (Balkin & Sheperis, 2011).

G*Power is a tool to compute statistical power analyses for many different tests such as, t tests, F tests, $\chi 2$ tests, z tests and some exact tests (Faul, Erdfelder, Buchner, & Lang, 2009). This application can also be used to compute effect sizes and to display graphically the results of power analyses (Faul et al., 2009). Specifically, when using this software application, I set certain parameters to estimate the appropriate sample size for this study. These parameters were (a) test family = F tests (b) statistical test = multiple linear regression, (c) effect size = 0.15 (i.e., a medium effect size), (d) number of predictors (i.e., number of independent variables) = 4, (e) power = 0.80, and (f) alpha = 0.05. By setting these parameters in G*Power, it was determined that at least 85 participants (i.e., recommended sample size) were needed to conduct correlational analyses in this study.

Procedures for Recruitment, Participation, and Data Collection

Recruitment and participation. Letter of cooperation, created by me, was sent via internet to Diabetes Daily (an online diabetes support group). This letter described the nature of the study; described the importance of their participation to reduce the risk of Type 2 diabetes in Fairfax County, VA; and requested their permission to recruit participants from this organization for this study (see Appendix A). Once receiving permission from Diabetes Daily and IRB approval from Walden University, I posted the information about the research study on the forum of Diabetes Daily and on Walden Participant Pool, allowing its members to participate. In addition, I posted flyers in public places (i.e., libraries, grocery stores, gyms, churches and community centers) to advertise the study. Flyers provided information about the nature of the study, inclusion criteria, exclusion criteria, link the survey on Qualtrics, researcher's contact information, and contact information of the ADA. Therefore, study participants were recruited through the use of advertisement on Diabetes Daily website, Walden University Participant Pool and flyers distributed in public places around Fairfax County, VA. A link to the questionnaires was provided on the Diabetes Daily and on the flyers.

Informed consent form (English and Spanish) along with surveys (Spanish and English) were posted on the online version of the survey through Qualtrics. Researcher's contact information was also provided on this survey application to answer any questions research participants had about giving informed consent to participate or about any information that was not clear on the actual survey.

For those research participants with access to computers, I informed them of the Qualtrics survey software. This software application is free and enables researchers to do

many kinds of online data collection and analysis (http://www.qualtrics.com/). Therefore, I used Qualtrics as a tool to collect research data.

For those individuals who preferred filling out the questionnaires on paper, I provided a self-addressed stamped envelope that was mailed back to me, allowing participants to take survey packet with them. The survey package included the instruments and a copy of the informed consent form. The informed consent form included a brief description of the study, the importance of the study, inclusion criteria, confidentiality, and information on the protection of human subjects. A contact phone number and email address were provided on the informed consent for any participants who had questions or who needed support or assistance with completing the questionnaires. No signed informed consent forms were collected since completion of the survey materials constituted informed consent (see Appendix B).

Data Collection

The data collection for this study involved the use of (a) the Sociodemographic Survey Form, (b) the DKQ-24, (c) the SAHL-S&E, (d) the Diabetes Self-efficacy questionnaire, and (e) the SDSCA.

I used Qualtrics as a tool to collect research data. Research data were collected until I received the minimum required number of questionnaires (i.e., 85) from eligible participants (http://www.qualtrics.com/). Specifically, the data were collected between March 20, 2017, and June 5, 2017.

Instrumentation and Operationalization of Constructs

Instrumentation. I requested permission to use survey instruments to gather research data from each developer for the purpose of recruitment and test administration.

These permissions were granted (see Appendix C). Validity and reliability of all instruments (English and Spanish versions) listed below had been already tested by each developer. Cronbach's alpha was calculated for survey instruments used in the analysis. The Sociodemographic Survey Form is the only instrument that was translated by me into Spanish, which is my native language. These were the instruments I used:

***Sociodemographic survey form*.** This document was developed by me in English and Spanish to gather demographic information (i.e., age, gender, education level, primary language, family income, nationality, employment status, marital status, insurance status and years since Type 2 diabetes) from each research participant (see Appendix D). It was assumed that subjects would reliably and validly report their own socioeconomic information and hence there was no pilot testing of the sociodemographic survey form except to ensure clarity of the questions.

Diabetes Knowledge Questionnaire (DKQ-24). This instrument is used to assess overall diabetes knowledge according to content recommendations in the National Standards for Diabetes Patient Education Programs (Garcia et al., 2001). The DKQ-24 is a short version of the original 60-item version (DKQ-60). The original version (DKQ-60) was established in 1989 and used by Villagomez, Brown, and Hanis with Spanish-speaking subjects in the Starr County Diabetes Education Study conducted from 1994 to 1998 (as cited in Garcia et al., 2001). Potential response choices for answering the DKQ-24 include *Yes, No, Do not know*. The scale of this questionnaire was set as follows: Yes = 1, No = 2, I do not know = 3. An item on DKQ-24, for example, states, "Eating too much sugar and other sweet foods is a cause of diabetes." Items were scored as correct or incorrect, and the correct items were summed to attain a total score that ranges from 0

(lack of knowledge) to 24 (knowledgeable; Garcia et al., 2001). Therefore, the diabetes knowledge of research participants was measured as a continuous variable in the form of a ratio level. The level of education was collected as a categorical variable (*no high school = 0, some high school = 1, graduated high school = 2, some college = 3, associate degree = 4, bachelor degree = 5, master degree = 6, doctoral degree = 7*). The 24-item version was developed and tested by Garcia et al. in 2001.

This 24-item version attained a reliability coefficient of 0.78, indicating internal consistency, and showed sensitivity to the intervention, suggesting construct validation (Valen et al., 2012). Therefore, the DKQ-24 is a reliable and valid instrument for measuring diabetes-related knowledge that is also relatively easy to administer to English or Spanish speakers (Garcia et al., 2001; see Appendix E).

Short Assessment of Health Literacy–Spanish and English (SAHL-S&E). The SAHL-S&E is a new instrument, consisting of comparable tests in English and Spanish, with good reliability and validity in both languages (Agency for Healthcare Research and Quality, 2014). Individuals being examined in English or Spanish are presented with 18 test terms. For each term (i.e., stem), there are a key word (with a related meaning) and a distractor word unrelated in meaning to the test term (Agency for Healthcare Research and Quality, 2014). The SAHL-S&E contains 18 reading comprehension items that can be completed in 2-3 minutes period (Agency for Healthcare Research and Quality, 2014). Its format, consisting of a stem in the form of a question and choices in the form of an answer to the question, is as follows: (a) Stem = question, (b) Key = correct choice, (c) Distractor = plausible but incorrect choice, and (d) No se (i.e., do not know; Lee et al., 2010). The SAHL-S&E was administered to research participants who were asked to

make a correct association of each medical term with one of the choices (i.e., key, distractor, and don't know) presented next to each item. For instance, stem (i.e., kidney); key (i.e., urine); distractor (i.e., fever); and don't know (Agency for Healthcare Research and Quality, 2014).

Administration of the test takes only 2-3 minutes and requires minimal training. Administration of these instruments could be facilitated by using laminated 4"-by-5" flash cards, with each card containing a medical test term printed in boldface on the top and the two association words (i.e., the key and the distracter - at the bottom; Agency for Healthcare Research and Quality, 2014). The SAHL-S&E is a valid and reliable measure with scores ranging from 0 to 18. Each correct answer gets one point. A score between 0 and 14 suggests the research participant has inadequate health literacy and a score between 15 and 18 suggests that research participant has adequate health literacy (Agency for Healthcare Research and Quality, 2014).

According to Lee et al. (2010), this instrument demonstrated satisfactory reliability of 0.80 and 0.89 in the Spanish- and English-speaking samples, respectively. SAHL-S was highly correlated with Short Assessment of Health Literacy for Spanish-speaking Adult (SAHLSA; $r = 0.88$, $p < 0.05$) and Spanish Test of Functional Health Literacy in Adults (TOFHLA; $r = 0.62$, $p < 0.05$) in the Spanish-speaking sample. SAHL-E also had high correlations with REALM ($r = 0.94$, $p < 0.05$) and English TOFHLA ($r = 0.68$, $p < 0.05$) in the English-speaking sample (Lee et al., 2010; see Appendix F). This scale is an open source test available online (http://www.ahrq.gov/professionals/quality-patient-safety/quality-

resources/tools/literacy/index.html) and is free to use without permission. However, a written permission through e-mail was sought and granted to me.

***Diabetes self-efficacy questionnaire*.** The Spanish and English versions of this questionnaire were developed by the Stanford Patient Education Research Center (patienteducation.stanford.edu/research/sediabetes.pdf). The Spanish version was tested in Spanish for the Diabetes Self-Management study (patienteducation.stanford.edu/research/sediabetesesp.pdf). This version was conducted by Lorig et al. in 2003. In the self-efficacy questionnaire, the scale ranges from 1 (not at all confident) to 10 (totally confident). An item on self-efficacy, for example, states "How confident do you feel that you can eat your meals every 4 to 5 hours every day, including breakfast every day?" Participants encircled the number that corresponded to his or her confidence of doing the task. The score for each item was the number circled. If two consecutive numbers were circled, I coded the lower number (less self-efficacy). If the numbers were not consecutive, I did not score the item. The score for the scale is the mean of the eight items. If more than two items were missing, I did not score the scale. Higher number indicates higher self-efficacy.

Its internal consistency reliability was determined to be 0.854. Its internal consistency reliability was determined to be 0.828. Both versions are based on eight items designed to assess how confident diabetes patients are when addressing certain behaviors that are essential for staying healthy (see Appendix G). This scale is an open source test available online (patienteducation.stanford.edu/research/sediabetes.html) and is free to use without permission. However, a written permission through e-mail was sought and granted to the researcher.

Summary of Diabetes Self-care Activities (SDSCA). The SDSCA, developed by Toobert et al. (2000), is a self-report measurement with 13 items that is used to assess the diet, exercise, blood sugar testing, foot care regimen, and smoking of diabetes self-management during the past seven days.

The SDSCA consists of 13 items that present a question and choices in the form of an answer to the question. An overall self-care score is calculated for each of the five self-care regimen areas (i.e., diet, exercise, blood sugar testing, foot care regimen, and smoking). An item on SDSCA**,** for example, states, "How many of the last 7 days have you followed a healthful eating plan?" For items 1–10, the researcher will use the number of days per week on a scale of 0–7. In other words, the scoring scale is between zero to seven, and the mean number of days will be used to calculate for each four regimen areas to be evaluated. Scoring scales general diet = Mean number of days for items 1 and 2. Specific diet = Mean number of days for items 3, and 4, reversing item 4 (0 = 7, 1 = 6, 2 = 5, 3 = 4, 4 = 3, 5 = 2, 6 = 1, 7 = 0). Given the low inter-item correlations for this scale, using the individual items is recommended. Exercise = Mean number of days for items 5 and 6. Blood-Glucose Testing = Mean number of days for items 7 and 8. Foot-Care = Mean number of days for items 9 and 10. Smoking Status = Item 11 (0 = nonsmoker, 1 = smoker), and number of cigarettes smoked per day. The scale does not sum to an overall score of self-care.

Toobert et al. (2000) found from seven different studies that SDSCA measure has high interterm correlations within the scale (mean = 0.47), except for specific diet, which has a moderate test-retest correlations (mean = 0.40). Further, the SDSCA subscales

revealed correlations (mean = 0.23) with other measures of diet and exercise, supporting its validity (Toobert et al., 2000).

Correlation of each item of the Spanish version of the SDSCA instrument ranged from 0.78 to 1.00. Test-retest correlations for the Spanish SDSCA ranged from 0.51 to 1.00 (Vincent, McEwen & Pasvogel 2008). Internal consistency (Cronbach's alpha) for the Spanish version was 0.68. The findings for the psychometric properties of the Spanish version of the SDSCA questionnaire suggest that it has conceptual and content equivalency with the original English version and is valid and reliable (Vincent et al., 2008; see Appendix H). Despite some items having lower test-retest correlations, the SDSCA is considered a reliable, valid, and usable instrument to measure diabetes self-care as it has been used in over 2,000 patients with diabetes across the United States (Toobert et al., 2000). Due to this high rate of usage in research, the tool is considered adequate for this study. A written permission through e-mail was sought and granted to the researcher.

Operationalization of Variables

Dependent Variable. Diabetes self-management activities was the dependent variable of this analysis and was measured by using the summary of diabetes self-care activities (SDSCA) with 13 items, which was assessed individually.

*Independent Variable 1. D*iabetes knowledge was measured by using the patient's diabetes knowledge questionnaire (DKQ) with 24 items, this was a continuous score between 0 and 24.

Independent Variable 2. Level of education was measured by using the information that was recorded in the sociodemographic survey form and was measured

on a categorical, ordinal scale with 8 levels; no high school, some high school, graduated high school, some college, associate degree, bachelor degree, master degree, doctoral degree and prefer not to answer.

Independent Variable 3. Health literacy was measured by using the short assessment of health literacy–Spanish and English (SAHL- S&E) with 18 items and was continuously scored between 0 and 18.

Independent Variable 4. Self-efficacy was measured by using the diabetes self-efficacy questionnaire with eight items and was measured as a continuous score between 0 and 8.

Data Analysis Plan

Software and data cleaning. My research data was analyzed using IBM SPSS Statistics Version 23. This software was applied complying with policies and guidelines established by Walden University. I entered the data into the SPSS computer software. Frankfort-Nachmias and Nachmias (2008) indicated that data editing and cleaning are essential steps in data processing that researchers should perform preceding data analysis. Data cleaning consists on the proofreading of data with the objective to detect and correct errors and inconsistent codes made either by researcher or research participants (Frankfort-Nachmias & Nachmias, 2008). Data editing was performed during and after the coding stage. I performed editing by checking for mistakes and omissions that research participants may have made when answering the questionnaires. This ensured and maximized accuracy of data (Frankfort-Nachmias & Nachmias, 2008). I accomplished this by conducting a careful inspection through all the data to ensure that all questions are marked and answered and to detect the existence of any missing and

inconsistence answer. Unanswered or blank questions in the questionnaire were coded as incorrect.

Research question and hypotheses. Research Question: What is the predictive relationship between diabetes knowledge, health literacy level, education level, self-efficacy, and self-reported diabetes self-care behaviors of Hispanics in the United States with Type 2 diabetes?

Null Hypothesis (H_0): There is no statistically significant predictive relationship between diabetes knowledge, health literacy level, education level, self-efficacy, and self-reported diabetes self-care behaviors of Hispanics in the United States with Type 2 diabetes.

Alternative Hypothesis (H_A): There is a statistically significant predictive relationship between diabetes knowledge, health literacy level, education level, self-efficacy, and self-reported diabetes self-care behaviors of Hispanics in the United States with Type 2 diabetes.

Statistical analyses. The results from this research study were presented using both descriptive and inferential statistics. Descriptive statistics is an approach that enables researchers to summarize and organize data by developing tables or graphical representations not only effectively, but also in a meaningful form (Frankfort-Nachmias & Nachmias, 2008). However, descriptive statistics will not allow me to make conclusions beyond the data. Descriptive statistics are important because if we simply presented our raw data it would be hard to visualize what the data was showing, especially if there was a lot of it (Laerd Statistics, 2013). Descriptive statistics enables us to present the data in a more meaningful way, which allows simpler interpretation of the

data (Laerd Statistics, 2013). Some of the concepts that were used for performing descriptive statistics for this study were frequency distribution, percentage distribution, odd ratio, graphs (e.g., histogram, bar chart, scatterplot), measure of central tendency (e.g., mode, medians, means), measures of dispersion (e.g., variance, standard deviation; Frankfort-Nachmias & Nachmias, 2008). Participants' characteristics were presented by frequency and percent. Categorical data were summarized using frequency tables, continuous data were evaluated using means and standard deviations, and when needed, they were transformed to categorical level of measurement. Cronbach's alpha was also calculated for survey instruments used in the analysis.

Inferential statistics allows researchers to make decisions or inferences by interpreting data patterns. This is, to determine if n expected pattern designated by the theory and hypotheses is actually detected in the observations (Frankfort-Nachmias & Nachmias, 2008). These techniques allowed me to utilize a sample to generalize about the populations from which this sample was drawn (Laerd Statistics, 2013). The methods of inferential statistics included (a) the estimation of parameters and (b) testing of statistical hypotheses (Laerd Statistics, 2013). Therefore, I analyzed differences, relationships, and odds ratios. I set the critical *P* value significance at *0.05* and used this value to calculate and assess whether the relationship between these variables were statistically significant. Hypothesis testing and estimation (95% confidence intervals [CIs]) are two forms of statistical techniques that I used to determine if there was an association between the dependent variable and the independent variables (Sullivan, 2012).

The hypotheses were tested using *correlation analysis* and *multiple linear regression analysis*. *Correlation analysis* is used to quantify the association between two continuous variables (i.e., between two independent variables or between an independent and a dependent variable) (Sullivan, 2012). In this study, I assessed the individual correlations between (a) two independent variables and (b) each of the independent variables and the dependent variable. When applying correlation analysis, researchers estimate a sample correlation coefficient, more specifically referred as Pearson Product Moment correlation coefficient (Sullivan, 2012). *Multiple linear regression analysis* is used to assess the relationship between a single continuous dependent variable and two or more independent variables (Sullivan, 2012). In this study, I assessed the predictive relationship between four independent variables and a single continuous dependent variable (Sullivan, 2012). While correlation provides a unitless measure of association between two variables (usually linear), the regression provides a means of predicting an outcome from the predictor variable (Sullivan, 2012).

Threats to Validity

According to Creswell (2013), the main reasons for identifying threats to validity in the conduct of quantitative research designs are to be aware that they may alter the accuracy of test findings and to try to minimize them (although it is not possible to completely eliminate them). Information biases are errors that result when the means (that are used by researchers) for collecting information about research participants are flawed or inadequate (Szklo & Nieto, 2014). Two types of information bias that may occur during the conduct of an investigation include (a) *recall bias* (when inaccurate recalls of past exposure are obtained from research participants) and (b) *reporting bias*

(when research participants are unwilling to report an exposure they are aware of [e.g., attitudes, beliefs and perceptions]) (Gordis, 2009). Some of the effective approaches that can be used to reduce recall bias are designing a structured questionnaire to ensure that exposure detection is complete and accurate and using questionnaires that rely on biological measurements and pre-exiting data (Aschengrau & Seage, 2008).

The main threat to internal validity in this particular study was that the all survey instruments used were based on participant recall of their personal information and behavior. However, this threat was addressed by using validated surveys. These surveys have previously demonstrated empirical validity in a consistent manner despite relying on personal recall from research participants. In addition, they have demonstrated good validity in comparison to other instruments (Garcia et al., 2001; Lee et al., 2010; Lorig et al., 2003; Toobert et al., 2000).

External threats may arise when researchers generalize beyond the groups used in the study to other racial group not included in it; settings not studied; or previous or future situations (Creswell, 2013). To ensure the external validity of a study, the characteristics of research participants must reflect the characteristic of the population being investigated by researchers (Frankfort-Nachmias & Nachmias, 2008). In this study, the threat to external validity focused on the fact that the test results may not be generalizable to the general population since this is a cross-sectional study design utilizing 85 participants only. If the researcher determines a relationship between the study variables, longitudinal studies will be recommended for further evaluation in the future. This recommendation will focus on requesting a large and representative enough sample to be generalizable to the entire population.

Ethical Consideration

Ethical principles and guidance for the conduct of research involving human subjects are effective tools applied by health researchers for reducing the possibility of exploitation while promoting respect for individual autonomy, beneficence, nonmaleficence and justice for all individuals who serve as human subjects of research (Gallin & Ognibene, 2007). Some of the ethical research practices that are commonly used during the conduct of research are the use of (a) informed consent forms, (b) IRBs, and (c) Health Insurance Portability and Accountability Act (HIPAA). It is important to emphasize that only those who met the inclusion criteria described earlier were considered as potential research participants. Approval from the IRB from Walden University (http://academicguides.waldenu.edu/researchcenter/orec) and from Diabetes Daily were prerequisite to be obtained before starting the recruiting stage of this research study. I successfully completed the NIH Web-based training course "Protecting Human Research Participants" certifying that I have the minimum level of knowledge for designing protocol for research study involving human subjects in an ethical manner. Date of completion of this training course was 09/16/2013 (see Appendix I).

The informed consent process is a vital component of conducting ethical research studies involving human subjects. Because this process is a primary safeguard mechanism for the protection of the rights, safety and well-being of those human subjects who participate in research studies, it is imperative that all potential research participants clearly comprehend the different requirements of informed consent so that they can make a conscious decision regarding their participation in a research study (Woodin & Schneider, 2008).

According to Aschengrau and Seage (2008), many of the ethical guidelines and regulations (used in the conduct of research studies today) have been implemented because serious ethical offenses to humankind have occurred in the past. Therefore, it is beneficial that public health professionals learn the history of these events, so that they can better appreciate the importance of the informed consent process during the conduct of ethical research practices. An informed consent form was given to research participants and the researcher answered any questions they had about giving informed consent to participate. For those individuals who may not read or write English or Spanish, the questionnaires and informed consent form were administrated verbally to them. No signed informed consent forms were collected since completion of the survey materials constituted informed consent.

An IRB is an independent entity (with no direct involvement in the research) that is established to protect the rights, safety, and well-being of research participants involved in a research study. IRB members are expected to review, approve, and conduct ongoing reviews of research, protocols, methods and material to be used in obtaining and documenting informed consent of the human subjects (Woodin & Schneider, 2008). One strategy for applying IRB is to remind all researchers that they must obtain approval from an IRB before any investigation (involving human volunteers) can begin. To obtain this approval, researchers are required to submit the following to the IRB: (a) research protocol, (b) informed consent form, and (c) precise documentation on the intended conduct of research. Another strategy for applying IRB is to remind all researchers that they are expected to use only the approved and updated version of the informed consent form (Aschengrau & Seage, 2008). It is valid to add that being in this type of study

involves some risk of the minor discomforts that can be encountered in daily life, such as fatigue, stress, or emotional upset while completing the questionnaires (Aschengrau & Seage, 2008). However, being in this study would not pose risk to participants' safety or wellbeing.

According to Gallin and Ognibene (2007), research studies that do not expose research participants to physical, social, psychological or other risks beyond those of daily life are considered to be exempt from the requirements of 45CFR 46 for IRB review. Survey and questionnaire research conducted in the United States may be exempt unless the information requested from research participants could place them at risk of criminal or civil liability or be damaging to their financial standing, employability, or reputation. The content of my survey did not put research participants at any of these risks. This means that research participants were not exposed to more than "minimal risk."

The HIPAA of 1996, commonly referred to as the Privacy Rule, was enacted by the U.S. Congress in 1996 as a response to public concern about any potential abuses of the privacy of health information (USDA, 2015). HIPAA was created to protect the privacy of individually identifiable health information, also known as protected health information (PHI), held or disclosed by a covered entity (such as, health plans, health care clearinghouses and health care providers; Gallin & Ognibene, 2007). The Privacy Rule also defines (a) the means by which individuals will be informed of the uses and disclosures of their medical information for research purposes and (b) their rights to access information about them held by the covered entities (USDA, 2015). The HIPAA is a rule that ensures the security and privacy of health data. In fact, to access protected

health information, it is required that researchers obtain consent from each research participant or obtain a waiver from an IRB (Aschengrau & Seage, 2008).

To address ethical integrity in research during the conduct of research process, the researcher ensured that

- the IRB at Walden University received and approved the informed consent form before starting with the recruiting process;
- this informed consent form (written in English and Spanish) was clear and presented in an easy to understand style, so that researcher was sure that all research participants agreed to be involved in this study; and
- the HIPAA was put in practice to ensure the security and privacy of health data at all time.

Ethical consideration for the study participants was discussed with the Walden University Institutional Review Board and (IRB) with the approval number 03-21-17-0227944. The final copy of the research proposal was provided to Walden University to review for accuracy and completeness. All research participants were required to read and understand a written consent so that they could participate in the study before the administration of this survey. Those who refused to agree to the written consent were not included in the study.

All original paper forms will be kept locked on my desk cabinet located in my home. Data were saved in my laptop. Access to these data will require the use of a password that I only know. Original paper forms will be destroyed at the completion of 5 years from the date data collection process is completed.

Summary

In Chapter 3, the overview of the research design and rationale, methodology, and threats to validity were discussed. This Chapter also presented very important information concerning the ethical considerations that must be taken into account for the study participants. In Chapter 4, data collection and results will be presented and discussed. Chapter 5 will address the interpretation of the study findings, limitation of the study, recommendations, implications, and conclusions of the study.

Chapter 4: Results

Introduction

Type 2 diabetes is a serious public health concern in the United States, especially among Hispanics (Ramal et al., 2012). Poor diabetes management adherence prevents patients from controlling their diabetes effectively, causing negative impacts on quality of life including hypertension, congestive heart failure, myocardial infarction, stroke, epilepsy, chronic hepatitis, and depression (Gregg et al., 2014; Mier et al., 2012). It is important for public health professionals (e.g., physicians, nurses, and health educators) to evaluate certain factors (e.g., diabetes knowledge, education level, health literacy level, and self-efficacy) of diabetic Hispanics when aiming to adopt positive diabetes self-managing behaviors (Brown et al., 2011).

The goal of this study was to investigate the associations between diabetes knowledge, health literacy, education, self-efficacy, and self-reported diabetes self-care behaviors. The research target population was Hispanics with Type 2 diabetes. The research question addressed in the study was as follows: What is the predictive relationship between diabetes knowledge, health literacy level, education level, self-efficacy, and self-reported diabetes self-care behaviors of Hispanics with Type 2 diabetes in the United States? I posed the following hypotheses:

H_0: There is no statistically significant predictive relationship between diabetes knowledge, health literacy level, education level, self-efficacy, and self-reported diabetes self-care behaviors of Hispanics in the United States with Type 2 diabetes.

H_A: There is a statistically significant predictive relationship between diabetes knowledge, health literacy level, education level, self-efficacy, and self-reported diabetes self-care behaviors of Hispanics in the United States with Type 2 diabetes.

This chapter will provide information on the data collection and the recruitment of research participants. In addition, I will describe demographic characteristics of the sample. Then, I will report results of the statistical analyses (e.g., regression models), followed by a summary of the test results.

Data Collection

This was a correlational cross-sectional study and participants were Hispanic Americans aged 28 to 83 with Type 2 diabetes who live in Fairfax County, VA. I selected participants using a convenience sampling approach. I excluded participants who had gestational diabetes and had major diabetes complications (e.g., proliferative retinopathy, nephropathy, and amputations) from the study because these conditions could interfere with their ability to complete the survey accurately.

I recruited study participants using advertisements on the Diabetes Daily website, Walden University Participant Pool, and flyers distributed in public locations in Fairfax County, VA. The advertisement and flyers provided information about the nature of the study, inclusion criteria, exclusion criteria, a link to the survey, my contact information, and contact information for the ADA (see Appendices A and B).

I collected data between March 20, 2017 and June 5, 2017 from research participants via an internet survey based in Qualtrics, which is an online electronic survey tool. For participants who preferred completing the questionnaires on paper, I provided a

self-addressed stamped envelope that they could return to me by mail. Both the internet and paper versions of the survey packet contained a consent form with a brief description of the study, the importance of the study, inclusion criteria, confidentiality, information on the protection of human subjects, and researcher contact information for any participants who had questions or who needed support or assistance with completing the questionnaires. In addition, I provided the self-report questionnaires to all research participants in both Spanish and English so they could complete the version they preferred. The self-questionnaires included (a) the Demographic Form (Appendix D); (b) the DKQ-24 (Appendix E); (c) the SAHL-S&E (Appendix F); (d) the Diabetes Self-efficacy questionnaire (Appendix G); and (e) the SDSCA (Appendix H).

The number of participants who completed the surveys was 96, although the minimum sample size needed was 85 (calculated by using a power analysis--see Chapter 3). The average age of the sample was 51.6 year old. Over half were female (n = 52, 54.7%). The data may be considered nationally representative because the demographic composition of the sample was similar to that of the nationwide gender distribution (Schneiderman et al., 2014). In order to investigate the prevalence of diabetes in Hispanics/Latinos from diverse Hispanic backgrounds in the United States, Schneiderman et al. (2014) used the data of the Hispanic Community Health Study/Study of Latinos (HCHS/SOL). The HCHS/SOL was a study of 16,415 women and men aged 18–74 years at screening from randomly selected households recruited during 2008–2011 from Bronx, NY; Chicago, IL; Miami-Dade County, FL; and San Diego, CA (Schneiderman et al., 2014).

Missing Data

The total number of people who submitted responses to the survey was 99. Missing data were limited to three cases (3.0%) because three participants did not report their education level (see Table 1). After I compared data with complete case to the one with incomplete case by using two-sample *t* test, there were no statistically significant differences between the two groups, $p > 0.05$ (see Table 1). Thus, I used the listwise deletion approach that removes all data for a case that has one or more missing values. This resulted in 96 respondents being included in the descriptive and regression analysis. I performed all analyses using SPSS Statistical Software Release 23, assuming a $p < 0.05$ for determining statistical significance (IBM, 2016).

Table 1

Comparison between observations with missing values and those without missing values

	With missing values (n = 3)	Without missing values (n = 96)	p value of t test
DKQ	32.71	43.00	0.32
SAHLS	12.20	16.67	0.23
SDSCA	14.07	16.67	0.54
SE	37.40	49.33	0.31

Note. DKQ = score of diabetes knowledge; SAHLS = score of health literacy level; SDSCA = score of self-reported diabetes self-care behaviors; SE = score of self-efficacy.

Results

I organized the report of research findings in the following order: demographic characteristics of the research sample, descriptive information on the independent and dependent variables, mean and standard deviation of the dependent variable, self-reported diabetes self-care behaviors by gender, race, education level, income level, marriage

status, health insurance, and employment status. I used *t* tests to analyze if the means in the dependent variable of specific demographic groups were different at statistically significant levels. Analysis of variance (ANOVA) analyses were used to examine whether the means in the dependent variable were different across some categorical variables, such as race, education level, income level, marriage status, health insurance, and employment status. In order to test the mutual relationship between multiple variables, I created a Spearman correlation matrix to show the relationships between diabetes knowledge, health literacy level, education level, self-efficacy, and self-reported diabetes self-care behaviors. Finally, I used a multiple linear regression model to test the relationship between diabetes knowledge, health literacy level, education level, and self-efficacy on self-reported diabetes self-care behaviors.

Demographics

I asked participants to complete a demographic information sheet, which included information on age, gender, race, marital status, family income, and education level (see Appendix D). Table 2 shows demographic characteristics of Hispanic adults with Type 2 diabetes who completed the survey (n = 96). The average age was 51.8 year old (SD = 11.1, range = 28-83). Over half of them were female (n = 52, 54.7%). Thirty-seven out of 96 participants were married (39.4%), and 30 were divorced (31.9%).

Twenty-five of the participants earned between $10,000 and $14,999 (26.0%), and 22 earned between $7,000 and $9,999 (22.9%). Nineteen participants had an associate degree (19.8%), and 31 participants graduated with a bachelor's degree (32.3%). The majority of participants had a full time job (66.7%), whereas nearly one

fifth of them were unemployed (*n* = 19, 19.8%). Thirty-six people were covered by employer-provided health insurance (37.9%).

Table 2

Demographic characteristics of respondents (n = 96)

	n	%	*M* (*SD*)
Age	96	100	51.8 (11.1)
Gender			
Male	43	45.3	
Female	52	54.7	
Marital Status			
Married	37	39.4	
Divorced	30	31.9	
Separated	22	23.4	
Widowed	5	5.3	
Income Level			
≤ $3,000	4	4.3	
$3,000 - 4,999	8	8.5	
$5,000 - 6,999	18	19.2	
$7,000 - 9,999	22	23.4	
$10,000 - 14,999	25	26.6	
≥15,000	17	18.1	
Education Level			
No high school	5	5.2	
Graduated from high school	12	12.5	
Some college	11	11.5	
Associate degree	19	19.8	
Bachelor degree	31	32.3	
Master degree	18	18.8	
Employment Status			
Full time employment	64	66.7	
Part time employment	13	13.5	
Unemployed	19	19.8	
Health Insurance			
No health insurance	13	13.7	
Employer provided health insurance	36	37.9	
Government provided health insurance	29	30.5	
Self-purchased health insurance	17	17.9	

Note. There is 1 missing value in Gender, 2 in Marriage Status, 2 in Income Level, 3 in Education Level, and 1 in Health Insurance.

Descriptive Analyses for Questionnaire results (Dependent Variable)

The mean score of the dependent variable and standard deviation of four questionnaires can be found in Table 3 (see Appendices E, F, G, and H). I used the score of self-reported diabetes self-care behaviors as the dependent variable. The average score of self-reported diabetes self-care behaviors was 32.7 (*SD* = 17.9), ranging from 0 to 51 with a median score of 40.

Table 3

Descriptive analysis for instrument results

	n	*M*	*SD*	Min	Max	*Mdn*
SDSCA	96	32.7	17.9	0	51	40
DKQ	96	12.2	6.5	0	20	15
SAHLS	96	14.1	7.3	0	18	18
SE	96	37.4	20.3	0	77	46

Note. SDSCA = score of self-reported diabetes self-care behaviors; DKQ = score of diabetes knowledge; SAHLS = score of health literacy level; SE = score of self-efficacy.

There were four independent variables. The average score of diabetes knowledge was 12.2 among 96 participants (*SD* = 6.5), ranging from 0 to 20 with a median score of 15. The data regarding diabetes knowledge collected using the DKQ-24 (Appendix E). The possible score ranges from 0 (lack of knowledge) to 24 (knowledgeable; Garcia et al., 2001).

The average score of health literacy level was 14.1 (*SD* = 7.3), ranging from 0 to 18 with a median score of 18. The assessment of health literacy level was derived from SAHL-S&E (see Appendix F). The possible score ranges from 0 to 18 (Agency for Healthcare Research and Quality, 2014). A score between 0 and 14 suggests the research participant has inadequate health literacy, and a score between 15 and 18 suggests that

research participant has adequate health literacy (Agency for Healthcare Research and Quality, 2014).

The average score of self-efficacy was 37.4 (*SD* = 20.3), ranging from 0 to 77 with a median score of 46. The assessment of health literacy level was derived from Diabetes self-efficacy questionnaire (see Appendix G). The possible score ranges from 0 to 80 (Lorig et al, 2003). Higher number indicates higher self-efficacy.

Normality Test for Continuous Variables

I tested normality for the continuous variables including age, the score of diabetes knowledge, the score of health literacy level, the score of self-reported diabetes self-care behaviors, and the score of self-efficacy. Several statistic approaches (such as a skewness test, a normal curve on a frequency distribution histogram, and a quantile-quantile plot) can be used to evaluate normality (D'Agostino, Belanger, & D'Agostino, 1990; Snedecor & Cochran, 1989; Wilk & Gnanadesikan, 1968).

A skewness test was used to check normality of variables (D'Agostino et al., 1990). I found age to be normally distributed ($p > 0.05$). However, neither the score of diabetes knowledge, the score of health literacy level, the score of self-reported diabetes self-care behaviors, nor the score of self-efficacy, were normally distributed ($p < 0.01$, see Table 4).

Table 4

Skewness test (n = 96)

Variable	*n*	*p* value of Skewness Test
Age	96	0.5774
DKQ	96	0.0000
SAHLS	96	0.0000
SDSCA	96	0.0000
SE	96	0.0000

Note. DKQ = score of diabetes knowledge; SAHLS = score of health literacy level; SDSCA = score of self-reported diabetes self-care behaviors; SE = score of self-efficacy.

A normal curve on a frequency distribution histogram can tell us whether a variable is normally distributed. As can be seen in Figure 2, the frequency distribution of diabetes knowledge was not normally distributed and it had a long left tail. Thus, the variable is not normally distributed. Thus, a nonparametric approach was applied in the further analysis.

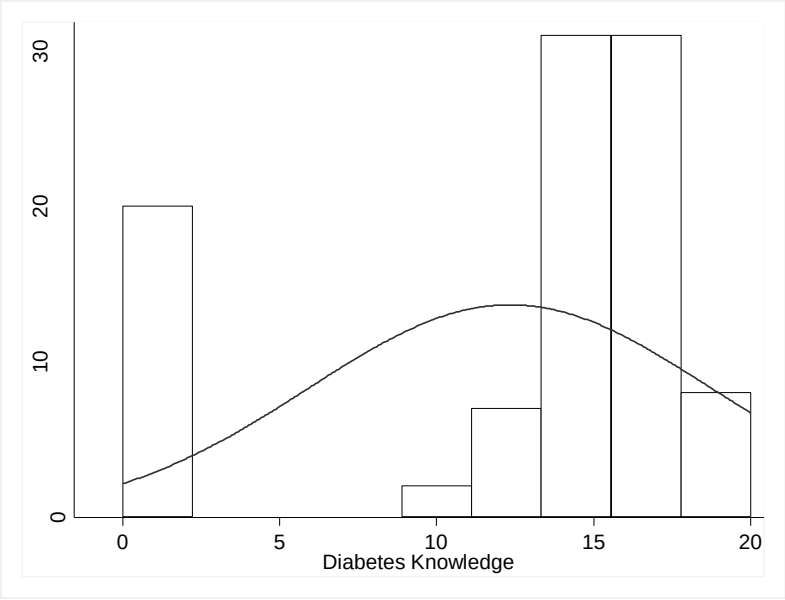


Figure 2. Frequency distribution of diabetes knowledge score with normal curve

As can be seen in Figure 3, the frequency distribution of health literacy level score was not normally distributed because it was not a bell shape due to its long left tail.

Thus, the variable is not normally distributed. Thus, a nonparametric approach was applied in the further analysis.

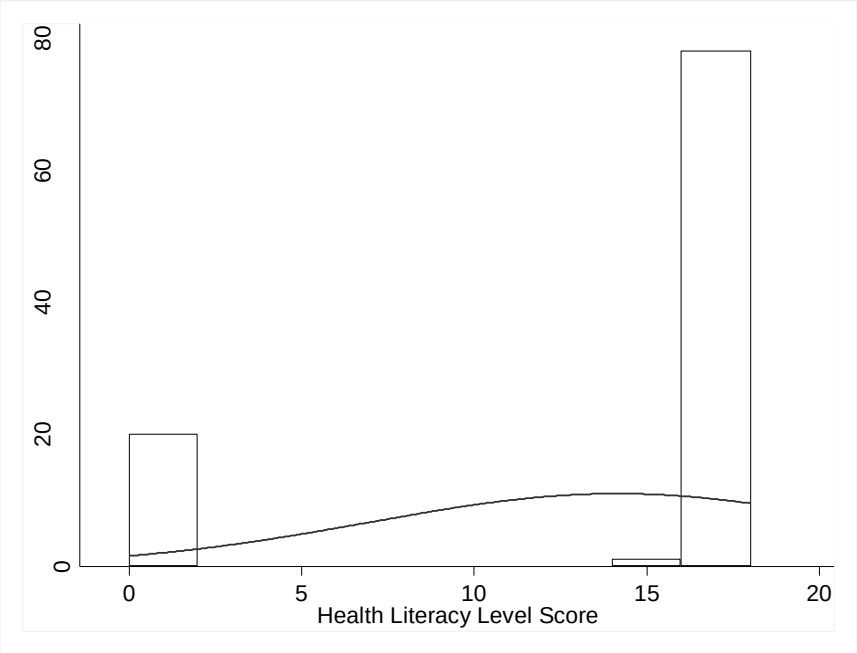


Figure 3. Frequency distribution of health literacy level score with normal curve.

Figure 4 shows that the frequency distribution of the self-reported diabetes self-care behaviors score was not normally distributed because it did not look like a bell shape due to its long left tail. Thus, the variable is not normally distributed. Thus, a nonparametric approach was applied in the further analysis.

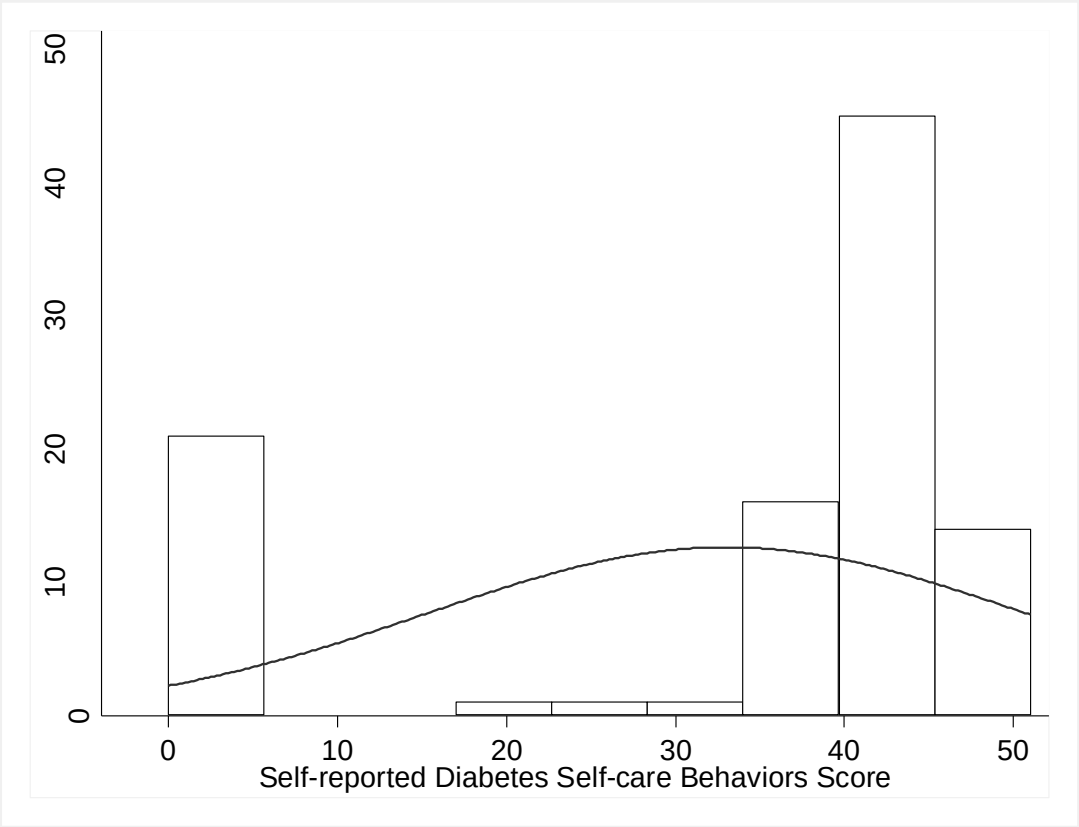


Figure 4. Frequency distribution of self-reported diabetes self-care behaviors score with normal curve.

Figure 5 shows that the frequency distribution of self-efficacy score was not normally distributed because of its long left tail. Thus, the variable is not normally distributed. Thus, a nonparametric approach was applied in the further analysis.

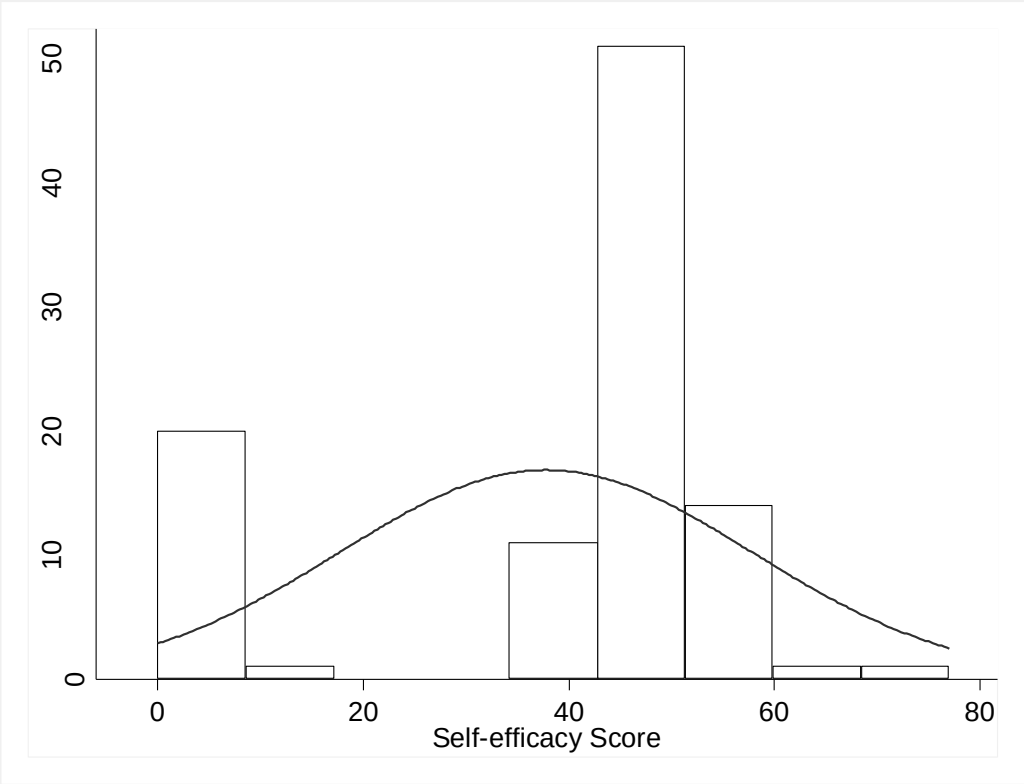


Figure 5. Frequency distribution of self-efficacy score with normal curve.

A quantile-quantile plot (Q-Q plot) is also helpful to check whether a variable is normally distributed. The Q-Q plot is a graphical tool to evaluate if a variable came from a theoretical distribution such as normal or exponential (Wilk & Gnanadesikan, 1968). For example, before researchers run a statistical analysis (i.e., Pearson correlation), assuming the dependent variable is normally distributed they could use a normal Q-Q plot to check that assumption. If both sets of quantiles came from the same distribution, the plots should show points forming a straight line. According to the normal Q-Q plots in Figures 6, 7, 8, and 9, the points could not form a straight line. Thus, none of these four variables were normally distributed. Thus, a nonparametric approach was applied in the further analysis.

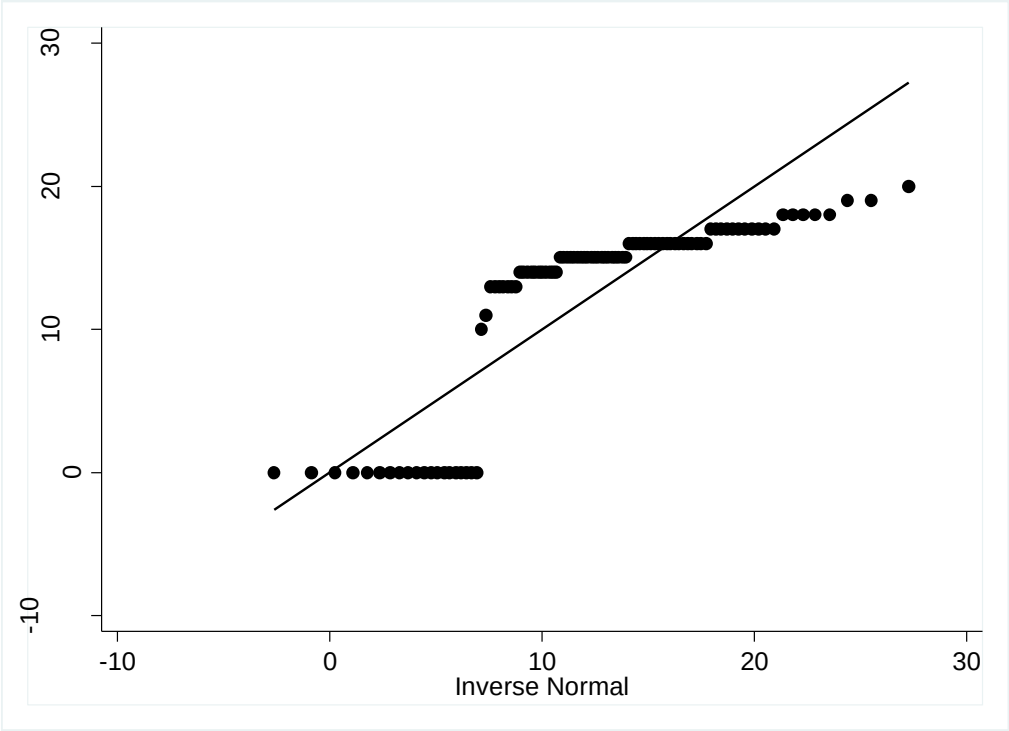


Figure 6. Normal Q-Q plot of diabetes knowledge.

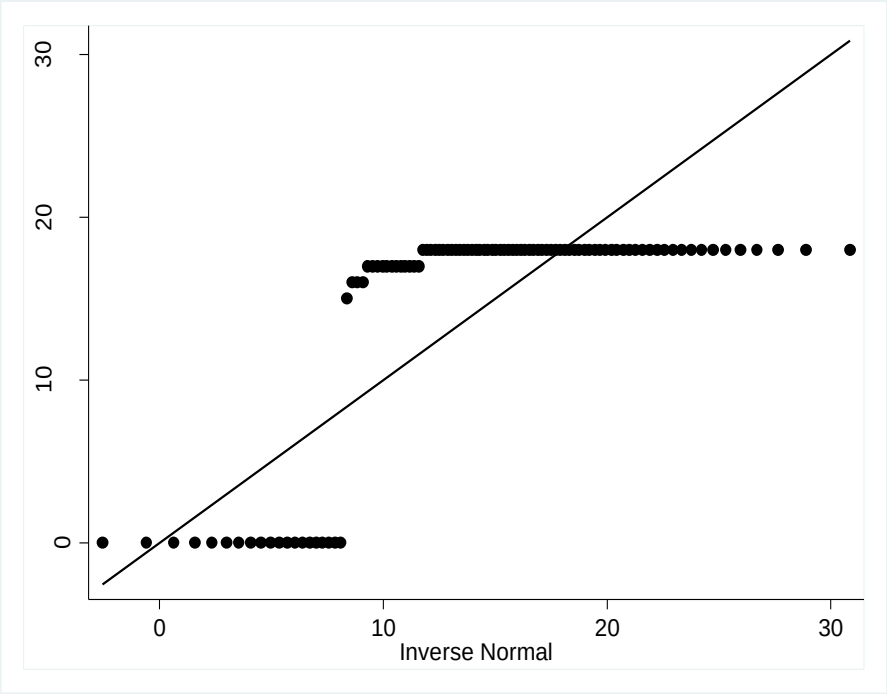


Figure 7. Normal Q-Q plot of health literacy level score.

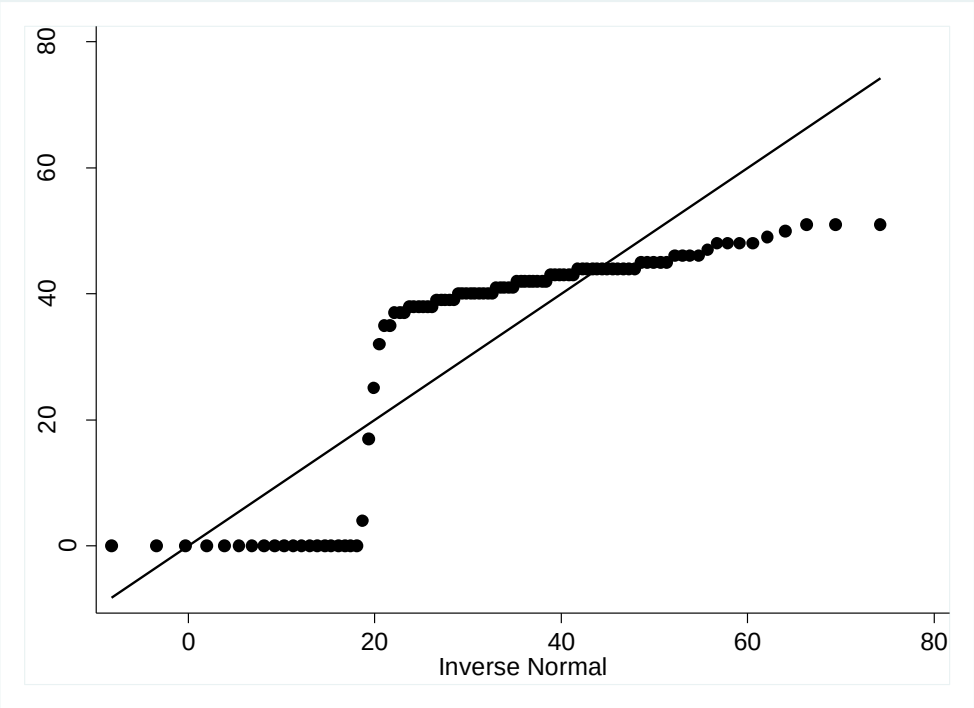


Figure 8. Normal Q-Q plot of self-reported diabetes self-care behaviors score.

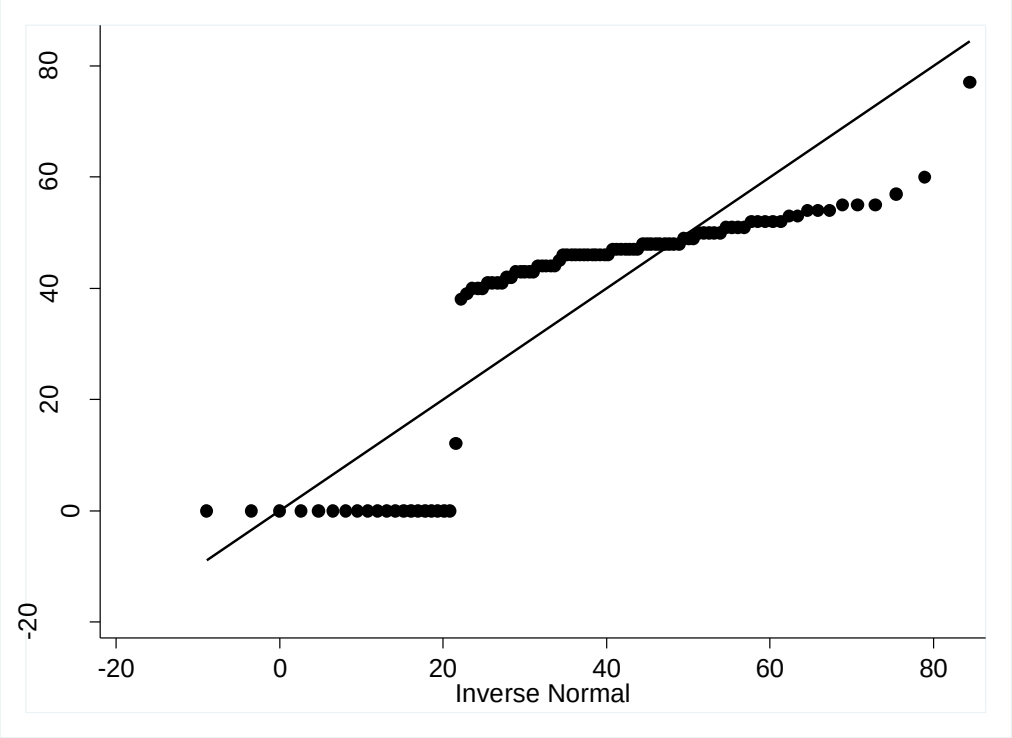


Figure 9. Normal Q-Q plot of self-efficacy score.

Self-Reported Diabetes Self-Care Behaviors by Demographic Characteristics

I used the SDSCA score as to measure self-care behaviors (dependent variable). Thus, it was important to look at the difference in SDSCA across demographic characteristics (see Table 5). If a dependent variable is normally distributed, a two-sample *t* test can be used for a comparison in means between two groups (e.g., gender), and an ANOVA analysis can be used for a comparison in means between three or more groups (e.g., education level) (Snedecor & Cochran, 1989). However, if a dependent variable is not normally distributed, neither two sample *t* test nor ANOVA analysis can be used due to violation of normality assumption (Snedecor & Cochran, 1989). The Wilcoxon-Mann-Whitney test, as an alternative to the *t* test, can be applied for testing the difference between two groups when the data is not normally distributed (Snedecor & Cochran, 1989). The Kruskal-Wallis H test, which is a rank-based nonparametric test, can be used to assess if there are statistically significant differences between three or more groups. It is considered a nonparametric alternative to the one-way ANOVA when the assumptions of ANOVA analysis were violated (e.g., nonnormality; Snedecor & Cochran, 1989).

The scores of SDSCA were not normally distributed (see Table 4, Figure 4, and Figure 8). Therefore, I applied the Wilcoxon-Mann-Whitney test to compare the mean scores of SDSCA between males and females. In addition, the Kruskal-Wallis H test was used to compare the mean scores of SDSCA across demographic characteristics such as marriage status, income level, education level, employment status, and health insurance status.

Table 5

Self-reported Diabetes Self-care Behaviors (SDSCA) by Demographic Characteristics

Variables	*n*	*M*	*SD*	*Mdn*	*p* value for Kruskal-Wallis H test
Gender					0.836
Male	43	34.6	16.2	40.0	
Female	52	31.7	19.0	41.0	
Marriage Status					0.571
Married	37	30.6	19.5	39.0	
Divorced	30	35.4	15.2	40.0	
Separated	22	34.8	16.6	41.5	
Widowed	5	26.8	24.6	41.0	
Income Level					0.000
≤ $3,000	4	0.0	0.0	0.0	
$3,000 - 4,999	8	30.9	19.2	40.5	
$5,000 - 6,999	18	38.6	13.7	43.5	
$7,000 - 9,999	22	43.1	4.2	43.0	
$10,000 - 14,999	25	36.1	14.4	40.0	
≥15,000	17	17.4	19.9	0.0	
Education Level					0.000
No high school	5	0.8	1.8	0.0	
Graduated from high school	12	19.7	21.1	12.5	
Some college	11	30.6	21.6	44.0	
Associate degree	19	33.9	18.2	42.0	
Bachelor degree	31	38.8	11.3	40.0	
Master degree	18	39.8	10.4	41.0	
Employment Status					0.120
Full time employment	64	34.9	16.1	40.0	
Part time employment	13	32.8	18.9	41.0	
Unemployed	19	25.3	21.9	40.0	
Health Insurance					0.459
No health insurance	13	26.8	22.3	39.0	
Employer provided health insurance	36	32.8	17.5	40.0	
Government provided health insurance	29	32.2	18.5	41.0	
Self-purchased health insurance	17	37.5	14.6	43.0	

Note. The *p* value came from a Wilcoxon-Mann-Whitney test.

The average score of SDSCA was 34.6 for males and 31.7 for females. A Wilcoxon-Mann-Whitney test showed that the difference in SDSCA between males and females was not statistically significant ($p = 0.836$). The average score of SDSCA was 30.6 for married participants, 35.4 for divorced participants, 34.8 for the participants who were separated from their spouses, and 26.8 for the participants who were widowed. A Kruskal-Wallis H test showed that the difference in SDSCA across marriage status was not statistically significant ($p = 0.571$).

The average score of the SDSCA was 0.0 for the participants whose monthly family income was less than $3,000, while it was 17.4 for those whose monthly family income was greater than $15,000. The average score increased with monthly family income rising. A Kruskal-Wallis H test showed that the difference in SDSCA across income levels was statistically significant ($p = 0.000$).

The average score of the SDSCA was 0.8 for the participants who did not graduate from high school, compared to 39.8 for those who had a master's degree or higher. The average score increased with a raise in monthly family income. A Kruskal-Wallis H test showed that the difference in SDSCA across education level was statistically significant ($p = 0.000$).

The average score of SDSCA was 35.3 for the participants who had a full-time job, 32.8 for those who had a part-time job only, and 25.3 for those who were unemployed. A Kruskal-Wallis H test showed that the difference in SDSCA across employment status was not statistically significant ($p = 0.120$). The average score of SDSCA was 26.8 for the participants who had no health insurance, 32.8 for those who had an employer-provided health insurance, 32.2 for those who had a government-

provided health insurance, and 37.5 for those who had a self-purchased health insurance. A Kruskal-Wallis H test showed that the difference in SDSCA across health insurance status was not statistically significant ($p = 0.459$).

Spearman Correlations

The scores on the instruments used to measure diabetes knowledge, health literacy, self-reported diabetes self-care behaviors, and self-efficacy were not normally distributed ($p < 0.01$). Thus, the use of Pearson's correlation was not appropriate. Instead, I applied the Spearman correlation to estimate the relationship between variables (Snedecor & Cochran, 1989).

I tested the main hypothesis by using Spearman correlation analysis. Table 6 summaries the estimation of Spearman correlations, known as "rho," between the scores of diabetes knowledge, health literacy, self-efficacy, education level, and self-reported diabetes self-care behaviors. The variable of education level was an ordinal variable and was coded as follows: no high school diploma (1), high school graduate (2), some college (3), associate's degree (4), bachelor's degree (5), and master's degree or higher (6).

I performed the Spearman correlation test to evaluate the relationship between the scores of diabetes knowledge, health literacy, self-efficacy, education level, and self-reported diabetes self-care behaviors (see Table 6). The rho between self-reported diabetes self-care behaviors and diabetes knowledge was 0.5230, and the association was related at statistically significant levels (rho = 0.5230, $p < 0.05$). Moreover, the score of self-reported diabetes self-care behaviors was related at statistically significant levels to the score of health literacy level (rho = 0.6332, $p < 0.05$), to the score of self-efficacy (rho = 0.7783, $p < 0.05$), and to the score of education level (rho = 0.2831, $p < 0.05$).

Table 6

Spearman correlations of each variable (n = 96)

	DKQ	SAHLS	SDSCA	SE	Education Level
DKQ	1				
SAHLS	0.5770*	1			
SDSCA	0.5230*	0.6332*	1		
SE	0.6760*	0.5986*	0.7783*	1	
Education Level	0.1511	0.3336*	0.2831*	0.2655*	1

Note. *$p < 0.05$. DKQ = score of diabetes knowledge; SAHLS = score of health literacy level; SDSCA = score of self-reported diabetes self-care behaviors; SE = score of self-efficacy. Education level is an ordinal variable: no high school diploma (1), high school graduate (2), some college (3), associate degree (4), bachelor degree (5), and master degree (6).

In order to check multicollinearity, I estimated the mutual relationships between diabetes knowledge score, score of health literacy level, self-efficacy score, and education level by using a Spearman correlation test (Table 6). Except the relationship between diabetes knowledge score and education level, other relationships were statistically significant. Thus, a multicollinear issue should be handled when four variables such as diabetes knowledge score, score of health literacy level, self-efficacy score, and education level would be used as independent variables in a linear regression model.

Linear Regression

I ran a multiple linear regression to test the relationship of a set of variables to the score of self-reported diabetes self-care behaviors. Independent variables included in the model were the scores of diabetes knowledge, health literacy level, self-efficacy, and education level, while the dependent variable was self-reported diabetes self-care behaviors as measured by the questionnaire (i.e., Appendix H).

Since the independent variables were significantly correlated with each other, three linear regressions were set up due to avoid collinearity issue (Table 7). Table 7 contains the variables used in the linear regression analyses and corresponding *R* squared. The first linear model included score of diabetes knowledge and educational level as independent variables. The *R* squared was 0.845. The second linear regression used the score of health literacy level and its *R* squared was 0.884. The third linear regression applied the score of self-efficacy and its *R* squared was 0.912

Table 7

Linear regression models, its independent variables, and R squared

Model	Independent variables included	*R* squared
1	DKQ, Education level	0.845
2	SAHLS	0.884
3	SE	0.912

Note. DKQ = score of diabetes knowledge; SAHLS = score of health literacy level; SDSCA = score of self-reported diabetes self-care behaviors; SE = score of self-efficacy.

The goodness of fit was determined by using *R* squared. The *R* squared is a statistical measure of how close the data are to the fitted regression line. The model that best fit the data was Model 3, which had the greatest *R* squared, 0.912. The Model 3 indicated that the score of self-efficacy was positively related to the score of self-reported diabetes self-care behaviors ($b = 0.84$, $p = 0.00$; Table 8). With one point increased in self-efficacy assessment, the score of SDSCA would increase 0.84 points. This finding indicates that patients with diabetes mellitus would manage their illness better if they had higher self-efficacy.

Table 8

A linear regression model of effects of SE on SDSCA (n = 96)

SDSCA	Coefficient	Std. Err.	*t*	*p* > *t*
SE	0.84	0.03	31.21	0.00
Constant	1.12	1.15	0.97	0.33

Note. The dependent variable is SDSCA. SDSCA = score of self-reported diabetes self-care behaviors; SE = score of self-efficacy.

According to the Spearman correlation analysis, a statistically significant positive relationship was found between diabetes knowledge, health literacy level, self-efficacy, education level, and self-reported diabetes self-care behaviors. Moreover, a linear regression model shows that the score of self-efficacy was related to self-reported diabetes self-care behaviors at statistically significant levels. Therefore, the null hypothesis was rejected.

Summary

The main purpose of this study was to examine the relationships between diabetes knowledge, health literacy level, education level, self-efficacy, and self-reported diabetes self-care behaviors among Hispanics with Type 2 diabetes in the United States. According to the Spearman correlation analysis and a linear regression model, the null hypothesis was rejected.

In summary, the results showed a statistically significant positive relationship between diabetes knowledge, health literacy level, self-efficacy, education level, and self-reported diabetes self-care behaviors. The finding from a linear regression model indicated that self-efficacy was a significant predictor of self-reported diabetes self-care behaviors.

Chapter 5 will address the interpretation of the study findings, limitation of the study, recommendations, implications, and conclusions of the study.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

Hispanic Americans suffer disproportionately high rates of Type 2 diabetes, which represents an urgent public health concern in the United States (Ramal et al., 2012). Moreover, poor adherence to diabetes management directives leads to health complications that worsen the quality of life for diabetic individuals while presenting a significant challenge to the American health care system. Type 2 diabetes is the fifth leading cause of death for Hispanics in the United States (Heuman et al., 2013); between 2010 and 2012, 12.8% of Hispanic adults were diagnosed with the disease, as opposed to 7.6% of non-Hispanic Whites (CDC, 2014). While researchers are aware of the scope of the crisis, the sociocultural and behavioral factors associated with diabetes in Hispanic American communities are not fully understood and the relationship between knowledge and health outcomes is not consistent (Nam et al., 2011).

The purpose of this quantitative research study was to explore and identify the predictive relationship between diabetes knowledge, education level, health literacy level, self-efficacy, and self-reported diabetes self-care behaviors among Hispanics living in Fairfax County, VA who have Type 2 diabetes. By providing a more nuanced understanding of diabetic Hispanic patients, the results of this study could help public health professionals design culturally appropriate educational programs and strategies that best serve the needs of Hispanic Americans undergoing treatment for Type 2 diabetes.

In this quantitative, correlational, cross-sectional research study, I used primary survey data to assess the relationship among certain factors that may be influencing the

self-reported diabetes self-care behaviors of a sample of Hispanic Americans with Type 2 diabetes. The sample included 96 individuals (male and female) aged 18 and older who resided in Fairfax County, VA. The independent variables I analyzed included diabetes knowledge, education level, health literacy, and self-efficacy, while the single dependent variable was the diabetes self-care behaviors. By examining the relationship between diabetes knowledge, health literacy level, education level, self-efficacy and self-reported diabetes self-care behaviors among these patients, researchers could scientifically determine which factors are preventing Hispanics with Type 2 diabetes from making appropriate changes in their diabetes self-care behaviors.

A combination of Orem's (2001) theory of self-care and Bandura's (1986) SCT guided this study. This provided a solid foundation for understanding the ways in which certain barriers, including health literacy, diabetes knowledge, education level, and self-efficacy contribute to the disproportionally high rates of Type 2 diabetes among Hispanic Americans, and for developing effective approaches for improving these patients' lives. This combination of theories contributed to a fuller understanding of the reasons patients with Type 2 diabetes do not opt to practice behaviors that promote health, and it was therefore a useful theoretical framework for this study. In Chapter 5, I summarize the key findings of this research study and an interpretation of the main conclusions follows. Finally, in this chapter, I present some of the study limitations, highlight implications, make a series of recommendations, and provide conclusions.

Summary of Findings

Findings revealed several statistically significant relationships among the variables studied. The rho between self-reported diabetes self-care behaviors and diabetes

knowledge was 0.5230, and the association was related at statistically significant levels (rho = 0.5230, $p < 0.05$). Moreover, the score of self-reported diabetes self-care behaviors was related at statistically significant levels to the score of health literacy level (rho = 0.6332, $p < 0.05$), to the score of self-efficacy (rho = 0.7783, $p < 0.05$), and to the score of education level (rho = 0.2831, $p < 0.05$). Checking for multicollinearity, I estimated the mutual relationships between diabetes knowledge score, score of health literacy level, self-efficacy score, and education level by using a Spearman correlation test. Results showed that except for the relationship between diabetes knowledge score and education level, other relationships were statistically significant. These figures mean that diabetes knowledge had a statistically significant relationship with the factors of health literacy, self-reported diabetes self-care behaviors, and self-efficacy. In addition, health literacy was also statistically and significantly related to self-reported diabetes self-care behaviors, self-efficacy, and education. Moreover, self-reported diabetes self-care behaviors were found significantly related to self-efficacy while self-efficacy was related to education level. I only found no relationship between the variables of education and diabetes knowledge. Overall, however, there was a statistically significant bilateral relationship between diabetes knowledge, health literacy level, self-efficacy, education level, and self-reported diabetes self-care behaviors. Results also indicated that both health literacy level and self-efficacy can predict self-reported diabetes self-care behaviors. However, neither diabetes knowledge nor education level can predict the score for self-reported diabetes self-care behaviors. These findings indicate that for patients with diabetes mellitus, health literacy and self-efficacy, both related to higher levels of diabetes knowledge, may help them self-manage their conditions better. Being educated

cannot solely lead to understanding or accurate knowledge of diabetes. Patients must take it upon themselves to seek out medical professionals and research about diabetes so that their knowledge of diabetes and subsequently their self-efficacy and self-reported diabetes self-care behaviors may improve.

Interpretation of the Findings

The present study's findings and theoretical framework can be placed in comparative context within the peer-reviewed literature. Several previous researchers assessed the relationship between self-reported diabetes self-care behaviors and their barriers, including diabetes knowledge, health literacy, education level, English proficiency, and self-efficacy, among Hispanics with Type 2 diabetes living in the United States (Aponte, 2013; Coffman et al., 2012; Heisler et al., 2014; Nam et al., 2011). Other researchers also used Bandura's SCT, with its central construct of self-efficacy, as a theoretical framework in studies of diabetes patients and found a significant number demonstrated a lack of confidence in their own motivation and ability (e.g. lower self-efficacy) to influence their diabetes-related health outcomes (Ramal et al., 2012). Similarly, I found that higher self-efficacy was linked with better adherence to self-management behaviors, reinforcing the appropriateness of using SCT constructs in analyzing and interpreting the behavior of diabetes patients. According to Bandura (1986), individuals with high self-efficacy can approach difficult tasks and activities with confidence, while individuals with low self-efficacy may believe that circumstances are more difficult than they really are, limiting their ability to effectively solve problems. Self-efficacy beliefs, then, are strong determinants and predictors of the level of accomplishment that individuals finally obtain (Bandura, 1986). Motivating individuals

to embrace and maintain high self-efficacy, which the current study showed to be a key predictor of adhering to self-care guidelines, is therefore crucial for helping diabetes patients stay healthy throughout their lives.

Researchers have also demonstrated the importance of other SCT constructs in the potential success of Hispanic diabetes patients' adherence to a healthy lifestyle. These include the role of the family (Ramal et al., 2012), the effectiveness of observational learning (Haltiwanger & Brutus, 2012), simplification of complex concepts, reduced didactic instruction, and engagement in activities that reinforce key concepts and modeling of healthy behaviors (Rosal et al., 2011). Ramal et al. (2012) found that family support is an important determinant of diabetes self-management and dietary changes among Hispanic diabetic patients, and Rintala et al. (2013) generated similar results. Other researchers have found that observational learning was effective in improving adherence to self-management guidelines (Haltiwanger & Brutus, 2012). The use of an educational soap opera helped Rosal et al. (2011) introduce self-management information and desired behaviors to research participants in the context of culturally relevant situations, demonstrating that patients can learn to perform new behaviors through observational learning.

My findings confirmed Nam et al.'s (2011) finding that diabetes knowledge alone was not the most statistically significant predictor of healthy self-management behaviors, since knowledgeable patients may not have the motivation and strength (e.g. self-efficacy) to consistently perform appropriate diabetes self-management activities. However, I found that higher diabetes knowledge was statistically significantly related to higher self-efficacy and better adherence to diabetes self-management directives. Chen et

al. (2014) found that a lack of knowledge may limit patient self-efficacy, and without sufficient self-efficacy, individuals may be less likely to change or start a new health behavior. I found that diabetes knowledge and higher self-efficacy were significantly linked, then, confirms Chen et al.'s earlier finding. Other researchers have also recognized the significance of diabetes knowledge and the importance of increasing diabetes knowledge among Hispanics (Jeppesen et al., 2012; Ryan et al., 2013), who have significant disparities in diabetes knowledge as compared to non-Hispanic Whites (Chen et al., 2014; Coffman et al., 2012; González et al., 2009; Zhao, 2014). Jeppesen et al. (2012) found that patients who score well on a diabetes knowledge test, with or without an educational intervention, generally have better clinical outcomes than those who score poorly. Again, my findings underscored the important role of diabetes knowledge, but extended the research by determining the crucial role played by self-efficacy in addition to diabetes knowledge in adhering to self-care guidelines.

My findings determined that health literacy was a crucial predictor of adhering to diabetes self-management recommendations, and that health literacy was statistically significantly related to self-efficacy (the other key predictor of behavioral compliance), diabetes knowledge, and education level. Various researchers have determined the negative effects of illiteracy and lower diabetes knowledge on the treatment and self-management strategies of Hispanics (Aponte, 2013; Coffman et al., 2012; Heisler et al., 2014; Nam et al., 2011). Hispanic adults with low health literacy and limited English proficiency seem to make less optimal treatment decisions, leading to poor medication adherence and outcomes (Heisler et al., 2014). Coffman et al. (2012) determined that 46.5% of the sample presented a low level of health literacy. The National Network of

Libraries of Medicine's (2013) research demonstrated that low health literacy among diabetes patients was linked to inappropriate diabetes knowledge and worse outcomes, as well as a higher risk of mortality and more emergency visits and hospitalizations. Hispanics were more likely to have diabetes if they had less than a high school education and were less proficient in English (Chang et al., 2013). When diabetes patients obtained adequate health literacy, health care use increased, leading to positive diabetes self-management activities and optimal diabetes control (Coffman et al., 2012). My findings, then, confirm Coffman et al.'s (2012) earlier findings regarding the significant relationship between higher health literacy and better adherence to healthy self-management behaviors, and the National Network of Libraries of Medicine's (2013) finding regarding the link between health literacy levels and diabetes knowledge.

My other major finding was that self-efficacy was a key predictor of adherence to diabetes self-management recommendations, along with health literacy. This finding confirms earlier research that recognized the crucial role of self-efficacy in adherence to healthy self-management behaviors. McCleary-Jones (2011) found that programs implemented to enhance self-efficacy in patients improved self-management behaviors among patients having chronic diseases. Other researchers have shown that improving self-efficacy may lead to better glycemic control (García et al., 2015; Valen et al., 2012). Likewise, lower self-efficacy and poor communication were detected in Hispanic diabetic adults living in Miami-Dade County, Florida (Kenya et al., 2015). Self-efficacy scores indicated that many participants felt overwhelmed or that they were failing in diabetes management (Kenya et al., 2015). Hispanic diabetic patients with limited English proficiency demonstrated a lack of confidence in their own motivation and ability to

influence their diabetes- related health outcomes (Ramal et al., 2012); diabetic low-income Puerto Ricans with high diabetes-related self-efficacy were less likely to experience enabling factor, doctor-access, medication-access, and forgetfulness barriers (Kollannoor-Samuel et al., 2012). Researchers collected data from diabetic Puerto Ricans suggested that minimizing barriers (e.g., low self-efficacy, lack of health insurance, and depression) could potentially optimize health care access and utilization among diabetic low-income Puerto Ricans (Kollannoor-Samuel et al., 2012). Valen et al. (2012) found that educational programs aimed at promoting diabetes self-management activities could be strengthened by incorporating programs designed to improve diabetes care self-efficacy.

My findings can be contextualized within the literature review in terms of population characteristics, independent and dependent variables, research design, and theoretical framework. While many other researchers have studied diabetic patients, both Hispanic and non-Hispanics (Haltiwanger & Brutus, 2012; Kenya et al., 2015; Ramal et al., 2012) this study sampled Hispanic diabetic patients living in Fairfax County, VA, a subset of the Hispanic population that had never been the subject of diabetes research. Ramal et al. (2012) studied Hispanic diabetes patients in San Bernardino, California, while Kenya et al. (2015) sampled Puerto Ricans with diabetes living in Miami-Dade County, Florida. There are many studies in the peer-reviewed literature in which the authors investigated the role of independent variables such as diabetes knowledge, health literacy, education levels, and self-efficacy on the dependent variable of diabetes self-management behaviors. Other researchers investigated the role played by other independent variables on diabetes self-care behaviors, such as the role of the family

(Ramal et al., 2012) and observational learning (Rosal et al., 2011; Haltiwanger & Brutus, 2012). However, I did not find other researchers who investigated the specific Hispanic cohort sampled in this study. Many other diabetes researchers have used Bandura's SCT (1986) as a theoretical framework for analyzing and interpreting patients' treatment and self-management behaviors (Chen et al., 2014; Thayer et al., 2000; White et al., 2013) while I also incorporated Orem's theory of self-care (2001), which has been used less often in studies of diabetes self-management behaviors (Pelicand et al., 2015; Sousa & Zauszniewski, 2005).

Limitations of the Study

The present study is based on several assumptions and contains certain limitations. I assumed that research participants accurately recalled their experiences and behaviors and answered all the survey questions accurately and honestly. This is important as dishonest or unreliable answers to the survey questions would compromise the study's validity. Confidentiality was assured throughout the research process to ensure that subjects were motivated to provide honest and accurate information. I did not include Hispanic Americans from other states and made the assumption that this low sample population of 96 Hispanic Americans in Fairfax County, VA was generally representative of all Hispanic Americans. I did not examine diabetes-related self-care behavior in Hispanic Americans trying to minimize their risk of developing Type 2 diabetes, as the aim of this study was to examine factors involved in diabetes self-care after development of Type 2 diabetes.

Limitations in this study can be broken down into two aspects: limitations related to research design and methodological weaknesses, and limitations related to biases

within the study. Cross-sectional studies are effective for (a) developing preventive surveillance programs and surveys and (b) assessing the association between exposure and illness onset for chronic illnesses in which epidemiologists lack of data on the time of onset. Although cross-sectional studies are inexpensive and fast to complete, they provide only a snapshot in time of the disease, which may result in misleading information when the study question is one of disease process (Dawson & Trapp, 2004). Cross-sectional studies have previously demonstrated some limitations. For instance, in the study conducted by Mier et al. (2012), some of the limitations detected were (a) the research data were calculated using a self-report tool, which may have introduced source biases and (b) the use of a relative small sample, which may have reduced the ability to appropriately generalize test results to other Hispanic populations.

This study was particularly affected by the first limitation as all survey instruments to be used were based on participant recall of their personal information and behavior. This threat was addressed by using validated surveys. These surveys have previously demonstrated empirical validity in a consistent manner despite relying on personal recall from research participants. In addition, they have demonstrated good validity in comparison to other instruments (Garcia et al., 2001; Lee et al., 2010; Lorig et al., 2003; Toobert et al., 2000). Power analysis was conducted to address the second threat and to ensure that the sample size was large enough for statistical analysis. A limitation related to potential bias in the study was that the population chosen for the study may be biased towards certain socioeconomic or cultural groups due to the selection of participants within the Fairfax County, VA only. Another limitation found in this study was the low level of literacy that may have discouraged some Hispanic diabetic

patients from taking part in this research, limiting my ability to recruit a higher number of participants.

External threats may arise when researchers generalize beyond the groups used in the study to other racial groups not included in it, settings not studied, or previous or future situations (Creswell, 2013). To ensure the external validity of a study, the characteristics of research participants must reflect the characteristic of the population being investigated by researchers (Frankfort-Nachmias & Nachmias, 2008). In this study, the threat to external validity focused on the fact that the test results may not be generalizable to the general population since this is a cross-sectional study design with only 96 research participants. Even though the current study has produced findings on the significant relationships among the variables, I could still recommend future researchers to find more about these relationships with longitudinal studies and the use of a large and representative enough sample to be generalizable to the entire population (Aschengrau & Seage, 2008).

Recommendations for Future Research

This study raises issues that suggest future research directions. First, a larger sample of Hispanic patients could be surveyed in the future as I used a relatively small sample of 96 participants. A larger sample could also mean higher reliability and better generalizability (Aschengrau & Senge, 2008). The study took place in a small geographical area, Fairfax County, VA, so comparative studies could be conducted of Hispanic diabetic patients in other states and regions to determine if the findings will hold, or if non-North Virginian patients with diabetes have other factors affecting their self-care. Other research designs could be recommended as well. For example, to avoid

faulty memory problems resulting from participants' self-reporting in questionnaires, participants could be asked to keep journals documenting their daily food choices, physical activity, and other self-care behaviors. Instead of self-report of self-care behaviors, other sample population that can examine the self-care behaviors of the patients can also be interviewed for reliability. Self-reporting measures have their own limitations, such as problems with honesty of the participants when answering sensitive questions related to health (Stirratt et al., 2015).

Qualitative studies involving in-depth interviews of Hispanic diabetic patients could be conducted to gain a deeper understanding of the patients' perspectives on their health needs and challenges. While this study focused on evaluating certain characteristics among Hispanic diabetic patients, a comparative study approach could be added with surveys of other minority groups or immigrants with limited English coping with Type 2 diabetes. These surveys, like the studies of Hispanic diabetic patients, could take English proficiency and different cultural frameworks into consideration. Hispanic patients living with other chronic diseases could be surveyed about their self-management strategies to determine key predictors of successful adherence to these strategies and minimizing their risks of complications. Other studies could be conducted of at-risk Hispanic Americans practicing self-care behaviors to minimize their risk of developing Type 2 diabetes to determine if higher levels of health literacy and self-efficacy were the key predictors of healthy behaviors. This would help health care professionals develop culturally appropriate educational materials and strategies on minimizing the risk of developing Type 2 diabetes. Lastly, other studies could be

conducted on health care professionals working with diabetic Hispanic patients for their perspectives on effective treatment and patient education.

Implications of the Findings

My research findings advanced the public health field's understanding of Hispanic diabetes patients and the factors affecting their adherence to self-care strategies, and could potentially lead to positive social change at the individual and policy level in Fairfax County, VA. By providing new knowledge and better understanding of the factors associated with Type 2 diabetes self-care, improving existing diabetes intervention strategies, and developing awareness of Type 2 diabetes among Hispanics residing in Fairfax County, VA can be undertaken. Individually, positive social change can be gained from this research through the empowerment of Hispanics in the self-management of their diabetes, after they come to see the value of diabetes knowledge in their self-care success. Positive social change can also be attained by highlighting the health disparities linked to ethnic minorities, including the Hispanics. With the value of diabetes knowledge and literacy highlighted, prevention efforts that can decrease the prevalence and burden of diabetes in the United States, especially among the high-risk and underserved populations such as Hispanics can focus on education and awareness-based interventions. Moreover, by providing the American public health workforce in Fairfax County, VA with insights for developing culturally sensitive education programs that best fit the needs of Hispanics and fight against Type 2 diabetes, this study's results could potentially contribute to positive social change at the public health policy level in Fairfax County, VA. Poor diabetes management adherence among diabetic Hispanic patients contributes to the prevalence of diabetes among this minority population in the

United States (Mier et al., 2012). It is therefore imperative that public health professionals seriously consider and evaluate the effects of four factors (e.g., diabetes knowledge, education level, health literacy level and self-efficacy) on diabetic Hispanics who are aiming to adopt positive diabetes self-managing behaviors. If innovative health strategies are not developed soon, the increasing prevalence of diabetes among Hispanics will consequently produce a significant economic burden not only on these individuals, but on the American health care system in the near future.

My research methodology involved utilizing a series of self-report questionnaires given to research participants in order to collect data, analyze certain variables, and determine their associations with the development of the health disparities of diabetes seen in the Hispanic American communities in Fairfax County, VA. Since this study was based on survey research in which one specific group was asked to answer questions about their backgrounds, experiences and attitudes, the most appropriate quantitative research design was the correlational, cross-sectional type. This research design allowed me to obtain findings that are highly generalizable when based on a sample of the general population, and to conduct the study in a short period of time at a low cost (Aschengrau & Seage, 2008). A quantitative, cross-sectional, correlational research design using primary data was used in this research study to measure the relationships between diabetes knowledge, health literacy, education level, self-efficacy, and self-reported diabetes self-care behaviors among diabetic Hispanics patients. Data collected reflected the participants' report of their knowledge about diabetes, level of health literacy, level of education, and confidence in performing certain activities related to diabetes management tasks. This allowed me to determine the predictive relationships between diabetes

knowledge, health literacy level, education level, self-efficacy and self-reported diabetes self-care behaviors among this specific target population.

Correlational studies are often identified with survey research and useful for generating and clarifying hypotheses (Frankfort-Nachmias & Nachmias, 2008), assessing the relationship between variables, and taking a "snapshot" of a specific population at a point in time and measuring the disease prevalence in relation to the exposure prevalence (Aschengrau & Seage, 2008). Cross-sectional studies are known for being carried out for public health planning and for etiologic research. Advantages of utilizing this type of research design include (a) test findings are highly generalizable when based on a sample of the general population; (b) they can be completed in a short period of time; and (c) they are low in cost (Aschengrau & Seage, 2008). Overall, the implications for this research methodology continues to be useful in public health research on sample populations, as self-report questionnaires help researchers to gain a fuller understanding of the target population's health needs and barriers.

Both Orem's theory of self-care (2001) and Bandura's SCT (1986) were used as theoretical models guiding this study. In terms of theoretical implications, both are useful in analyzing and interpreting health behaviors. The construct of self-efficacy in SCT was especially central to this study, given that one of the major research findings was that high self-efficacy is a key predictor of adherence to diabetes self-management behaviors and better health outcomes, along with health literacy. The recommendations derived from this study's results include encouraging health care professionals working with at-risk Hispanic patients to create culturally appropriate educational strategies to increase patients' health literacy and self-efficacy.

My findings are largely consistent with current theories and the selected theoretical framework, and help advance the research methodology. Many earlier researchers, as noted, had investigated the roles played by health literacy and self-efficacy in Hispanic and other diabetes patients in following self-care guidelines, and had called for addressing disparities by increasing health literacy and self-efficacy among Hispanics facing higher risks of developing Type 2 diabetes (Chen et al., 2014; Healthy People 2020, 2014). My finding that self-efficacy was key to following diabetes self-care guidelines was consistent with the SCT, which predicted that patients with higher self-efficacy are more successful at following self-care guidelines and have better health outcomes, while those with lower self-efficacy found making health changes overwhelming and had worse outcomes. This study may help advance the methodology of using self-report questionnaires in quantitative, correlational, cross-sectional public health research to gain a fuller understanding of patients' needs, behaviors, and barriers.

This study has important implications for practice. Hispanic Americans facing higher risks of developing Type 2 diabetes, as well as Hispanic diabetes patients, may be interested in these study findings to reduce their risk of the disease or, if already diagnosed, reduce their risk of complications through adhering to self-management guidelines. Health care professionals and public health researchers and policymakers would be interested in using these findings as well. Health care professionals working with at-risk Hispanic patients could use this study to develop culturally appropriate educational strategies to enhance their patients' health literacy and self-efficacy, which this study has demonstrated to be clearly linked to medical compliance and better health outcomes.

Conclusion

To conclude, the purpose of this study was to examine the relationship between four independent variables–diabetes knowledge, health literacy, educational level, and self-efficacy–and adherence to diabetes self-management behaviors. This quantitative, correlational, cross-sectional research study found that health literacy and self-efficacy are the key predictors of adherence to self-care guidelines among Hispanic diabetic patients. The theories guiding this study were Orem's theory of self-care and Bandura's SCT, with its key construct of self-efficacy. Given the theoretical framework and other findings from the literature, it was expected that self-efficacy would be a key predictor of adherence to self-care strategies. By using a quantitative, correlational, cross-sectional research design, I facilitated a greater understanding of how a subset of the Hispanic American diabetic population approached self-management behaviors as well as the barriers they face in achieving optimal health outcomes. The present study contributed to positive social change by identifying the factors that were the key predictors of adherence to self-care guidelines that minimize the risk of developing complications of Type 2 diabetes. The study's findings would be of interest to Hispanic diabetic patients as well as health care professionals and policymakers in Fairfax County, VA interested in developing culturally appropriate educational strategies centered on increasing health literacy and self-efficacy in Hispanic diabetic patients to help them achieve positive diabetes self-management activities and optimal diabetes control.

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Appendix A: Recruitment Letters

Church A
Attn: Pastor

March 28, 2016

Dear Pastor,

I am a Ph.D. candidate at Walden University. My research area focuses on factors influencing diabetes self-management among Hispanics with Type 2 diabetes who live in the United States. Your organization was chosen as a data collection site because the population serve includes the population of interest for this study.

The purpose of this research study is to identify the relationship between education level, health literacy level, diabetes knowledge, self-efficacy and self-reported diabetes self-care behaviors among Hispanic Americans with Type 2 diabetes who reside in Fairfax County, VA. It is hoped that the results of this study could help inform policy makers, researchers, and health promotion program developers as they work to reduce risk for Type 2 diabetes among this population living in Fairfax County.

I am requesting your permission to recruit participants for this study at your site to participate in this study. With your permission, recruitment will consist of letters describing briefly the nature of Type 2 diabetes, the purpose and nature of the study. I will also be posting one to two Type 2 informational posters on public announcement boards at main entrances of the building as permitted. I will provide potential research participants with consent forms, surveys, and pens. The table will be located in an area that will not be an obstruction, but will be visible to individuals, and will be supervised by the researcher at all times to maintain confidentiality. The surveys are anonymous and

contain no identifying information. For those participants who may want to complete the surveys at home, they will be provided with a self-stamp envelope so that they could submit surveys to the researcher by regular mail.

The risk involved in this study is minimal, such that participants might be more aware of their risk for Type 2 diabetes based on their family history. There are however, some benefits, such that participants might become more actively involved in changing high risk behaviors to healthier ones. Participation in this study is voluntary, and participants may refuse to participate at any time without any consequences.

Thank you for your consideration to grant me permission to conduct this study among participants who utilizes services at your church.

If you need to reach me, please do so at the following contact information:

Email:

Cell phone:

Sincerely,

Ph.D. Candidate
Walden University – Public Health – Epidemiology Specialization

Church B
Attn: Pastor

March 28, 2016

Dear Pastor,

I am a Ph.D. candidate at Walden University. My research area focuses on factors influencing diabetes self-management among Hispanics with Type 2 diabetes who live in the United States. Your organization was chosen as a data collection site because the population serve includes the population of interest for this study.

The purpose of this research study is to identify the relationship between education level, health literacy level, diabetes knowledge, self-efficacy and self-reported diabetes self-care behaviors among Hispanic Americans with Type 2 diabetes who reside in Fairfax County, Virginia. It is hoped that the results of this study could help inform policy makers, researchers, and health promotion program developers as they work to reduce risk for Type 2 diabetes among this population living in Fairfax County, VA.

I am requesting your permission to recruit participants for this study at your site to participate in this study. With your permission, recruitment will consist of letters describing briefly the nature of Type 2 diabetes, the purpose and nature of the study. I will also be posting one to two Type 2 informational posters on public announcement boards at main entrances of the building as permitted. I will provide potential research participants with consent forms, surveys, and pens. The table will be located in an area that will not be an obstruction, but will be visible to individuals, and will be supervised by the researcher at all times to maintain confidentiality. The surveys are anonymous and contain no identifying information. For those participants who may want to complete the

surveys at home, they will be provided with a self-stamp envelope so that they could submit surveys to the researcher by regular mail.

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Thank you for your consideration to grant me permission to conduct this study among participants who utilizes services at your church.

If you need to reach me, please do so at the following contact information:

Email:

Cell phone:

Sincerely,

Ph.D. Candidate
Walden University – Public Health – Epidemiology Specialization

Appendix B: Informed Consent Form

You are invited to participate in a research study of what factors influence diabetes self-care behaviors among Hispanics with Type 2 diabetes living in the United States, specifically in Fairfax, County, VA. This form is part of a process called "informed consent" to allow you to understand this study before deciding whether to take part.

This study is being conducted by me, who is a doctoral student at Walden University.

Background Information:
The purpose of this study is to determine the relationship between diabetes knowledge, education level, health literacy, self-efficacy and self-reported diabetes self-care behaviors among Hispanics with Type 2 diabetes living in the United States. Number of participants needed is 85.

Inclusion Criteria:

- Hispanic Americans between the ages of 18-100 years.
- Hispanic Americans who have been diagnosed with Type 2 diabetes.
- Hispanic Americans who are currently residing in Fairfax County, VA.

Procedures:
If you agree to participate in this study, you will be asked to complete this survey.

Together, you should be able to complete all surveys in 15 to 30 minutes.

Here are some sample questions:

- "Is eating too much sugar and other sweet foods a cause of diabetes?"
- "How confident do you feel that you can eat your meals every 4 to 5 hours every day, including breakfast every day?"
- "How many of the last SEVEN DAYS have you followed a healthful eating plan?"
- "Which of these two terms, do you associate best the term *próstata*? __*glándula, circulación*. If you do not know the answer, please *select no se*."

Voluntary Nature of the Study:
This study is voluntary. Everyone will respect your decision of whether or not you choose to be in the study. No one will treat you differently if you decide not to be in the study. If you decide to join the study now, you can still change your mind later. You may stop at any time without any penalty.

Risk and Benefits of Being in the Study:
Being in this type of study involves some risk of the minor discomforts that can be encountered in daily life, such as fatigue, stress, or emotional upset while completing the questionnaires. However, being in this study would not pose risk to your safety or

wellbeing. The potential benefit is your opportunity to participate in a research study on factors that influence diabetes self-management.

Incentive:
There is no monetary compensation associated with this study.

Privacy:
Any information you provide will be kept confidential. The researcher will not use your personal information for any purposes outside of this research project. Also, the researcher will not include your name or anything else that could identify you in the study reports. Data will be kept secure in a locked file; only the researcher will have access to the records. Data will be kept for a period of at least 5 years, as required by the university.

Contacts and Questions: You may ask any questions you have now. Or if you have questions later, you may contact the researcher via phone and/or email. If you want to talk privately about your rights as a participant, you can contact a Walden University representative who can discuss this with you. The phone number is (612) 312-1210. The approval number for this study is 03-21-17-0227944 and it expires on March 20th, 2018.

You may keep this consent form.

This study is not sponsored and there is no potential conflict of interest.

Statement of Consent:
I have read the above information and I understand the study and will like to decide to participate in this study. If you are completing a paper version of the survey, please return the survey in the envelope provided.

Formulario de Consentimiento Informado

Se le invita a participar en una investigacion de los factores que influyen las actividades de auto-cuidado en los pacientes de diabetes tipo 2 que viven en los Estados Unidos, especificamente en el condado de Fairfax, VA. Este formulario es parte de un proceso llamado "consentimiento informado" que se redacta para que usted comprenda esta investigacion antes de decider en participar en ella.

Esta investigacion es conducida por mi, quien es un estudiante en la Universidad de Walden al nivel de doctorado.

Informacion de esta investigation:
El proposito de esta invstigacion es determinar la relacion entre conocimiento de la diabetes, nivel de educacion, nivel de alfabetismo, nivel de eficacia y las actividades de auto-cuidado en los pacientes de diabetes Tipo 2 que viven en los Estados Unidos. El numero de participantes requerido es 85.

Criterio de Inclusion:

- Hispano Americanos con 18 – 100 aňos de edad.
- Hispano Americanos diagnosticados con diabetes Tipo 2.
- Hispano Americanos quienes viven actualmente en el condado de Fairfax, VA.

Procedimientos:
Si usted acepta en participar en esta investigacion, usted necesitara completar esta encuesta.

En total, usted podra completar todos los cuestionarios de 15 a 30 minutos.

Ejemplos de algunas de las preguntas se encuantran aqui abajo:

- "¿El comer mucha azúcar y otras comidas dulces es una cause de la diabetes?"
- "¿Qué tan seguro(a) se siente Ud. de poder comer sus alimentos cada 4 ó 5 horas
  todos los días. Esto incluye tomar desayuno todos los días?"
- "¿Cuántos días, durante los últimos siete días, ha seguido un régimen alimenticio
  saludable?"
- "¿Ente cual de estos dos terminos, usted asocia major el termino próstata?
  __glándula, __circulación." Si no sabe la respuesta, favor de seleccionar, "
  __no se."

Sentido voluntario de la investigacion:
Esta investigacion es voluntaria. Se le respetara su decision de participar o no en esta investigacion. Nadie sera tratado diferentemente si usted decidiera de no participar en esta investigacion. En caso de que usted tome parte en esta investigacion ahora, usted podra cambiar su decision luego. Usted podra terminar su participacion en todo momento sin nunguna penalidad.

Riegos y Beneficios en Participar en esta investigacion:
Participar en este tipo de investigacion expone a algun riesgo de poca incomodidad a su vida cotideana tales como fatiga, estres, o desagrado emocional cuando este completando los cuestionarios. Sin embargo, esta investigacion no lo expondra a ningun peligro a su salud o seguridad. El beneficio potencial de su participacion en esta investigacion es su oportunidad de participar en esta investigacion enfocada en determinar esos factores que influyan las actividades de auto-cuidado entre los pacientes de diabetes tipo 2.

Pago:
No hay ninguna compensacion monetaria con su participacion en esta investigacion.

Privacidad:
Cualquiera informacion que haya sido obtenidad de usted, sera mantenida confidencialmente. El investigador no usara su informacion personal para ningun proposito ajeno al proposito de esta investigacion. Ademas, el investigador no incluira su nombre o cualquier dato que lo identifique en los reportes de esta investigacion. Los datos seran guardados en una carpeta con seguro, y solo el investigador tendra acceso a los documentos originales. Mismos datos se mantendran existentes por 5 años, como es requerido por la Universidad de Walden.

Para Contacto y Preguntas:
Usted puedra hacer cualquiera pregunta ahora. Si tubiera alguna pregunta despues, usted puede contactar al investigador via telefonica al y/o email. Si usted quiere hablar en privado acerca de sus derechos como participante de esta investigacion, usted tambien podra contactar al representante de la Universidad de Walden, quien podra responder a usted sus preguntas. El numero de telefono es 612-312-1210. El número de aprobación para este estudio es 03-21-17-0227944 y expira el 20 de marzo de 2018.

Usted podra mantener este documento con usted.

Esta investigacion no ha recibido ninguna ayuda financial y no tiene ningun potential conflicto de intereses.

Declaracion de Consentimiento:
Yo he leido la informacion presentado arriba y reconozco que entiendo suficientemente la investigacion para tomar una decision sobre mi participacion en la misma. Si usted esta completando esta encuesta a mano, por favor de regresarla usando el sobre que se le ha entregado.

Appendix C: Request for Using Instrumentations

Instrument name: **Diabetes Knowledge Questionnaire DKQ-24**

Hello Ms,

I am a PhD candidate at Walden University and currently developing my proposal. My research study will be focused on factors influencing diabetes self-management among Hispanics with Type 2 diabetes who live in the United States. I will be using the Diabetes Knowledge Questionnaire DKQ-24 version in English and Spanish that you and your colleagues developed and used in your research study titled "Development of the Spanish-language diabetes knowledge questionnaire" published in 2001.

In this relation, I would like to ask permission from you to use that instrument. Would you be so kind to email me a clean DKQ 24 (English/Spanish) version that I can use for my research? I have found one just like yours, but it only has 21 items. I would like to use the one with 24 questions in both languages.

Thank you very much for the information you may be able to share.

I am looking forward for your response.

Sincerely yours,

Dear,
Thank you for your interest in the DKQ-24. You are welcome to use it in your study. (attached).

Here is the citation for your proposal, report of findings, and publications.
Garcia, A. A., Villagomez, E., Brown, S. A., Kouzekanani, K., & Hanis, C. L. (2001). The Starr County Diabetes Education Study: Development of the Spanish language diabetes knowledge questionnaire. *Diabetes Care, 24*, 16-21.

To score the DKQ, assign one point for each correct response (correct responses are noted in the original article, attached). The score is the percentage of the total items scored as correct. The scores are useful as descriptive indicators and to use in correlation and regression analyses. There is no determined diagnostic threshold for the necessary level of knowledge needed for effective diabetes self-management.

Could you please give me the url where you found the 21-item version?
Please let me know if you have any questions as you proceed. I look forward to receiving a copy of your findings.
Best wishes for a successful project,

Instrument name: **Short Assessment of Health Literacy SAHLSA-50, SAHL-S & E**

Dear:

Thank you for your inquiry. I am responding on behalf of the Associate Director, Office of Communications and Knowledge Transfer, Print and Electronic Publishing. I handle the majority of permission requests for the Agency for Healthcare Research and Quality.

You have AHRQ's permission to use SAHLSA-50, validated in 2006, in your thesis research. We do ask that you give source credit for this health literacy measurement tool. However, I would like to point out that there is a newer tool (SAHL-S & E), based on the principles of SAHLSA-50 and validated in 2010, that consists of two tests designed to give comparable results for Spanish- and English-speaking populations, respectively. If you decide to, you have permission to use SAHL-S & -E instead. Both tools can be found on the AHRQ Web page "Health Literacy Measurement Tools (Revised)." On this page there are links to printable (.pdf) versions of both tools and to their answer sheets, as well as instructions on administering the tests for each tool. However, please let me know which tool you decide to use.

I look forward to hearing from you further. Please let me know whether this email permission is acceptable to Walden University, or if it requires a signed letter on AHRQ letterhead. I could provide the for you next week.

Sincerely,

Health Communications Specialist/Manager of Copyrights & Permissions
Office of Communications and Knowledge Transfer
Agency for Healthcare Research and Quality

Auto-Response - 03/01/2016 11:20 PM
> The following answers might help you immediately. (Answers open in a separate window.) Answer Link: Do I need to request permission to use or reproduce materials provided on the AHRQ Web site? (https://info.ahrq.gov/app/answers/detail/a_id/341)
> Answer Link: How do I order print copies of the evidence reports? (https://info.ahrq.gov/app/answers/detail/a_id/247)
> Answer Link: Does AHRQ have case studies on its research and dissemination activities? (https://info.ahrq.gov/app/answers/detail/a_id/543)
>
> Customer By Web Form- 03/01/2016 11:20 PM Who it may concern,
>
> I am a PhD candidate at Walden University (located in Minneapolis, USA) and currently developing my proposal. My research study will be focused on factors influencing diabetes self-management among Hispanics with Type 2 diabetes who live in the United States. I would like to use using the Short Assessment of Health Literacy for Spanish Adults (SAHLSA-50) "instrument. Therefore, I would like to ask permission from you to use this instrument. This is also to comply with the requirements set by Walden's IRB regarding the use of the SAHLSA-50. Would you please be so kind to send a clean copy of SAHLSA-50 questionnaire to me?

> I am looking forward for your response.

> Sincerely yours,

> PhD candidate
> Walden University

Instrument name: **DIABETES SELF-EFFICACY**

to me
These questionnaires are in the public domain but you certainly have my permission.
From:
Sent: Sunday, February 14, 2016 6:53 AM
To:
Subject: Self-Efficacy for Diabetes

Who it may concern,

I am a PhD candidate at Walden University and currently developing my proposal. My research study will be focused on factors influencing diabetes self-management among Hispanics with Type 2 diabetes who live in the United States. Because one of the factors that will be assessed in my study is "self-efficacy," I will be using the "Self-efficacy For Diabetes" instrument (in English and Spanish) that your organization has developed. In this relation, I understand that the use of this instrument is free, but I would like to ask a professional courtesy to use this tool in the conduct of my study. This is also to comply with the requirements set by Walden's IRB regarding the use of the Diabetes Self-Efficacy Test.

Sincerely yours,

Ph.D. Candidate
Walden University

Instrument name: **Summary of Diabetes Self-Care Activities SDSCA**

to me

Dear,

Thank you for contacting me about Summary of Diabetes Self-Care Activities questionnaire (SDSCA). The research for the SDSCA was supported from 1983 through 2009 by the National Institutes of Health, but that support has now ended. If you find this instrument useful, and would like permission to use it in your study and if you would like to keep it available for future use, we are now charging a one-time *total fee* of (*not* per questionnaire):

Students: $25

Research Scientists/Professors $100
Clinicians, health-care practitioners $100
Corporate research rates or multi-site trials: $1000

Please click on the following link and select the appropriate price (Please let us know if you are unable to pay, and we can make other arrangements):
http://www.ori.org/sdsca

Once we receive your payment, you will have our permission to use the English version of the Summary of Diabetes Self-Care Activities Questionnaire in your research project and we will be able to provide answers to any questions you may have. We have attached the 2000 Diabetes Care article with the SDSCA psychometric information. At the end of the article, there is an appendix with the English version of the questionnaire, and the scoring information. We have also attached a user-friendly copy of the English version of the SDSCA instrument.
You will find answers to some frequently asked questions on the website. If you have further questions, please contact me again at:

I wish you success with your research,

Dear,

Thank you for your payment of $25 for permission to use the Summary of Diabetes Self Care Activities (SDSCA) in your study. Now that we have received your payment, you have our permission to use the English version of the Summary of Diabetes Self-Care Activities Questionnaire in your research project and we will be able to provide answers to any questions you may have. We have attached the 2000 Diabetes Care article with the SDSCA psychometric information. At the end of the article, there is an appendix with the English version of the questionnaire, and the scoring information. We have also attached a user-friendly copy of the English version of the SDSCA instrument.

If you need a translation of the SDSCA please contact me first, as the SDSCA has been translated into many languages.

Please be sure to check our website first for the most frequently asked questions:

http://www.ori.org/sdsca

We wish you every success with your research,

Appendix D. Sociodemographic Survey

Health Disparities among Hispanic Americans with Type 2 Diabetes

Complete the following questions by placing a check mark on each item that best identifies you

Please indicate your gender:

Male ____

Female ____

Prefer not to answer ____

What is your current age (number of years)? ____

What is the primary language that you speak?

Spanish _____

English _____

Prefer not to answer _____

What is your country of origin?

United States ____

Mexico ____

Other ____

What is your marital status?

Married ____

Divorced ____

Widowed ____

Separated ____

Domestic Partner ____

Never Married ____

What is your annual family income?

≤ $3,000 ____

$3,000 - 4,999 ____

$5,000 - 6,999 ____

$7,000 - 9,999 ____

$10,000 - 14,999 ____

≥15,000 ____

Prefer not to answer ____

What is your highest level of education completed?

No high school _____

Some high school _____

Graduated high school _____

Some college _____

Associate degree _____

Bachelor degree _____

Master degree _____

Doctoral degree _____

Years Since Diagnosis of Type 2 Diabetes (please indicate number of years) _____

What is your current employment status?

Unemployed ____

Part time employment ____

Full time employment ____

What is your current insurance status?

No health insurance ____

Government provided health insurance (such as Medicare) ____

Employer provided health insurance ____

Self-purchased health insurance ____

CUESTIONANRIO DE HOJA DE DATOS

Desigualdades de la Salud entre Hispanos Americanos con diabetes Tipo 2

Completar las siguientes preguntas, marcando su respuesta con “X.”

Por favor de indicar su Sexo:

Masculino ____

Femenino ____

Prefiero no responder ____

Cual es su edad actual (años de edad)? _____

Cual es el primer Idioma que usted habla?

Español ___

Ingles ___

Prefiero no responder ___

Cual es su pais de origen?

Estados Unidos ____

Mexico ____

South America ____

Other pais ____

Cual es su Estado Civil?

Casado ____

Divorciado ____

Viudo ____

Separado ____

Viviendo con Compañero ____

Soltero ____

Por favor de indicar Salario de Familia

≤ $3,000 ____

$3,000 - 4,999 ____

$5,000 - 6,999 ____

$7,000 - 9,999 ____

$10,000 - 14,999 ____

≥15,000 ____

Prefiero no responder ____

Cual es el Nivel mas alto de Educacion que ha completado?

No secundaria _____

Algun estudio de secundaria _____

Graduado de secundaria _____

Algun estudio de Universidad _____

Graduado de Asociado _____

Graduado de Bachillerato _____

Graduado de Maestria _____

Graduado de Doctorado _____

Prefiero no responder _____

Años de diagnostico con diabetes Tipo 2 (Por favor de indicar el numero de años)
_____

Cual es su estado de empleo actual?

Desempleado ____

Empleado de tipo medio ____

Empleado de tipo completo ____

Cual es su estado de seguro de salud actual?

Sin Seguro de Salud health insurance _____

Seguro de Salud del gobierno (como Medicare) _____

Seguro de Salud del empleador ____

Seguro de Salud de uno mismo _____

Appendix E: Patient's Diabetes Knowledge Questionnaire

DIRECTIONS: Read the following statements below carefully and select your response by using "X" accordingly. Its scale is: Yes = 2, No = 1, I don't know = 0

	Questions	Yes	No	Don't Know
1	Eating too much sugar and other sweet foods is a cause of diabetes.			
2	The usual cause of diabetes is lack of effective insulin in the body.			
3	Diabetes is caused by failure of the kidneys to keep sugar out of the			
4	Kidneys produce insulin.			
5	In untreated diabetes, the amount of sugar in the blood usually			
6	If I am diabetic, my children have a higher chance of being diabetic.			
7	Diabetes can be cured.			
8	A fasting blood sugar level of 210 is too high.			
9	The best way to check my diabetes is by testing my urine.			
10	Regular exercise will increase the need for insulin or other diabetic medication.			
11	There are two main types of diabetes: Type 1 (insulin-dependent) and Type 2 (non-insulin dependent).			
12	An insulin reaction is caused by too much food.			
13	Medication is more important than diet and exercise to control my diabetes.			
14	Diabetes often causes poor circulation.			
15	Cuts and abrasions on diabetes heal more slowly.			
16	Diabetics should take extra care when cutting their toenails.			
17	A person with diabetes should cleanse a cut with iodine and alcohol.			
18	The way I prepare my food is as important as the foods I eat.			
19	Diabetes can damage my kidneys.			
20	Diabetes can cause loss of feeling in my hands, fingers and feet.			
21	Shaking and sweating are signs of high blood sugar.			
22	Frequent urination and thirst are signs of low blood sugar.			
23	Tight elastic hose or socks are not bad for diabetics.			
24	A diabetic diet consists mostly of special foods.			

.

INSTRUCCIONES: Por favor lea estas frases cuidadosamente y marque su respuesta con "X" La escala es: Sí = 2, No = 1, No sé = 0

	Preguntas	Si	No	No Se
1	El comer mucha azúcar y otras comidas dulces es una cause de la			
2	La causa común de la diabetes es la falta de insulina efectiva en el			
3	La diabetes es causada porque los riñones no pueden mantener el azúcar fuera de la orina.			
4	Los riñones producen la insulina.			
5	En la diabetes que no se está tratando, la cantidad de azúcar en la			
6	Si yo soy diabético, mis hijos tendran más riesgo de ser diébeticos.			
7	Se puede curar la diabetes.			
8	Un nivel de azucar de 210 en prueba de sangre hecha en ayunas es muy			
9	La mejor manera de checar mi diabetes es haciendo pruebas de orina.			
10	El ejercicio regular aumentará la necesidad de insulina u otro			
11	Hay dos tipos principales de diabetes: Tipo 1 (dependiente de insulina) y Tipo 2 (no-dependiente de insulina).			
12	Una reacción de insulina es causada por mucha comida.			
13	La medicina es más importante que la dieta y el ejercicio pare controlar mi diabetes.			
14	La diabetes frequentemente causa mala circulación.			
15	Cortaduras y rasguños cicatrizan mas despacio en diabéticos.			
16	Los diabéticos deberían poner cuidado extra al cortarse las uñas de los dedos de los pies.			
17	Una persona con diabetes debería limpiar una cortadura primero yodo y alcohol.			
18	La manera en que preparo mi comida es igual de importante que las comidas que como.			
19	La diabetes puede dañar mis riñones.			
20	La diabetes puede causar que no sienta en mis manos, dedos y pies.			
21	El temblar y sudar son señales de azúcar alta en la sangre.			
22	El orinar seguido y la sed son señales de azúcar baja en la sangre.			
23	Los calcetines y las medias elásticas apretadas no son malos para los			
24	Una dicta diabética consiste principalmente de comidas especiales.			

Appendix F: Short Assessment of Health Literacy-English (SAHL-E)

The 18 items of SAHL-E, ordered according to item difficulty (keys and distracters are listed in the same random order as in the field interview)

Stem	Key or Distracter		
1. kidney	__ urine	__fever	__don't know
2. occupation	__ work	__education	__ don't know
3. medication	__ instrument	__ treatment	__ don't know
4. nutrition	__ healthy	__soda	__ don't know
5. miscarriage	__ loss	__marriage	__ don't know
6. infection	__ plant	__ virus	__ don't know
7. alcoholism	__ addiction	__ recreation	__ don't know
8. pregnancy	__birth	__childhood	__ don't know
9. seizure	__dizzy	__calm	__ don't know
10. dose	__sleep	__amount	__ don't know
11. hormones	__growth	__harmony	__ don't know
12. abnormal	__different	__similar	__ don't know
13. directed	__instruction	__decision	__ don't know
14. nerves	__bored	__anxiety	__ don't know
15. constipation	__blocked	__loose	__ don't know
16. diagnosis	__ evaluation	__recovery	__ don't know
17. hemorrhoids	__veins	__heart	__ don't know
18. syphilis	__contraception	__condom	__ don't know

Las 18 preguntas del cuestionario SAHL-S, estan presentadas aqui abajo de acuerdo al nivel de dificultad (keys y distracters estan presentadas en las misma manera como se ha establecido en la intrevista).

Stem	Key or Distracter		
1. empleo	__trabajo	__educación	__no se
2. convulsiones	__mareado	__tranquilo	__no se
3. infección	__mata	__virus	__no se
4. medicamento	__instrumento	__tratamiento	__no se
5. alcoholismo	__adicción	__recreo	__no se
6. riñón	__orina	__fiebre	__no se
7. dosis	__dormir	__cantidad	__no se
8. aborto espontáneo	__pérdida	__matrimonio	__no se
9. estreñimiento	__bloqueado	__suelto	__no se
10. embarazo	__parto	__niñez	__no se
11. nervios	__aburrido	__ansiedad	__no se
12. nutrición	__saludable	__gaseosa	__no se
13. indicado	__instrucción	__decisión	__no se
14. hormonas	__crecimiento	__harmonía	__no se
15. abnormal	__diferente	__similar	__no se
16. diagnóstico	__evaluación	__recuperación	__no se
17. hemorroides	__venas	__corazón	__no se
18. sífilis	__anticonceptivo	__condón	__no se

Appendix G: Diabetes Self-Efficiency Scale

STANFORD
PATIENT EDUCATION
RESEARCH CENTER

Self-Efficacy for Diabetes

We would like to know how confident you are in doing certain activities. For each of the following questions, please choose the number that corresponds to your confidence that you can do the tasks regularly at the present time.

1. How confident do you feel that you can eat your meals every 4 to 5 hours every day, including breakfast every day?

2. How confident do you feel that you can follow your diet when you have to prepare or share food with other people who do not have diabetes?

3. How confident do you feel that you can choose the appropriate foods to eat when you are hungry (for example, snacks)?

4. How confident do you feel that you can exercise 15 to 30 minutes, 4 to 5 times a week?

5. How confident do you feel that you can do something to prevent your blood sugar level from dropping when you exercise?

6. How confident do you feel that you know what to do when your blood sugar level goes higher or lower than it should be?

7. How confident do you feel that you can judge when the changes in your illness mean you should visit the doctor?

8. How confident do you feel that you can control your diabetes so that it does not interfere with the things you want to do?

not at all confident 1 2 3 4 5 6 7 8 9 10 totally confident

STANFORD
PATIENT EDUCATION
RESEARCH CENTER

Spanish Diabetes Self-Efficacy

En las siguientes preguntas nos gustaría saber qué piensa Ud. de sus habilidades para controlar su enfermedad. Por favor marque el número que mejor corresponda a su nivel de seguridad de que puede realizar en este momento las siguientes tareas.

1. ¿Qué tan seguro(a) se siente Ud. de poder comer sus alimentos cada 4 ó 5 horas todos los días. Esto incluye tomar desayuno todos los días?

2. ¿Que´ tan seguro(a) se siente Ud. de continuar su dieta cuando tiene que preparar o compartir alimentos con personas que no tienen diabetes?

3. ¿Qué tan seguro(a) se siente Ud. de poder escoger los alimentos apropiados para comer cuando tiene hambre (por ejemplo, bocadillos)?

4. ¿Qué tan seguro(a) se siente Ud. de poder hacer ejercicios de 15 a 30 minutos, unas 4 o 5 veces por semana?

5. ¿Qué tan seguro(a) se siente Ud. de poder hacer algo para prevenir que su nivel de azúcar en la sangre disminuya cuando hace ejercicios?

6. ¿Qué tan seguro(a) se siente Ud. de poder saber qué hacer cuando su nivel de azúcar en la sangre sube o baja más de lo normal para usted?

7. ¿Qué tan seguro(a) se siente Ud. de poder evaluar cuando los cambios en su enfermedad significan que usted debe visitar a su médico?

muy inseguro(a) 1 2 3 4 5 6 7 8 9 10 muy seguro(a)

8. ¿Qué tan seguro(a) se siente Ud. de poder controlar su diabetes para que no interfiera con las cosas que quiere hacer?

muy inseguro(a)	1	2	3	4	5	6	7	8	9	10 muy seguro(a)

Appendix H: Summary of Diabetes Self-Care Activities Questionnaire

The questions below ask you about your diabetes self-care activities during the past 7 days. If you were sick during the past 7 days, please think back to the last 7 days that you were not sick.

DIET

	Number of Days
1. How many of the last SEVEN DAYS have you followed a healthful eating plan?	□0 □1 □2 □3 □4 □5 □6 □7
2. On average, over the past month, how many DAYS PER WEEK have you followed your eating plan?	□0 □1 □2 □3 □4 □5 □6 □7
3. On how many of the last SEVEN DAYS did you eat five or more servings of fruits and vegetables?	□0 □1 □2 □3 □4 □5 □6 □7
4. On how many of the last SEVEN DAYS did you eat high-fat foods, such as red meat or full-fat dairy products?	□0 □1 □2 □3 □4 □5 □6 □7

PHYSICAL ACTIVITY

5. On how many of the last SEVEN DAYS did you participate in at least 30 minutes of physical activity? *(Total minutes of continuous activity, including walking).*	□0 □1 □2 □3 □4 □5 □6 □7
6. On how many of the last SEVEN DAYS did you participate in a specific exercise session (such as swimming, walking, biking) other than what you do around the house or as part of your work?	□0 □1 □2 □3 □4 □5 □6 □7

BLOOD SUGAR TESTING

7. On how many of the last SEVEN DAYS did you test your blood sugar?	□0 □1 □2 □3 □4 □5 □6 □7

Number of Days

8. On how many of the last SEVEN DAYS did you test your blood sugar the number of times recommended by your health-care provider? □0 □1 □2 □3 □4 □5 □6 □7

FOOT CARE

9. On how many of the last SEVEN DAYS did you check your feet? □0 □1 □2 □3 □4 □5 □6 □7

10. On how many of the last SEVEN DAYS did you inspect the inside of your shoes? □0 □1 □2 □3 □4 □5 □6 □7

11. On how many of the last SEVEN DAYS did you dry between your toes after washing? □0 □1 □2 □3 □4 □5 □6 □7

SMOKING

12. Have you smoked a cigarette, even a puff, in the PAST SEVEN DAYS?

□0 No □1 Yes

13. How many cigarettes did you smoke on an average day? _____

Las siguientes serán preguntas acerca de sus actividades para el auto-cuidado de su diabetes ***en los últimos 7 días***. Si usted estuvo enfermo(a) durante los últimos 7 días, por favor piense en 7 dias consecutivos y anteriores en que estuvo bien de salud. Por favor conteste las preguntas honestamente y lo más preciso posible.

ALIMENTACION Numero de dias

1. ¿Cuántos días, durante los últimos siete días, ha seguido un régimen alimenticio saludable? □0 □1 □2 □3 □4 □5 □6 □7

2. En promedio, durante el mes pasado, ¿Cuántos días por semana ha seguido Su régimen alimenticio? □0 □1 □2 □3 □4 □5 □6 □7

3. ¿Cuántos días, durante los últimos siete días, comió cinco o más porciones de frutas y verduras? □0 □1 □2 □3 □4 □5 □6 □7

4. ¿Cuántos días, durante los últimos Siete días, comió comidas altas en grasa tal como carne roja o productos lácteos enteros?? □0 □1 □2 □3 □4 □5 □6 □7

EJERCICIO

5. Cuántos días, durante los últimos siete días, hizó por lo menos 30 minutos de actividad física diaria? *(minutos totals de actividad que incluye caminar activity)* □0 □1 □2 □3 □4 □5 □6 □7

6. ¿Cuántos días, durante los últimos siete días, participó en una sesión específica de ejercicio (tal como nadar, caminar, andar en bicicleta), aparte de los quehaceres de la casa o la actividad en su trabajo? □0 □1 □2 □3 □4 □5 □6 □7

PRUEBAS DEL AZUCAR EN LA SANGRE

7. ¿Cuántos días, durante los últimos siete días, se examinó su nivel de azúcar en la sangre? □0 □1 □2 □3 □4 □5 □6 □7

Numero de dias

8. ¿Cuántos días, durante los últimos siete días, se examinó su nivel de azúcar en la sangre el número de veces que su proveedor de salud le recomendó? □0 □1 □2 □3 □4 □5 □6 □7

CUIDADO DE LOS PIES

9. ¿Cuántos días, durante los últimos siete días, se revisó los pies? □0 □1 □2 □3 □4 □5 □6 □7

10. ¿Cuántos días, durante los últimos siete días, inspeccionó la parte de adentro de sus zapatos? □0 □1 □2 □3 □4 □5 □6 □7

11. ¿Cuántos días, durante los últimos siete días, se seco entre los dedos de sus dedos despues de laverselos? □0□1 □2 □3 □4 □5 □6 □7

CONSUMO DE TABACO

12. ¿Ha fumado algun cigarro, incluso una jalada, EN LOS ULTIMOS SIETE DIAS?

□0 no □1 Sí

13. ¿Cuantos cigarros fumo en un dia normal? _____

Appendix I: NIH Certificate of Completion

Certificate of Completion

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

Date of completion: 09/16/2013

Certification Number: 1269878

Appendix J: SPSS Outputs

```
* Encoding: windows-1252.
GET
  FILE='\Nelson\Final Data.sav'.

Warning.  Command name: GET FILE
SPSS Statistics data file " \Nelson\Final Data.sav" is written in a character encoding (utf-
8)
incompatible with the current LOCALE setting.  It may not be readable.
Consider changing LOCALE or setting UNICODE on.  (DATA 1721)

Warning # 67.  Command name: GET FILE
The document is already in use by another user or process.  If you make
changes to the document they may overwrite changes made by others or your
changes may be overwritten by others.
File opened \Nelson\Final Data.sav

DATASET NAME DataSet1 WINDOW=FRONT.
```

Dataset Name

Notes

Output Created		29-JUL-2017 23:22:36
Comments		
Input	Data	Nelson\Final Data.sav
	Filter	<none>
	Weight	<none>
	Split File	<none>
Syntax		DATASET NAME DataSet1 WINDOW=FRONT.
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.00

Warnings

The active dataset will replace the existing dataset named DataSet1.

```
DESCRIPTIVES VARIABLES=age
  /STATISTICS=MEAN STDDEV MIN MAX.
```

Descriptives

Notes

Output Created		29-JUL-2017 23:22:36
Comments		
Input	Data	Nelson\Final Data.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	99
Missing Value Handling	Definition of Missing	User defined missing values are treated as missing.
	Cases Used	All non-missing data are used.
Syntax		DESCRIPTIVES VARIABLES=age /STATISTICS=MEAN STDDEV MIN MAX.
Resources	Processor Time	00:00:00.03
	Elapsed Time	00:00:00.02

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
age	99	28	83	51.60	11.101
Valid N (listwise)	99				

FREQUENCIES VARIABLES=male m_status income education employ_status insurance
/ORDER=ANALYSIS.

Frequencies

Notes

Output Created	29-JUL-2017 23:22:37
Comments	

Input	Data	Nelson\Final Data.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	99
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data.
Syntax		FREQUENCIES VARIABLES=male m_status income education employ_status insurance /ORDER=ANALYSIS.
Resources	Processor Time	00:00:00.03
	Elapsed Time	00:00:00.03

Statistics

		male	m_status	income	education level	employment status	insurance
N	Valid	98	97	97	96	99	98
	Missing	1	2	2	3	0	1

Frequency Table

male

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	53	53.5	54.1	54.1
	1	45	45.5	45.9	100.0
	Total	98	99.0	100.0	
Missing	System	1	1.0		
Total		99	100.0		

m_status

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	38	38.4	39.2	39.2
	2	31	31.3	32.0	71.1
	3	22	22.2	22.7	93.8
	4	6	6.1	6.2	100.0
	Total	97	98.0	100.0	
Missing	System	2	2.0		
Total		99	100.0		

income

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	4	4.0	4.1	4.1
	2	8	8.1	8.2	12.4
	3	18	18.2	18.6	30.9
	4	23	23.2	23.7	54.6
	5	27	27.3	27.8	82.5
	6	17	17.2	17.5	100.0
	Total	97	98.0	100.0	
Missing	System	2	2.0		
Total		99	100.0		

education level

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	5	5.1	5.2	5.2
	2	12	12.1	12.5	17.7
	3	11	11.1	11.5	29.2
	4	19	19.2	19.8	49.0
	5	31	31.3	32.3	81.3
	6	18	18.2	18.8	100.0
	Total	96	97.0	100.0	

Missing	System	3	3.0		
Total		99	100.0		

employment status

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	67	67.7	67.7	67.7
	2	13	13.1	13.1	80.8
	3	19	19.2	19.2	100.0
	Total	99	100.0	100.0	

insurance

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	13	13.1	13.3	13.3
	2	38	38.4	38.8	52.0
	3	30	30.3	30.6	82.7
	4	17	17.2	17.3	100.0
	Total	98	99.0	100.0	
Missing	System	1	1.0		
Total		99	100.0		

```
DATASET NAME DataSet1 WINDOW=FRONT.
DESCRIPTIVES VARIABLES=dkq_score sahls_score sdsca_score se_score
  /STATISTICS=MEAN STDDEV MIN MAX.
```

Descriptives

Notes

Output Created		29-JUL-2017 23:22:37
Comments		
Input	Data	Nelson\Final Data.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>

	Split File	<none>
	N of Rows in Working Data File	99
Missing Value Handling	Definition of Missing	User defined missing values are treated as missing.
	Cases Used	All non-missing data are used.
Syntax		DESCRIPTIVES VARIABLES=dkq_score sahls_score sdsca_score se_score /STATISTICS=MEAN STDDEV MIN MAX.
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.00

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
diabetes knowledge	99	0	20	12.33	6.422
health literacy level score	99	0	18	14.15	7.176
self-reported diabetes self-care behaviors score	99	0	51	33.02	17.728
self-efficacy score	99	0	77	37.76	20.054
Valid N (listwise)	99				

DESCRIPTIVES VARIABLES=dkq_score sahls_score sdsca_score se_score age
/STATISTICS=MEAN STDDEV MIN MAX KURTOSIS SKEWNESS.

Descriptives

Notes

Output Created		29-JUL-2017 23:22:37
Comments		
Input	Data	Nelson\Final Data.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	99

Missing Value Handling	Definition of Missing	User defined missing values are treated as missing.
	Cases Used	All non-missing data are used.
Syntax		DESCRIPTIVES VARIABLES=dkq_score sahls_score sdsca_score se_score age /STATISTICS=MEAN STDDEV MIN MAX KURTOSIS SKEWNESS.
Resources	Processor Time	00:00:00.02
	Elapsed Time	00:00:00.02

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic
diabetes knowledge	99	0	20	12.33	6.422	-1.299
health literacy level score	99	0	18	14.15	7.176	-1.488
self-reported diabetes self-care behaviors score	99	0	51	33.02	17.728	-1.222
self-efficacy score	99	0	77	37.76	20.054	-1.186
age	99	28	83	51.60	11.101	.151
Valid N (listwise)	99					

Descriptive Statistics

	Skewness	Kurtosis	
	Std. Error	Statistic	Std. Error
diabetes knowledge	.243	.001	.481
health literacy level score	.243	.247	.481
self-reported diabetes self-care behaviors score	.243	-.259	.481
self-efficacy score	.243	-.066	.481
age	.243	-.179	.481
Valid N (listwise)			

```
EXAMINE VARIABLES=dkq_score
  /PLOT BOXPLOT HISTOGRAM NPPLOT
  /COMPARE GROUPS
```

```
/STATISTICS DESCRIPTIVES
/CINTERVAL 95
/MISSING LISTWISE
/NOTOTAL.
```

Explore

Notes

Output Created		29-JUL-2017 23:22:37
Comments		
Input	Data	Nelson\Final Data.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	99
Missing Value Handling	Definition of Missing	User-defined missing values for dependent variables are treated as missing.
	Cases Used	Statistics are based on cases with no missing values for any dependent variable or factor used.
Syntax		EXAMINE VARIABLES=dkq_score /PLOT BOXPLOT HISTOGRAM NPPLOT /COMPARE GROUPS /STATISTICS DESCRIPTIVES /CINTERVAL 95 /MISSING LISTWISE /NOTOTAL.
Resources	Processor Time	00:00:00.99
	Elapsed Time	00:00:01.25

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
diabetes knowledge	99	100.0%	0	0.0%	99	100.0%

Descriptives

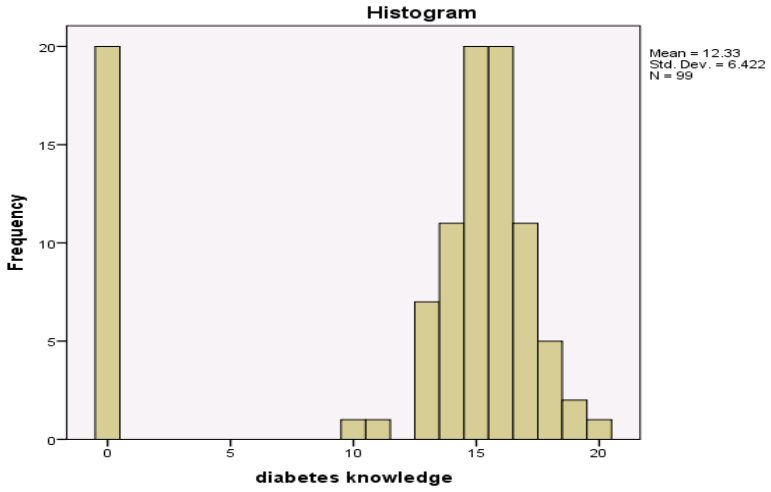
			Statistic	Std. Error
diabetes knowledge	Mean		12.33	.645
	95% Confidence Interval for Mean	Lower Bound	11.05	
		Upper Bound	13.61	
	5% Trimmed Mean		12.66	
	Median		15.00	
	Variance		41.245	
	Std. Deviation		6.422	
	Minimum		0	
	Maximum		20	
	Range		20	
	Interquartile Range		3	
	Skewness		-1.299	.243
	Kurtosis		.001	.481

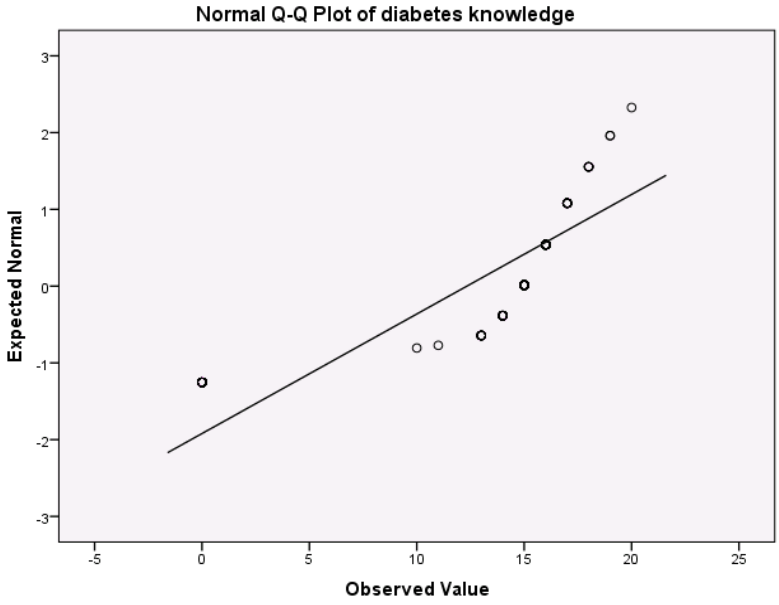
Tests of Normality

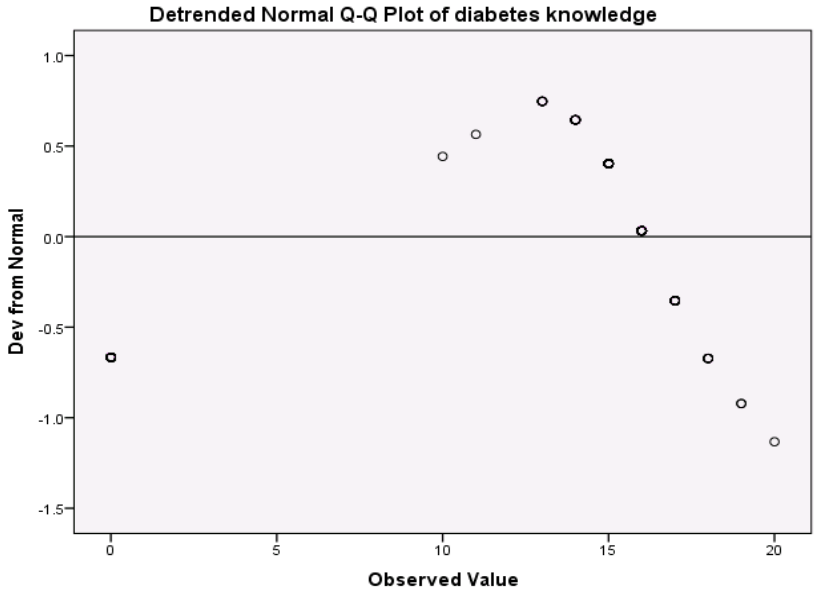
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
diabetes knowledge	.319	99	.000	.698	99	.000

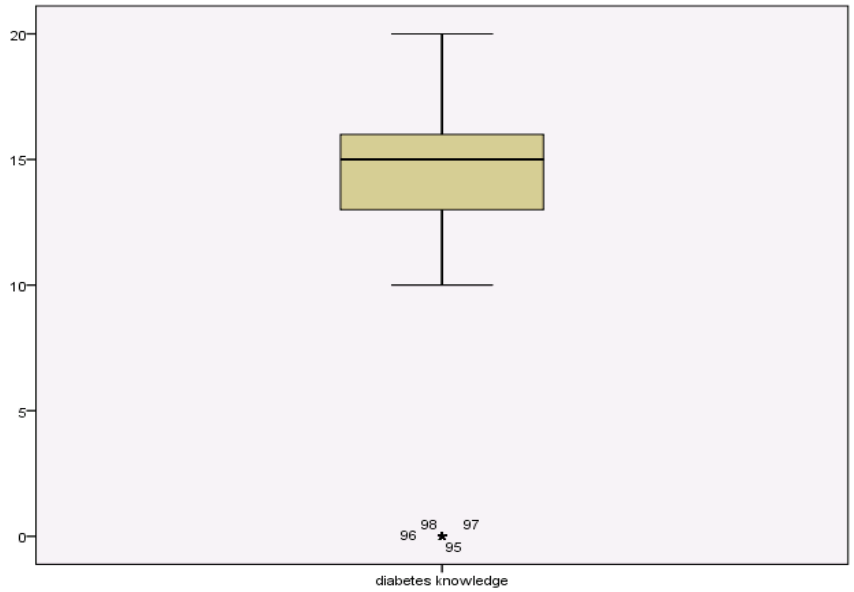
a. Lilliefors Significance Correction

diabetes knowledge




Normal Q-Q Plot of diabetes knowledge
Expected Normal
Observed Value
3
2
1
0
-1
-2
-3
-5
0
5
10
15
20
25


Detrended Normal Q-Q Plot of diabetes knowledge
Dev from Normal
Observed Value
1.0
0.5
0.0
-0.5
-1.0
-1.5
0
5
10
15
20




```
EXAMINE VARIABLES=sahls_score
  /PLOT BOXPLOT HISTOGRAM NPPLOT
  /COMPARE GROUPS
  /STATISTICS DESCRIPTIVES
  /CINTERVAL 95
  /MISSING LISTWISE
  /NOTOTAL.
```

Explore

Notes

Output Created		29-JUL-2017 23:22:38
Comments		
Input	Data	Nelson\Final Data.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	99
Missing Value Handling	Definition of Missing	User-defined missing values for dependent variables are treated as missing.

	Cases Used	Statistics are based on cases with no missing values for any dependent variable or factor used.
Syntax		EXAMINE VARIABLES=sahls_score /PLOT BOXPLOT HISTOGRAM NPPLOT /COMPARE GROUPS /STATISTICS DESCRIPTIVES /CINTERVAL 95 /MISSING LISTWISE /NOTOTAL.
Resources	Processor Time	00:00:00.83
	Elapsed Time	00:00:00.84

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
health literacy level score	99	100.0%	0	0.0%	99	100.0%

Descriptives

			Statistic	Std. Error
health literacy level score	Mean		14.15	.721
	95% Confidence Interval for Mean	Lower Bound	12.72	
		Upper Bound	15.58	
	5% Trimmed Mean		14.72	
	Median		18.00	
	Variance		51.497	
	Std. Deviation		7.176	
	Minimum		0	
	Maximum		18	
	Range		18	
	Interquartile Range		1	
	Skewness		-1.488	.243

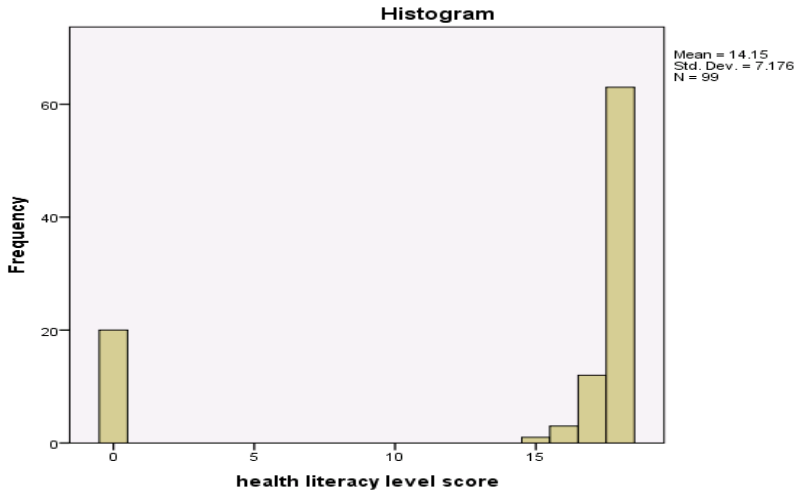
Kurtosis	.247	.481

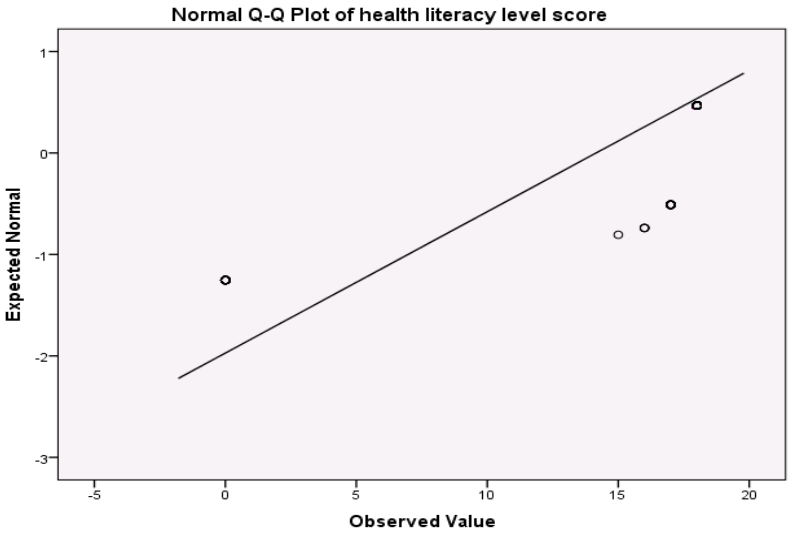
Tests of Normality

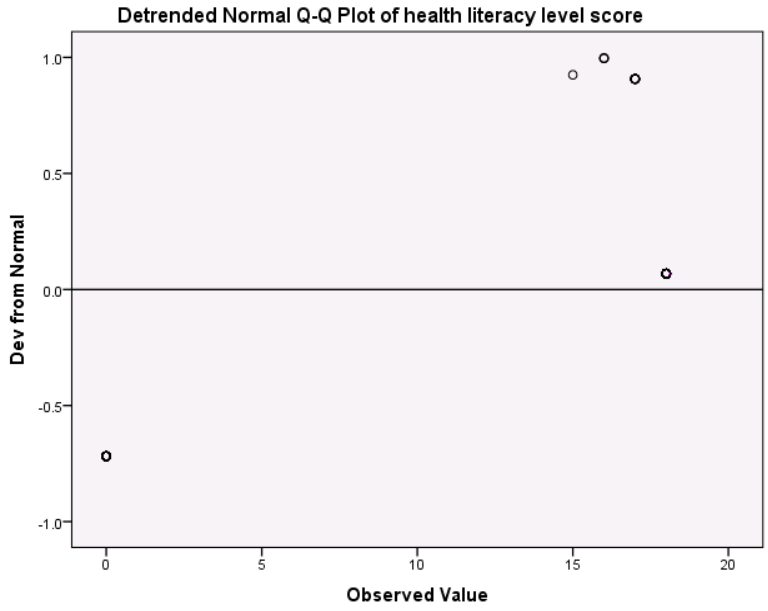
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
health literacy level score	.412	99	.000	.531	99	.000

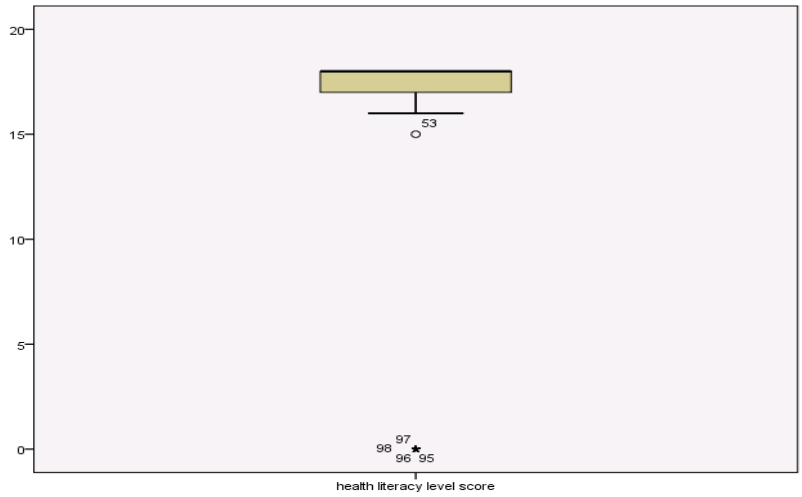
a. Lilliefors Significance Correction

health literacy level score










```
EXAMINE VARIABLES=sdsca_score
  /PLOT BOXPLOT HISTOGRAM NPPLOT
  /COMPARE GROUPS
  /STATISTICS DESCRIPTIVES
  /CINTERVAL 95
  /MISSING LISTWISE
  /NOTOTAL
```

Explore

Notes

Output Created		29-JUL-2017 23:22:39
Comments		
Input	Data	Nelson\Final Data.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	99
Missing Value Handling	Definition of Missing	User-defined missing values for dependent variables are treated as missing.
	Cases Used	Statistics are based on cases with no missing values for any dependent variable or factor used.
Syntax		EXAMINE VARIABLES=sdsca_score /PLOT BOXPLOT HISTOGRAM NPPLOT /COMPARE GROUPS /STATISTICS DESCRIPTIVES /CINTERVAL 95 /MISSING LISTWISE /NOTOTAL.
Resources	Processor Time	00:00:00.73
	Elapsed Time	00:00:01.05

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
self-reported diabetes self-care behaviors score	99	100.0%	0	0.0%	99	100.0%

Descriptives

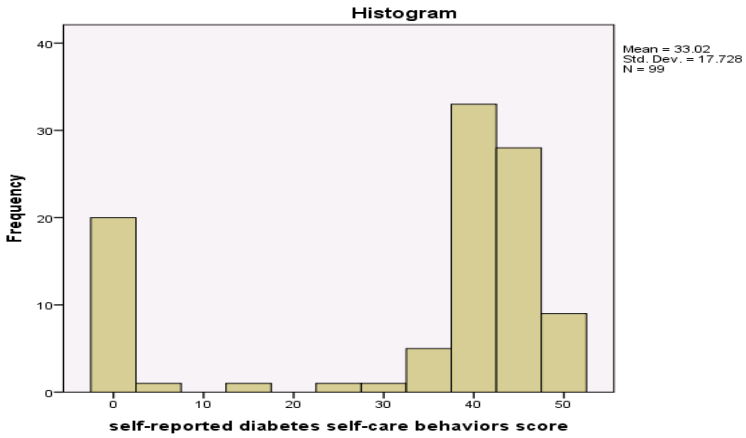
			Statistic	Std. Error
self-reported diabetes self-care behaviors score	Mean		33.02	1.782
	95% Confidence Interval for Mean	Lower Bound	29.48	
		Upper Bound	36.56	
	5% Trimmed Mean		33.89	
	Median		41.00	
	Variance		314.265	
	Std. Deviation		17.728	
	Minimum		0	
	Maximum		51	
	Range		51	
	Interquartile Range		9	
	Skewness		-1.222	.243
	Kurtosis		-.259	.481

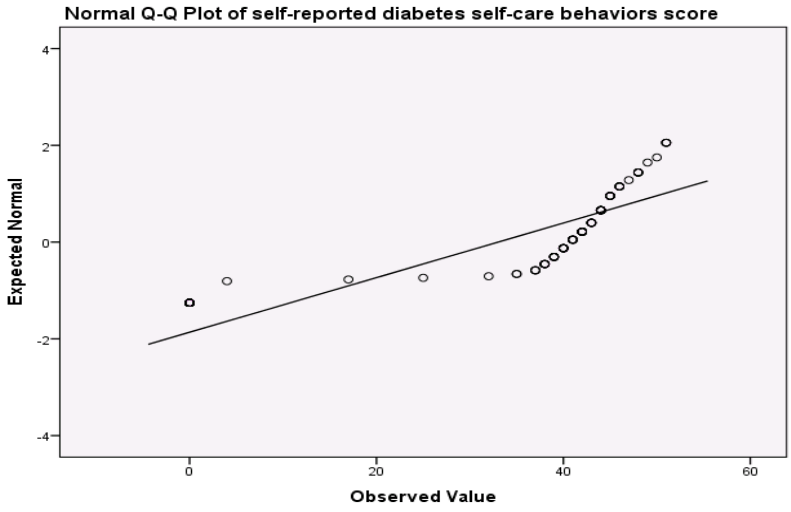
Tests of Normality

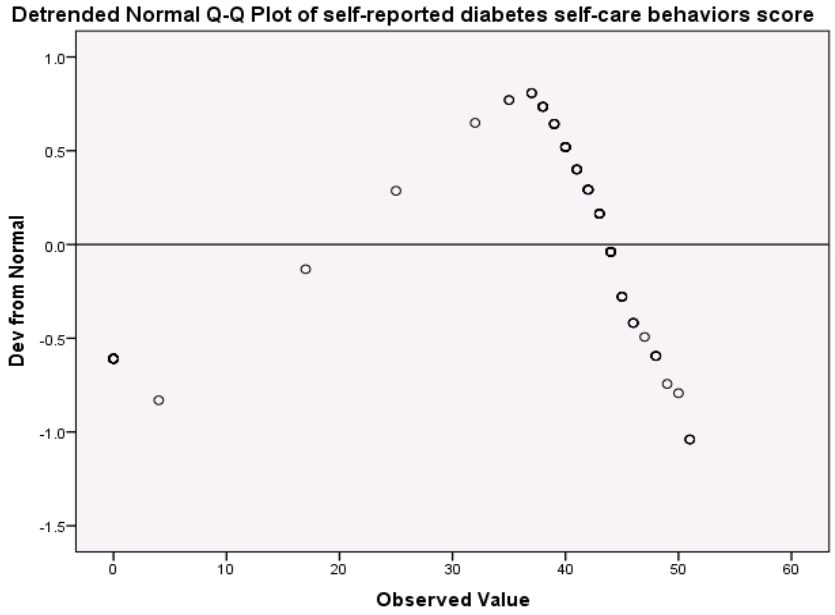
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
self-reported diabetes self-care behaviors score	.326	99	.000	.698	99	.000

a. Lilliefors Significance Correction

self-reported diabetes self-care behaviors score




Normal Q-Q Plot of self-reported diabetes self-care behaviors score
Expected Normal
Observed Value
4
2
0
-2
-4
0
20
40
60


Detrended Normal Q-Q Plot of self-reported diabetes self-care behaviors score
Dev from Normal
Observed Value
1.0
0.5
0.0
-0.5
-1.0
-1.5
0
10
20
30
40
50
60


```
EXAMINE VARIABLES=se_score
  /PLOT BOXPLOT HISTOGRAM NPPLOT
  /COMPARE GROUPS
  /STATISTICS DESCRIPTIVES
  /CINTERVAL 95
  /MISSING LISTWISE
  /NOTOTAL.
```

Explore

Notes

Output Created		29-JUL-2017 23:22:40
Comments		
Input	Data	Nelson\Final Data.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	99
Missing Value Handling	Definition of Missing	User-defined missing values for dependent variables are treated as missing.
	Cases Used	Statistics are based on cases with no missing values for any dependent variable or factor used.

Syntax		EXAMINE VARIABLES=se_score /PLOT BOXPLOT HISTOGRAM NPPLOT /COMPARE GROUPS /STATISTICS DESCRIPTIVES /CINTERVAL 95 /MISSING LISTWISE /NOTOTAL.
Resources	Processor Time	00:00:00.78
	Elapsed Time	00:00:00.94

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
self-efficacy score	99	100.0%	0	0.0%	99	100.0%

Descriptives

			Statistic	Std. Error
self-efficacy score	Mean		37.76	2.015
	95% Confidence Interval for Mean	Lower Bound	33.76	
		Upper Bound	41.76	
	5% Trimmed Mean		38.57	
	Median		46.00	
	Variance		402.145	
	Std. Deviation		20.054	
	Minimum		0	
	Maximum		77	
	Range		77	
	Interquartile Range		10	
	Skewness		-1.186	.243
	Kurtosis		-.066	.481

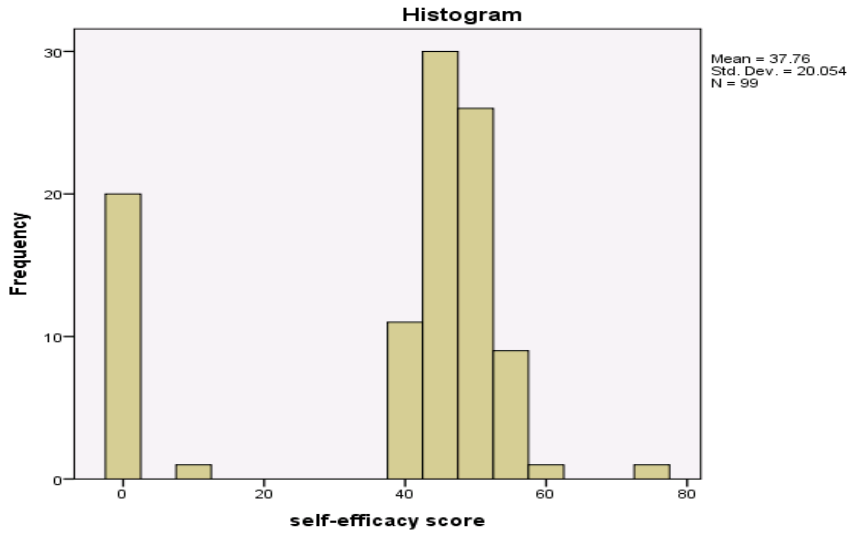
Tests of Normality

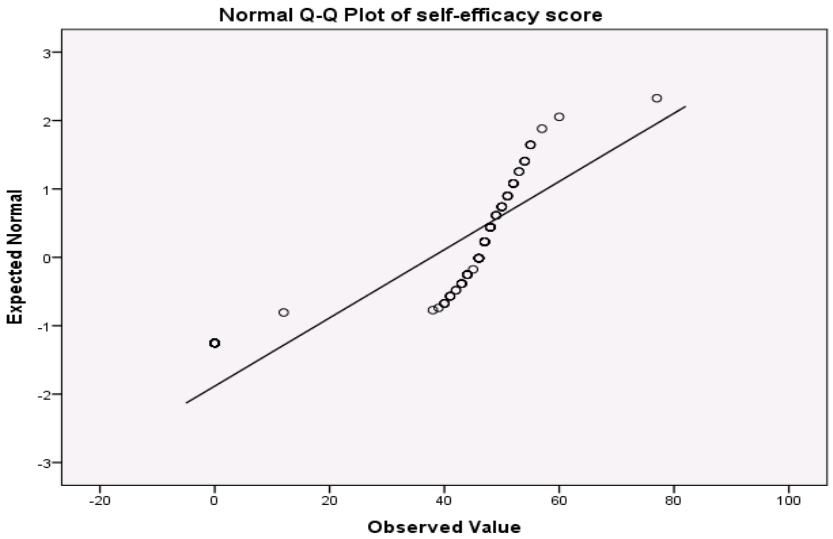
	Kolmogorov-Smirnov[a]	Shapiro-Wilk

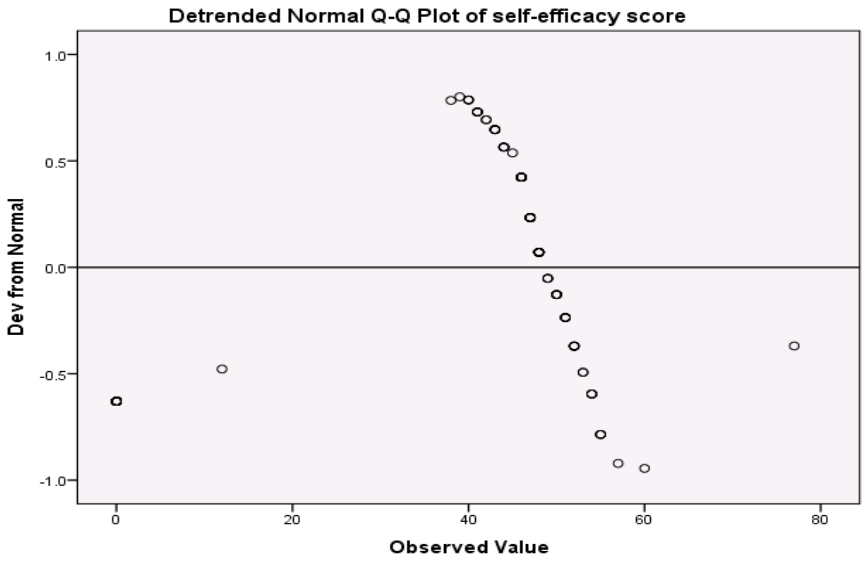
	Statistic	df	Sig.	Statistic	df	Sig.
self-efficacy score	.312	99	.000	.718	99	.000

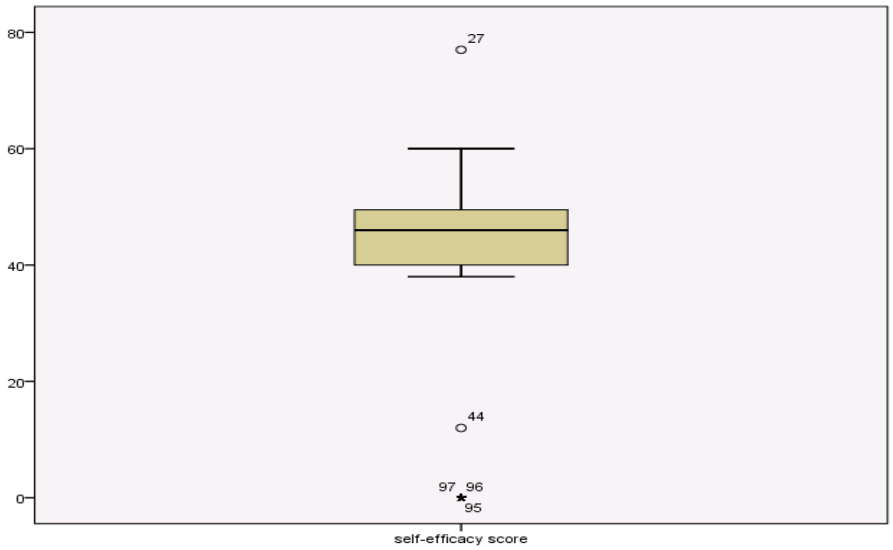
a. Lilliefors Significance Correction

self-efficacy score










```
FREQUENCIES VARIABLES=dkq_score sahls_score sdsca_score se_score
  /STATISTICS=SKEWNESS SESKEW
  /HISTOGRAM NORMAL
  /ORDER=ANALYSIS.
```

Frequencies

Notes

Output Created		29-JUL-2017 23:22:41
Comments		
Input	Data	Nelson\Final Data.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	99
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data.
Syntax		FREQUENCIES VARIABLES=dkq_score sahls_score sdsca_score se_score /STATISTICS=SKEWNESS SESKEW /HISTOGRAM NORMAL /ORDER=ANALYSIS.
Resources	Processor Time	00:00:00.73
	Elapsed Time	00:00:00.70

Statistics

		diabetes knowledge	health literacy level score	self-reported diabetes self-care behaviors score	self-efficacy score
N	Valid	99	99	99	99
	Missing	0	0	0	0
Skewness		-1.299	-1.488	-1.222	-1.186
Std. Error of Skewness		.243	.243	.243	.243

Frequency Table

diabetes knowledge

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	20	20.2	20.2	20.2
	10	1	1.0	1.0	21.2

	11	1	1.0	1.0	22.2
	13	7	7.1	7.1	29.3
	14	11	11.1	11.1	40.4
	15	20	20.2	20.2	60.6
	16	20	20.2	20.2	80.8
	17	11	11.1	11.1	91.9
	18	5	5.1	5.1	97.0
	19	2	2.0	2.0	99.0
	20	1	1.0	1.0	100.0
	Total	99	100.0	100.0	

health literacy level score

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	20	20.2	20.2	20.2
	15	1	1.0	1.0	21.2
	16	3	3.0	3.0	24.2
	17	12	12.1	12.1	36.4
	18	63	63.6	63.6	100.0
	Total	99	100.0	100.0	

self-reported diabetes self-care behaviors score

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	20	20.2	20.2	20.2
	4	1	1.0	1.0	21.2
	17	1	1.0	1.0	22.2
	25	1	1.0	1.0	23.2
	32	1	1.0	1.0	24.2
	35	2	2.0	2.0	26.3
	37	3	3.0	3.0	29.3
	38	6	6.1	6.1	35.4
	39	5	5.1	5.1	40.4
	40	9	9.1	9.1	49.5

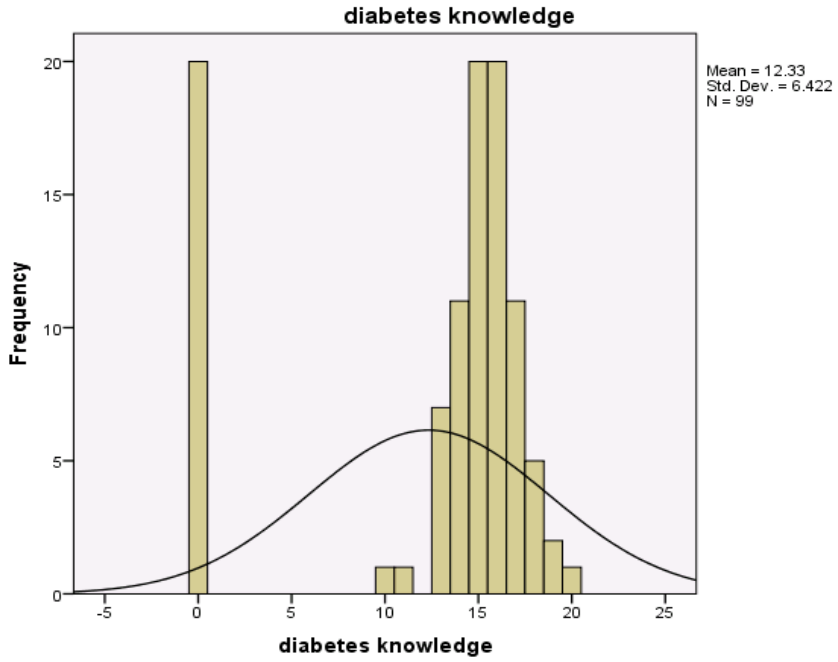
	41	5	5.1	5.1	54.5
	42	8	8.1	8.1	62.6
	43	6	6.1	6.1	68.7
	44	12	12.1	12.1	80.8
	45	5	5.1	5.1	85.9
	46	4	4.0	4.0	89.9
	47	1	1.0	1.0	90.9
	48	4	4.0	4.0	94.9
	49	1	1.0	1.0	96.0
	50	1	1.0	1.0	97.0
	51	3	3.0	3.0	100.0
	Total	99	100.0	100.0	

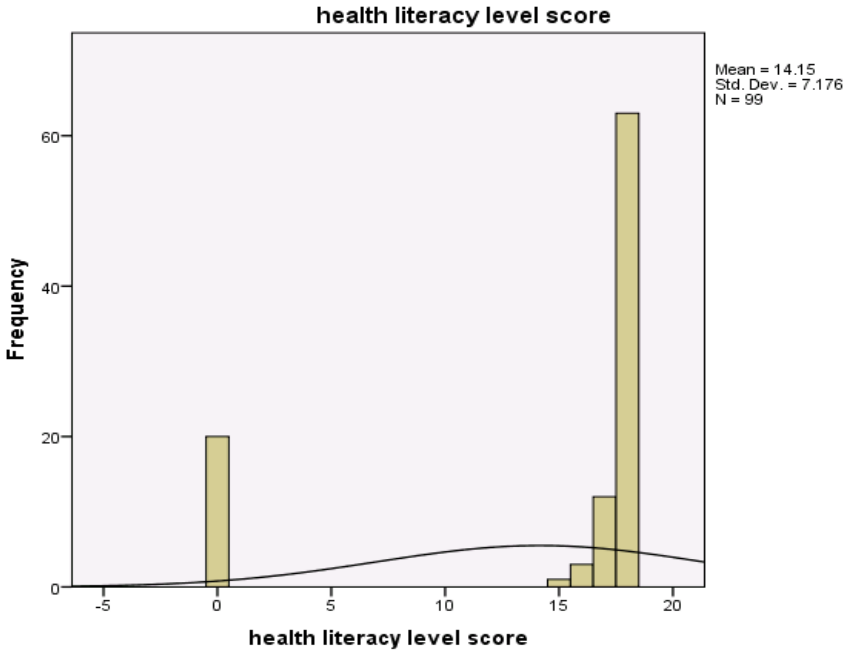
self-efficacy score

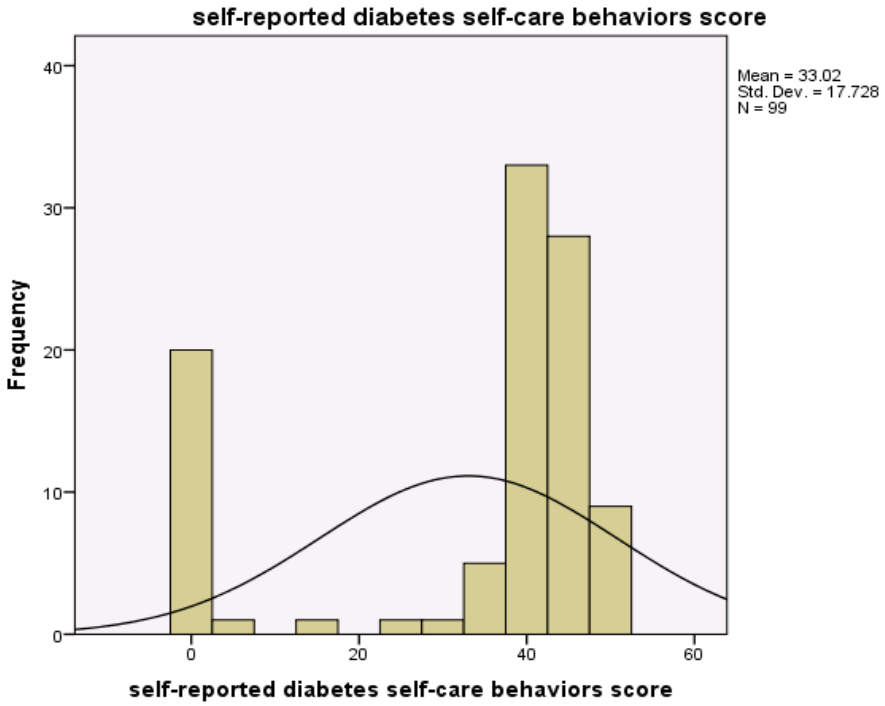
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	20	20.2	20.2	20.2
	12	1	1.0	1.0	21.2
	38	1	1.0	1.0	22.2
	39	1	1.0	1.0	23.2
	40	3	3.0	3.0	26.3
	41	4	4.0	4.0	30.3
	42	2	2.0	2.0	32.3
	43	5	5.1	5.1	37.4
	44	5	5.1	5.1	42.4
	45	1	1.0	1.0	43.4
	46	12	12.1	12.1	55.6
	47	7	7.1	7.1	62.6
	48	9	9.1	9.1	71.7
	49	3	3.0	3.0	74.7
	50	5	5.1	5.1	79.8
	51	4	4.0	4.0	83.8
	52	5	5.1	5.1	88.9
	53	2	2.0	2.0	90.9

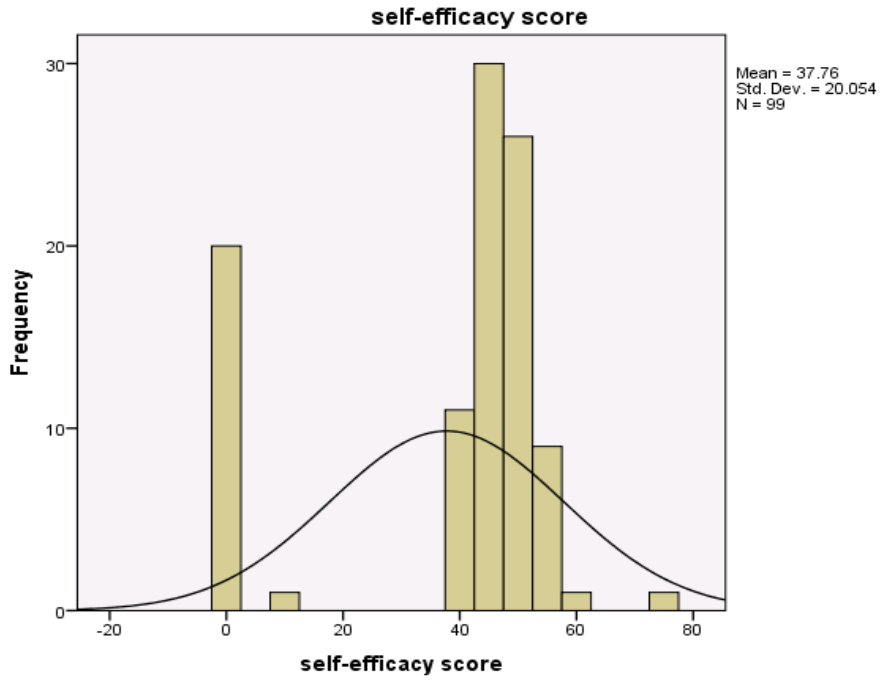
54	3	3.0	3.0	93.9
55	3	3.0	3.0	97.0
57	1	1.0	1.0	98.0
60	1	1.0	1.0	99.0
77	1	1.0	1.0	100.0
Total	99	100.0	100.0	

Histogram




health literacy level score
Mean = 14.15
Std. Dev. = 7.176
N = 99
Frequency
60
40
20
0
-5
0
5
10
15
20
health literacy level score


self-reported diabetes self-care behaviors score
Mean = 33.02
Std. Dev. = 17.728
N = 99
Frequency
40
30
20
10
0
0
20
40
60
self-reported diabetes self-care behaviors score




```
COMPUTE dv=lg10(sdsca_score+1).

REGRESSION
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS R ANOVA
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT dv
  /METHOD=ENTER education dkq_score sahls_score se_score
  /SAVE RESID.
```

Regression

Notes

Output Created		18-DEC-2017 17:12:38
Comments		
Input	Data	\Nelson\Final Data.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	99

Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on cases with no missing values for any variable used.
Syntax		REGRESSION /MISSING LISTWISE /STATISTICS COEFF OUTS R ANOVA /CRITERIA=PIN(.05) POUT(.10) /NOORIGIN /DEPENDENT sdsca_score /METHOD=ENTER dkq_score education.
Resources	Processor Time	00:00:00.03
	Elapsed Time	00:00:00.03
	Memory Required	13296 bytes
	Additional Memory Required for Residual Plots	0 bytes

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	education level, diabetes knowledge[b]	.	Enter

a. Dependent Variable: self-reported diabetes self-care behaviors score

b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.919[a]	.845	.841	7.137

a. Predictors: (Constant), education level, diabetes knowledge

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	25750.624	2	12875.312	252.766	.000[b]
	Residual	4737.209	93	50.938		
	Total	30487.833	95			

a. Dependent Variable: self-reported diabetes self-care behaviors score

b. Predictors: (Constant), education level, diabetes knowledge

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-3.593	2.281		-1.575	.119
	diabetes knowledge	2.339	.124	.845	18.795	.000
	education level	1.859	.550	.152	3.381	.001

a. Dependent Variable: self-reported diabetes self-care behaviors score

Regression

Notes

Output Created		18-DEC-2017 17:12:38
Comments		
Input	Data	\Nelson\Final Data.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	99
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on cases with no missing values for any variable used.

Syntax		REGRESSION /MISSING LISTWISE /STATISTICS COEFF OUTS R ANOVA /CRITERIA=PIN(.05) POUT(.10) /NOORIGIN /DEPENDENT sdsca_score /METHOD=ENTER sahls_score.
Resources	Processor Time	00:00:00.02
	Elapsed Time	00:00:00.02
	Memory Required	12848 bytes
	Additional Memory Required for Residual Plots	0 bytes

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	health literacy level score[b]	.	Enter

a. Dependent Variable: self-reported diabetes self-care behaviors score

b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.940[a]	.884	.883	6.073

a. Predictors: (Constant), health literacy level score

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	27220.559	1	27220.559	738.076	.000[b]
	Residual	3577.401	97	36.880		
	Total	30797.960	98			

a. Dependent Variable: self-reported diabetes self-care behaviors score

b. Predictors: (Constant), health literacy level score

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.154	1.355		.114	.910
	health literacy level score	2.322	.085	.940	27.168	.000

a. Dependent Variable: self-reported diabetes self-care behaviors score

Regression

Notes

Output Created		18-DEC-2017 17:12:38
Comments		
Input	Data	\Nelson\Final Data.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	99
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on cases with no missing values for any variable used.
Syntax		REGRESSION /MISSING LISTWISE /STATISTICS COEFF OUTS R ANOVA /CRITERIA=PIN(.05) POUT(.10) /NOORIGIN /DEPENDENT sdsca_score /METHOD=ENTER se_score.
Resources	Processor Time	00:00:00.03
	Elapsed Time	00:00:00.03

	Memory Required	12848 bytes
	Additional Memory Required for Residual Plots	0 bytes

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	self-efficacy score[b]	.	Enter

a. Dependent Variable: self-reported diabetes self-care behaviors score

b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.955[a]	.912	.911	5.296

a. Predictors: (Constant), self-efficacy score

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	28077.159	1	28077.159	1000.987	.000[b]
	Residual	2720.800	97	28.049		
	Total	30797.960	98			

a. Dependent Variable: self-reported diabetes self-care behaviors score

b. Predictors: (Constant), self-efficacy score

Coefficients[a]

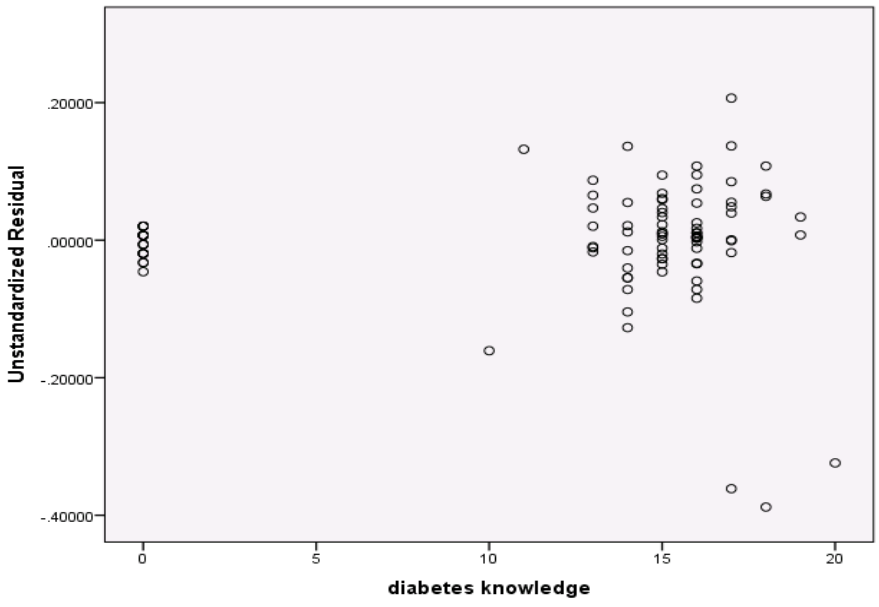
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.151	1.139		1.010	.315
	self-efficacy score	.844	.027	.955	31.638	.000

a. Dependent Variable: self-reported diabetes self-care behaviors score

Graph

Notes

Output Created		29-JUL-2017 23:22:42
Comments		
Input	Data	Nelson\Final Data.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	99
Syntax		GRAPH /SCATTERPLOT(BIVAR)=dkq_score WITH RES_1 /MISSING=LISTWISE.
Resources	Processor Time	00:00:00.34
	Elapsed Time	00:00:00.33

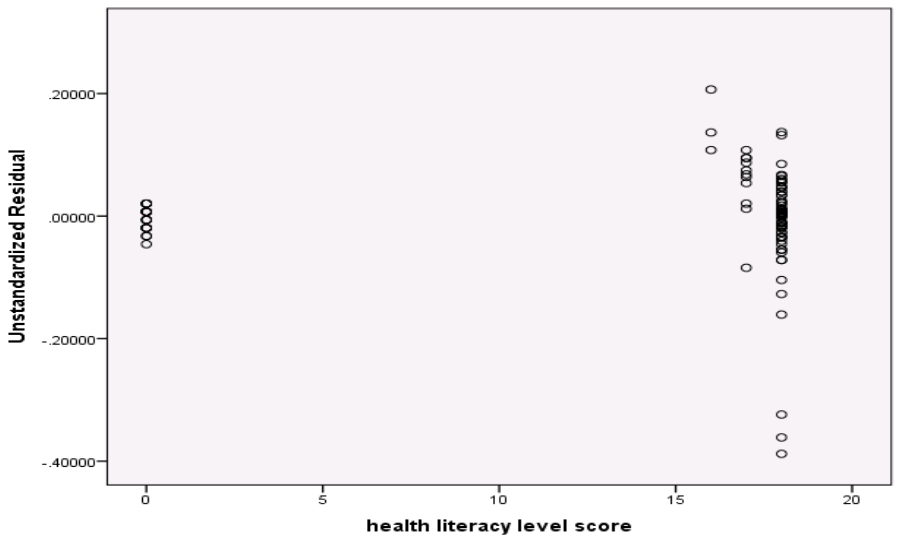


```
GRAPH
  /SCATTERPLOT(BIVAR)=sahls_score WITH RES_1
  /MISSING=LISTWISE.
```

Graph

Notes

Output Created		29-JUL-2017 23:22:42
Comments		
Input	Data	Nelson\Final Data.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	99
Syntax		GRAPH /SCATTERPLOT(BIVAR)=sahls_score WITH RES_1 /MISSING=LISTWISE.
Resources	Processor Time	00:00:00.23
	Elapsed Time	00:00:00.27

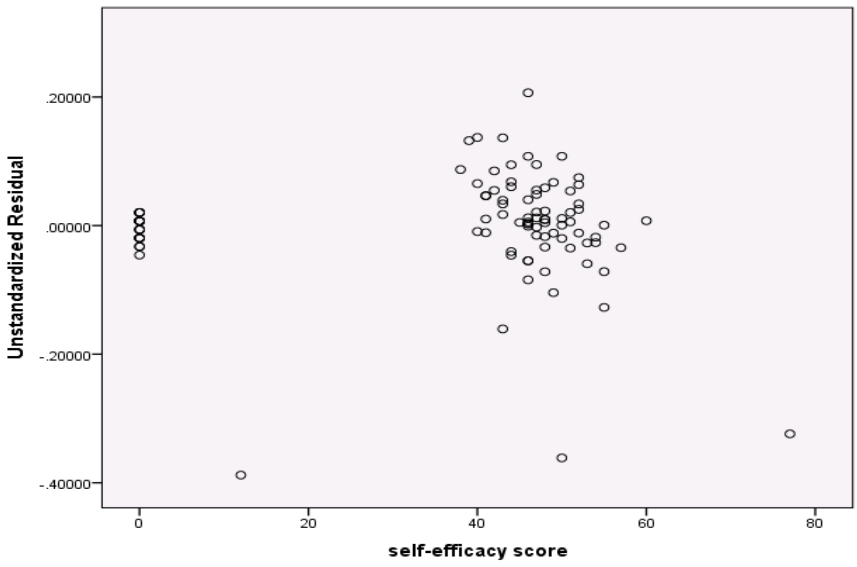


```
GRAPH
  /SCATTERPLOT(BIVAR)=se_score WITH RES_1
  /MISSING=LISTWISE.
```

Graph

Notes

Output Created		29-JUL-2017 23:22:43
Comments		
Input	Data	Nelson\Final Data.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	99
Syntax		GRAPH /SCATTERPLOT(BIVAR)=se_score WITH RES_1 /MISSING=LISTWISE.
Resources	Processor Time	00:00:00.17
	Elapsed Time	00:00:00.17

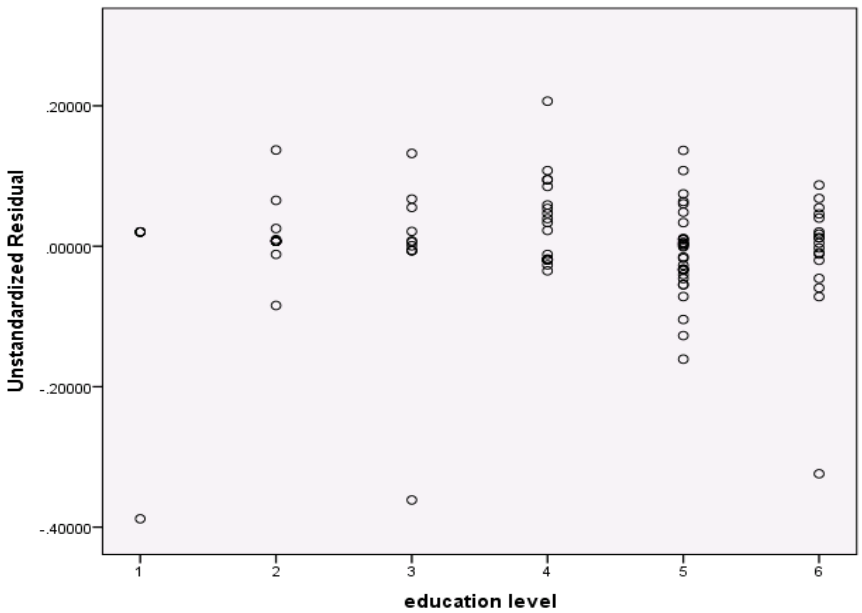


```
GRAPH
  /SCATTERPLOT(BIVAR)=education WITH RES_1
  /MISSING=LISTWISE.
```

Graph

Notes

Output Created		29-JUL-2017 23:22:43
Comments		
Input	Data	Nelson\Final Data.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	99
Syntax		GRAPH /SCATTERPLOT(BIVAR)=education WITH RES_1 /MISSING=LISTWISE.
Resources	Processor Time	00:00:00.20
	Elapsed Time	00:00:00.44



```
NONPAR CORR
  /VARIABLES=dkq_score sahls_score sdsca_score se_score education
  /PRINT=SPEARMAN TWOTAIL NOSIG
  /MISSING=LISTWISE.
```

Nonparametric Correlations

Notes

Output Created		29-JUL-2017 23:22:43
Comments		
Input	Data	Nelson\Final Data.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	99
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each list of variables are based on the cases with no missing data for any variable in that list.
Syntax		NONPAR CORR /VARIABLES=dkq_score sahls_score sdsca_score se_score education /PRINT=SPEARMAN TWOTAIL NOSIG /MISSING=LISTWISE.
Resources	Processor Time	00:00:00.03
	Elapsed Time	00:00:00.03
	Number of Cases Allowed	524288 cases[a]

a. Based on availability of workspace memory

Correlations[b]

			diabetes knowledge	health literacy level score
Spearman's rho	diabetes knowledge	Correlation Coefficient	1.000	.577**
		Sig. (2-tailed)	.	.000
	health literacy level score	Correlation Coefficient	.577**	1.000
		Sig. (2-tailed)	.000	.
	self-reported diabetes self-care behaviors score	Correlation Coefficient	.523**	.633**
		Sig. (2-tailed)	.000	.000
	self-efficacy score	Correlation Coefficient	.676**	.599**
		Sig. (2-tailed)	.000	.000
	education level	Correlation Coefficient	.151	.334**
		Sig. (2-tailed)	.142	.001

Correlations[b]

			self-reported diabetes self-care behaviors score	self-efficacy score
Spearman's rho	diabetes knowledge	Correlation Coefficient	.523**	.676**
		Sig. (2-tailed)	.000	.000
	health literacy level score	Correlation Coefficient	.633**	.599**
		Sig. (2-tailed)	.000	.000
	self-reported diabetes self-care behaviors score	Correlation Coefficient	1.000	.778**
		Sig. (2-tailed)	.	.000
	self-efficacy score	Correlation Coefficient	.778**	1.000
		Sig. (2-tailed)	.000	.

	education level	Correlation Coefficient	.283**	.266**
		Sig. (2-tailed)	.005	.009

Correlations[b]

			education level
Spearman's rho	diabetes knowledge	Correlation Coefficient	.151
		Sig. (2-tailed)	.142
	health literacy level score	Correlation Coefficient	.334**
		Sig. (2-tailed)	.001
	self-reported diabetes self-care behaviors score	Correlation Coefficient	.283**
		Sig. (2-tailed)	.005
	self-efficacy score	Correlation Coefficient	.266**
		Sig. (2-tailed)	.009
	education level	Correlation Coefficient	1.000
		Sig. (2-tailed)	.

**. Correlation is significant at the 0.01 level (2-tailed).

b. Listwise N = 96

```
* Define Variable Properties.
*sdsca_score.
VARIABLE LEVEL  sdsca_score(SCALE).
EXECUTE.

MEANS TABLES=sdsca_score BY male m_status income education employ_status
insurance
  /CELLS=MEAN COUNT STDDEV MEDIAN MIN MAX.
```

Means

Notes

Output Created		29-JUL-2017 23:22:43
Comments		
Input	Data	Nelson\Final Data.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>

	N of Rows in Working Data File	99
Missing Value Handling	Definition of Missing	For each dependent variable in a table, user-defined missing values for the dependent and all grouping variables are treated as missing.
	Cases Used	Cases used for each table have no missing values in any independent variable, and not all dependent variables have missing values.
Syntax		MEANS TABLES=sdsca_score BY male m_status income education employ_status insurance /CELLS=MEAN COUNT STDDEV MEDIAN MIN MAX.
Resources	Processor Time	00:00:00.05
	Elapsed Time	00:00:00.03

Case Processing Summary

	Cases					
	Included		Excluded		Total	
	N	Percent	N	Percent	N	Percent
self-reported diabetes self-care behaviors score * male	98	99.0%	1	1.0%	99	100.0%
self-reported diabetes self-care behaviors score * m_status	97	98.0%	2	2.0%	99	100.0%
ed diabetes self-care behaviors score * income	97	98.0%	2	2.0%	99	100.0%
self-reported diabetes self-care behaviors score * education level	96	97.0%	3	3.0%	99	100.0%
self-reported diabetes self-care behaviors score * employment status	99	100.0%	0	0.0%	99	100.0%
self-reported diabetes self-care behaviors score * insurance	98	99.0%	1	1.0%	99	100.0%

self-reported diabetes self-care behaviors score * male

self-reported diabetes self-care behaviors score

male	Mean	N	Std. Deviation	Median	Minimum	Maximum
0	31.94	53	18.900	40.00	0	51
1	34.93	45	15.922	41.00	0	49
Total	33.32	98	17.571	41.00	0	51

self-reported diabetes self-care behaviors score * m_status

self-reported diabetes self-care behaviors score

m_status	Mean	N	Std. Deviation	Median	Minimum	Maximum
1	31.00	38	19.387	39.50	0	51
2	35.65	31	15.043	40.00	0	51
3	34.82	22	16.561	41.50	0	48
4	29.33	6	22.853	41.50	0	48
Total	33.25	97	17.554	41.00	0	51

self-reported diabetes self-care behaviors score * income

self-reported diabetes self-care behaviors score

income	Mean	N	Std. Deviation	Median	Minimum	Maximum
1	.00	4	.000	.00	0	0
2	30.88	8	19.172	40.50	0	44
3	38.61	18	13.695	43.50	0	49
4	43.13	23	4.126	43.00	35	51
5	36.63	27	13.965	40.00	0	48
6	17.35	17	19.909	.00	0	45
Total	33.18	97	17.495	41.00	0	51

self-reported diabetes self-care behaviors score * education level

self-reported diabetes self-care behaviors score

education level	Mean	N	Std. Deviation	Median	Minimum	Maximum
1	.80	5	1.789	.00	0	4
2	19.67	12	21.142	12.50	0	46
3	30.64	11	21.621	44.00	0	51
4	33.89	19	18.184	42.00	0	49
5	38.81	31	11.309	40.00	0	51

6	39.78	18	10.395	41.00	0	48
Total	32.71	96	17.914	40.00	0	51

self-reported diabetes self-care behaviors score * employment status

self-reported diabetes self-care behaviors score

employment status	Mean	N	Std. Deviation	Median	Minimum	Maximum
1	35.25	67	15.780	41.00	0	51
2	32.85	13	18.885	41.00	0	48
3	25.26	19	21.865	40.00	0	51
Total	33.02	99	17.728	41.00	0	51

self-reported diabetes self-care behaviors score * insurance

self-reported diabetes self-care behaviors score

insurance	Mean	N	Std. Deviation	Median	Minimum	Maximum
1	26.77	13	22.257	39.00	0	49
2	33.32	38	17.143	40.00	0	51
3	32.60	30	18.245	41.00	0	51
4	37.47	17	14.629	43.00	0	50
Total	32.95	98	17.804	41.00	0	51

```
*Nonparametric Tests: Independent Samples.
NPTESTS
  /INDEPENDENT TEST (sdsca_score) GROUP (male)
  /MISSING SCOPE=ANALYSIS USERMISSING=EXCLUDE
  /CRITERIA ALPHA=0.05  CILEVEL=95.
```

Nonparametric Tests

Notes

Output Created		29-JUL-2017 23:22:43
Comments		
Input	Data	Nelson\Final Data.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	99

Syntax		NPTESTS /INDEPENDENT TEST (sdsca_score) GROUP (male) /MISSING SCOPE=ANALYSIS USERMISSING=EXCLUDE /CRITERIA ALPHA=0.05 CILEVEL=95.
Resources	Processor Time	00:00:00.16
	Elapsed Time	00:00:00.16

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of self-reported diabetes self-care behaviors score is the same across categories of male.	Independent-Samples Mann-Whitney U Test	.838	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

*Nonparametric Tests: Independent Samples.
NPTESTS
/INDEPENDENT TEST (sdsca_score) GROUP (m_status)
/MISSING SCOPE=ANALYSIS USERMISSING=EXCLUDE
/CRITERIA ALPHA=0.05 CILEVEL=95.

Nonparametric Tests

Notes

Output Created		29-JUL-2017 23:22:44
Comments		
Input	Data	Nelson\Final Data.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	99

Syntax		NPTESTS /INDEPENDENT TEST (sdsca_score) GROUP (m_status) /MISSING SCOPE=ANALYSIS USERMISSING=EXCLUDE /CRITERIA ALPHA=0.05 CILEVEL=95.
Resources	Processor Time	00:00:00.48
	Elapsed Time	00:00:00.28

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of self-reported diabetes self-care behaviors score is the same across categories of m_status.	Independent-Samples Kruskal-Wallis Test	.923	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

*Nonparametric Tests: Independent Samples.
NPTESTS
/INDEPENDENT TEST (sdsca_score) GROUP (income)
/MISSING SCOPE=ANALYSIS USERMISSING=EXCLUDE
/CRITERIA ALPHA=0.05 CILEVEL=95.

Nonparametric Tests

Notes

Output Created		29-JUL-2017 23:22:44
Comments		
Input	Data	Nelson\Final Data.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	99

Syntax		NPTESTS /INDEPENDENT TEST (sdsca_score) GROUP (income) /MISSING SCOPE=ANALYSIS USERMISSING=EXCLUDE /CRITERIA ALPHA=0.05 CILEVEL=95.
Resources	Processor Time	00:00:00.25
	Elapsed Time	00:00:00.31

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of self-reported diabetes self-care behaviors score is the same across categories of income.	Independent-Samples Kruskal-Wallis Test	.000	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

```
*Nonparametric Tests: Independent Samples.
NPTESTS
  /INDEPENDENT TEST (sdsca_score) GROUP (education)
  /MISSING SCOPE=ANALYSIS USERMISSING=EXCLUDE
  /CRITERIA ALPHA=0.05  CILEVEL=95.
```

Nonparametric Tests

Notes

Output Created		29-JUL-2017 23:22:44
Comments		
Input	Data	Nelson\Final Data.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	99

Syntax		NPTESTS /INDEPENDENT TEST (sdsca_score) GROUP (education) /MISSING SCOPE=ANALYSIS USERMISSING=EXCLUDE /CRITERIA ALPHA=0.05 CILEVEL=95.
Resources	Processor Time	00:00:00.16
	Elapsed Time	00:00:00.11

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of self-reported diabetes self-care behaviors score is the same across categories of education level.	Independent-Samples Kruskal-Wallis Test	.009	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

*Nonparametric Tests: Independent Samples.
NPTESTS
/INDEPENDENT TEST (sdsca_score) GROUP (employ_status)
/MISSING SCOPE=ANALYSIS USERMISSING=EXCLUDE
/CRITERIA ALPHA=0.05 CILEVEL=95.

Nonparametric Tests

Notes

Output Created		29-JUL-2017 23:22:44
Comments		
Input	Data	Nelson\Final Data.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	99

Syntax		NPTESTS /INDEPENDENT TEST (sdsca_score) GROUP (employ_status) /MISSING SCOPE=ANALYSIS USERMISSING=EXCLUDE /CRITERIA ALPHA=0.05 CILEVEL=95.
Resources	Processor Time	00:00:00.17
	Elapsed Time	00:00:00.31

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of self-reported diabetes self-care behaviors score is the same across categories of employment status.	Independent-Samples Kruskal-Wallis Test	.557	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

```
*Nonparametric Tests: Independent Samples.
NPTESTS
  /INDEPENDENT TEST (sdsca_score) GROUP (insurance)
  /MISSING SCOPE=ANALYSIS USERMISSING=EXCLUDE
  /CRITERIA ALPHA=0.05  CILEVEL=95.
```

Nonparametric Tests

Notes

Output Created		29-JUL-2017 23:22:45
Comments		
Input	Data	Nelson\Final Data.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	99

Syntax		NPTESTS /INDEPENDENT TEST (sdsca_score) GROUP (insurance) /MISSING SCOPE=ANALYSIS USERMISSING=EXCLUDE /CRITERIA ALPHA=0.05 CILEVEL=95.
Resources	Processor Time	00:00:00.19
	Elapsed Time	00:00:00.34

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of self-reported diabetes self-care behaviors score is the same across categories of insurance.	Independent-Samples Kruskal-Wallis Test	.684	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

GENLIN sdsca_score (order = DESCENDING) with dkq_score sahls_score se_score education
/model dkq_score sahls_score se_score education distribution = NEGBIN(MLE) link=log.

Generalized Linear Models

Notes

Output Created		29-JUL-2017 23:22:45
Comments		
Input	Data	Nelson\Final Data.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	99
Missing Value Handling	Definition of Missing	User-defined missing values for factor, subject and within-subject variables are treated as missing.

	Cases Used	Statistics are based on cases with valid data for all variables in the model.
Weight Handling		not applicable
Syntax		GENLIN sdsca_score (order = DESCENDING) with dkq_score sahls_score se_score education /model dkq_score sahls_score se_score education distribution = NEGBIN(MLE) link=log.
Resources	Processor Time	00:00:00.14
	Elapsed Time	00:00:00.19

Model Information

Dependent Variable	self-reported diabetes self-care behaviors score
Probability Distribution	Negative binomial (MLE)
Link Function	Log

Case Processing Summary

	N	Percent
Included	96	97.0%
Excluded	3	3.0%
Total	99	100.0%

Continuous Variable Information

		N	Minimum	Maximum	Mean
Dependent Variable	self-reported diabetes self-care behaviors score	96	0	51	32.71
Covariate	diabetes knowledge	96	0	20	12.20
	health literacy level score	96	0	18	14.07
	self-efficacy score	96	0	77	37.40
	education level	96	1	6	4.18

Continuous Variable Information

		Std. Deviation
Dependent Variable	self-reported diabetes self-care behaviors score	17.914
Covariate	diabetes knowledge	6.472
	health literacy level score	7.271
	self-efficacy score	20.251
	education level	1.465

Goodness of Fit[a]

	Value	df	Value/df
Deviance	104.244	90	1.158
Scaled Deviance	104.244	90	
Pearson Chi-Square	88.796	90	.987
Scaled Pearson Chi-Square	88.796	90	
Log Likelihood[b]	-272.665		
Akaike's Information Criterion (AIC)	557.329		
Finite Sample Corrected AIC (AICC)	558.273		
Bayesian Information Criterion (BIC)	572.716		
Consistent AIC (CAIC)	578.716		

Dependent Variable: self-reported diabetes self-care behaviors score

Model: (Intercept), dkq_score, sahls_score, se_score, education[a]

a. Information criteria are in smaller-is-better form.

b. The full log likelihood function is displayed and used in computing information criteria.

Omnibus Test[a]

Likelihood Ratio Chi-Square	df	Sig.

315.548	4	.000

Dependent Variable: self-reported diabetes self-care behaviors score

Model: (Intercept), dkq_score, sahls_score, se_score, education[a]

a. Compares the fitted model against the intercept-only model.

Tests of Model Effects

	Type III		
Source	Wald Chi-Square	df	Sig.
(Intercept)	8.986	1	.003
dkq_score	.912	1	.340
sahls_score	111.585	1	.000
se_score	22.942	1	.000
education	2.562	1	.109

Dependent Variable: self-reported diabetes self-care behaviors score

Model: (Intercept), dkq_score, sahls_score, se_score, education

Parameter Estimates

			95% Wald Confidence Interval		Hypothesis Test	
Parameter	B	Std. Error	Lower	Upper	Wald Chi-Square	df
(Intercept)	-1.143	.3813	-1.891	-.396	8.986	1
dkq_score	-.013	.0134	-.039	.013	.912	1
sahls_score	.230	.0217	.187	.272	111.585	1
se_score	.018	.0037	.010	.025	22.942	1
education	.028	.0176	-.006	.063	2.562	1
(Scale)	1[a]					
(Negative binomial)	.007	.0055	.002	.032		

Parameter Estimates

Parameter	Hypothesis Test Sig.
(Intercept)	.003
dkq_score	.340
sahls_score	.000
se_score	.000
education	.109
(Scale)	
(Negative binomial)	

Dependent Variable: self-reported diabetes self-care behaviors score

Model: (Intercept), dkq_score, sahls_score, se_score, education

a. Fixed at the displayed value.

```
COMPUTE miss=NMISS(education,dkq_score,sahls_score,sdsca_score,se_score) >=1.
EXECUTE.

T-TEST GROUPS=miss(1 0)
  /MISSING=ANALYSIS
  /VARIABLES=dkq_score sahls_score sdsca_score se_score
  /CRITERIA=CI(.95).
```

T-Test

Notes

Output Created		29-JUL-2017 23:22:46
Comments		
Input	Data	Nelson\Final Data.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	99
Missing Value Handling	Definition of Missing	User defined missing values are treated as missing.

	Cases Used	Statistics for each analysis are based on the cases with no missing or out-of-range data for any variable in the analysis.
Syntax		T-TEST GROUPS=miss(1 0) /MISSING=ANALYSIS /VARIABLES=dkq_score sahls_score sdsca_score se_score /CRITERIA=CI(.95).
Resources	Processor Time	00:00:00.12
	Elapsed Time	00:00:00.16

Group Statistics

	miss	N	Mean	Std. Deviation	Std. Error Mean
diabetes knowledge	1.00	3	16.67	1.528	.882
	.00	96	12.20	6.472	.661
health literacy level score	1.00	3	16.67	1.528	.882
	.00	96	14.07	7.271	.742
self-reported diabetes self-care behaviors score	1.00	3	43.00	1.000	.577
	.00	96	32.71	17.914	1.828
self-efficacy score	1.00	3	49.33	4.163	2.404
	.00	96	37.40	20.251	2.067

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means
		F	Sig.	t
diabetes knowledge	Equal variances assumed	3.222	.076	1.189
	Equal variances not assumed			4.056
health literacy level score	Equal variances assumed	3.700	.057	.615

	Equal variances not assumed			2.250
self-reported diabetes self-care behaviors score	Equal variances assumed	5.776	.018	.990
	Equal variances not assumed			5.368
self-efficacy score	Equal variances assumed	3.394	.068	1.015
	Equal variances not assumed			3.766

Independent Samples Test

		t-test for Equality of Means		
		df	Sig. (2-tailed)	Mean Difference
diabetes knowledge	Equal variances assumed	97	.237	4.469
	Equal variances not assumed	4.841	.010	4.469
health literacy level score	Equal variances assumed	97	.540	2.594
	Equal variances not assumed	5.774	.067	2.594
self-reported diabetes self-care behaviors score	Equal variances assumed	97	.325	10.292

	Equal variances not assumed	78.036	.000	10.292
self-efficacy score	Equal variances assumed	97	.312	11.938
	Equal variances not assumed	5.982	.009	11.938

Independent Samples Test

		t-test for Equality of Means		
		Std. Error Difference	95% Confidence Interval of the Difference	
			Lower	Upper
diabetes knowledge	Equal variances assumed	3.757	-2.989	11.926
	Equal variances not assumed	1.102	1.608	7.329
health literacy level score	Equal variances assumed	4.221	-5.783	10.971
	Equal variances not assumed	1.153	-.254	5.441
self-reported diabetes self-care behaviors score	Equal variances assumed	10.395	-10.339	30.922
	Equal variances not assumed	1.917	6.475	14.109
self-efficacy score	Equal variances assumed	11.756	-11.394	35.269
	Equal variances not assumed	3.170	4.175	19.700