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Perceptions of Behavioral and Lifestyle Changes Among African American Women With Type 2 Diabetes

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2016

Abstract

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Type 2 Diabetes

by

Myriam Almonor

MA, Fairleigh Dickinson University, 2001

BS, State University of New York at Stony Brook, 1993

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Public Health - Epidemiology

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Abstract

The prevalence of type 2 diabetes (T2D) continues to rise and is predicted to increase to 30 million people by 2030 in the United Sates alone. African Americans (AA) have one of the highest prevalence rates of T2D among all ethnic groups. African American Women (AAW) are 100% more likely to develop T2D compared with their white counterparts. The aim of this study was to quantitatively investigate the relationship of the perceptions of AAW not previously identified that could lead to a reduction in risk of T2D among AAW. A cross-sectional study of 183 AAW 20 to 65 years old was conducted to identify any correlation among the variables, using validated surveys. The participants were recruited via flyers and online. The health belief model and the theory of planned behavior served as the theoretical framework. Spearman's *rho* correlation was used to determine the strength of the correlations. The majority of respondents had moderate to high lifestyle and behavior changes relative to diet (59%) and blood sugar testing (93%), as well as low participation for exercise (62%). The majority of the AAW had low awareness of T2D severity (72%), low interference to daily activities (88%), and low social support for diabetes management (74%). A significant correlation was observed between healthy diet and severity, interference, outcome expectancies, and self-efficacy ($p < .001$). A significant relationship was found between exercise and severity, interference, outcome expectancies, and self-efficacy ($p < .001$). This study may inspire social change by creating awareness among healthcare workers regarding educational resources, environmental changes, and community interventions to reduce the economic burden associated with health care costs, to mitigate T2D, and to reduce health disparity.

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Dedication

To God all the Glory! I could not have reached this milestone without the inspiration and guidance from my God. He has given me strength, motivation and His energy has kept me uplifted throughout this assiduous journey. He has given me confidence and wisdom to pursue my dreams. He has removed all obstacles from my path and kept me focused throughout this challenging project.

This manuscript is dedicated primarily to the loving memory of my late father, Antoine J. Almonor, who has always believed in me. Dad, rejoice, your daughter has honored you again! I thank you for your unconditional love, for instilling in me the value of education and the willpower to accomplish my dreams. You are the quintessence of love, courage, and endurance!

To my mother, Elizabeth P. Almonor, who has always supported me; I appreciate all you have done, thank you! To my brother, Jean Benoit Almonor, who has always encouraged me to pursue my dreams no matter how extraordinary they may have seemed, thank you!

To all my friends, who have inspired and supported me through this major step of my life; thank you for your love, support, and most expressly for your prayers! You all have been instrumental in achieving this major milestone. I love you all and I dedicate this research to you!

And finally, to all those who are at risk of diabetes or who are suffering with this chronic disease: I dedicate this research to you as a symbol of my contribution in bringing awareness to type 2 diabetes.

Acknowledgments

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Chapter 1: Introduction to the Study

Background

Diabetes is characterized by chronic hyperglycemia due to insulin resistance or deficiency (American Diabetes Association, [ADA], 2014). This problem is caused by food that is not metabolized in the system, thus resulting in glucose build up in the blood (Centers for Disease Control and Prevention [CDC], 2014a). There are two forms of diabetes mellitus, type 1 (insulin dependent) and type 2 (non-insulin dependent). Type 2 diabetes (T2D) is the most common form of diabetes mellitus accounting for 90% to 95% of total diabetes cases (Wu, Ding, Tanaka, & Zhang, 2014). Complications associated with T2D include cardiovascular disease, diabetic neuropathy, diabetic nephropathy, diabetic retinopathy, and cancer (Chaturvedi, 2007; Vigersky, 2011; Fong, 2004; Elwing, 2006; Donadon, 2008; Larsson, 2008; CDC, 2014a).

Twenty six million people in the United States are affected by T2D and 382 million people are affected worldwide (National Institutes of Health, 2014). The prevalence of T2D continues to rise at an alarming rate and is predicted to increase to 439 million people globally and 30 million in the United Sates alone by 2030 (Wild et al., 2004; Chen, Magliano, & Zimmet, 2011). African Americans (AA) have the second highest prevalence of T2D diabetes (12.6%) among all ethnic groups after Native Americans/Alaskans (16.1%). In the United States, African American Women (AAW) are 100% more likely to develop T2D, whereas African American men are 20% to 50% more likely to develop T2D compared with their white counterparts (Chen et al., 2011; CDC, 2014b).

The estimated annual health care cost for diabetes was $245 billion in 2012, with

more than 70% contributing to direct medical cost and the remainder contributing to reduced productivity (Clark, 2014; ADA, 2013). T2D is not only a public health concern for the United States but is also a worldwide problem. Although a plethora of therapies treats T2D, the health care cost continues to rise. Researchers have realized a need for considering modifiable factors associated with increased risk of developing T2D. AAW's perceptions toward lifestyle changes can significantly reduce risk factors for development of T2D by eating a healthy diet and increasing physical activities, education, health beliefs, and knowledge of diabetes.

Problem Statement

T2D is a chronic disease characterized by blood glucose levels that are above the normal range due to insulin resistance or deficiency (ADA, 2014). This disease is caused by food that is not metabolized in the system, thus resulting in glucose build up in the blood (CDC, 2014c). Diabetes can cause several health complications such as kidney failure, blindness, cardiovascular diseases (CVDs), myocardial infarction, and even amputation of the lower limbs (CDC, 2014d). Diabetes mellitus and gestational diabetes can cause severe health problems in pregnant women including birth defects in their unborn children (ADA, 2014; CDC, 2014d).

Diabetes is the seventh leading cause of death in the United States and is a global public health concern (CDC, 2014a). Approximately 29.1 million people (9.3%) in the United States have diabetes. T2D accounts for 90% to 95% of the 21.0 million diagnosed cases and the remaining 8.1 million are still undiagnosed (CDC, 2014a). It is projected that by the year 2050, approximately one in three American adults will have diabetes (CDC, 2014a). In 2010, the CDC reported that approximately 1.9 million people were

newly diagnosed with T2D diabetes. The prevalence of diabetes rapidly increases with age, and in the United States the prevalence is 2.6% in adults 20 to 39 years old and 10.8% in the age groups 40 to 59; however, T2D is increasing rapidly among young adults (Diabetes Care, 2010). Within a 4-year span the prevalence rate of diabetes significantly increased in 2014 to 18.7% (4.9 million), (CDC, 2014c).

As reported by Harvard Medical School of Public Health (2014), the risks for developing diabetes and CVDs increase with individuals' body mass index (BMI) and vary among different ethnic groups. Scientists have noted a higher prevalence of obesity among African Americans due to weight related issues, thus significantly increasing their risk for T2D compared with other ethnic groups (Harvard Medical School, 2014). Risk factors such as socioeconomic status, cultural, behavioral, and lifestyle changes may influence the prevalence of T2D in the AAW population (Brancarti, Kao, Folsom, Watson, and Szklo, 2000; Harvard Medical School, 2014).

Given the high rate of increased risk of developing T2D among AAW, further investigations on T2D risk assessments are necessary specifically among AAW to prevent and control T2D regarding behavioral and lifestyle changes (Colberg et al., 2010; Hamilton, 2014; Hivert et al., 2009; White et al., 2013). A gap exists in the literature regarding AAW's perceptions toward behavioral and lifestyle changes to prevent T2D. The perceptions about the effects of T2D and the willingness of AAW to make behavioral lifestyle changes such as dietary habits and physical activities may efficiently reduce the risk of T2D in the target population of AAW.

Purpose of the Study

The purpose of this study was to quantitatively investigate the relationship of the perceptions of AAW not previously identified with regard to behavioral and lifestyle changes that could possibly lead to a reduction in risk of T2D in this high-risk population group. Identifying and exploring the perceptions regarding the effects of T2D and the willingness of AAW to make behavioral lifestyle changes, such as dietary habits and physical activities, may efficiently reduce the risk of T2D in the target population and ultimately encourage positive social change in communities.

Research Question and Hypothesis

The following research questions (RQs) and hypotheses guided this study:

1. RQ1 (descriptive): What are the perceptions of AAW with regard to behavioral and lifestyle changes, such as physical activities and healthy diet?

2. RQ2 (inferential): Do the aforementioned identified perceptions affect behavioral and lifestyle changes in AAW?

H_{02}: The aforementioned identified perceptions do not affect behavioral and lifestyle changes in AAW.

H_{a2}: The aforementioned identified factors do affect behavioral and lifestyle changes in AAW.

3. RQ3: Do the aforementioned identified perceptions affect behavioral and lifestyle changes in AAW, taking into account the demographic characteristics of the sample?

H_{03}: The aforementioned identified factors do not affect behavioral and lifestyle changes in AAW, taking into account the demographic characteristics of the sample.

H_{a3}: The aforementioned identified factors do affect behavioral and lifestyle changes in AAW, taking into account the demographic characteristics of the sample.

The independent variable is perceptions of AAW with regard to behavioral and lifestyle changes. The dependent variable is behavioral and lifestyle changes. The covariates include demographic and socioeconomic status.

Theoretical Framework

The health belief model (HBM) and the theory of planned behavior (TPB) were the theoretical frameworks for this study. As noted by Glanz and Bishop (2010), the HBM is commonly used when beliefs significantly influence prevention-based health issues, such as early detection of cancer and hypertension. The HBM is relevant to explain the behavior and attitude of the African American population with regard to health prevention of diseases such as T2D among others (Creswell, 2009). The TPB has been used successfully to predict and explain a wide range of health behaviors and intentions/perceptions towards lifestyle changes, such as health services, exercising, smoking, and drinking (Ajzen, 1991). According to the TPB, behavioral achievement depends on both motivation (intention) and ability (behavioral control). It distinguishes between three types of beliefs: behavioral, normative, and control (Ajzen, 1991). To properly disseminate the results of this research, it is essential to present the material in a clear and concise manner; hence, the use of a theoretical framework is essential to ensure synchronization of the conceptual world and the empirical world (Franfort-Nachmias & Nachmias, 2008). The strategy for this research using the HBM and the TPB as described above is the "theory-then-research" procedure followed by a quantitative analysis to

assess the population behaviors with regard to reducing T2D in the target population(Frankfort-Nachmias & Nachmias, 2008). Strategies to manage or prevent chronic diseases may improve health outcomes for T2D and populations that are at high risk for acquiring T2D.

Nature of the Study

This quantitative nonexperimental study was used to identify potential new factors to limit the risk of developing T2D in AAW. A cross-sectional design assessment of perceptions of AAW with regard to behavioral and lifestyle changes to identify a correlation among the variables was conducted. A convenience sample of AAW from Maryland and Virginia was recruited from (a) public places (markets, shopping malls, recreational areas, gyms, etc.), (b) online social organizations, and (c) the SurveyMonkey participant population to gather the data. The advantage of using a convenience sample was to eliminate sampling bias and provide a synopsis of the sample size of the target population.

Definitions

The following definitions were used in this study:

Behavioral and lifestyle changes: Making changes by implementing a healthy diet and physical activities to ensure overall health and wellness (Glassgow, 1994).

Knowledge of diabetes: Having knowledge and a clear understanding regarding the outcome expectancies and self-care (self-efficacy) practices as they relate to T2D will permit patients to make informed choices about focusing their risk reduction efforts (Saver, 2014).

Perception towards behavioral and lifestyle changes: How one views their quality of life (i.e., lifestyle), health, and the necessary changes to improve their health (Stover, 2001). This concept is composed of three categories that include (a) perceptions of T2D and related social support, (b) perceptions of self-care activities, and (c) perceptions of outcome expectancies and self- efficacy (Glassgow, 1994).

Type 2 diabetes (*T2D*): T2D is insulin resistance in the body that causes abnormal blood glucose levels (ADA, 2014a).

Assumptions

The following assumptions were applied to this study:

1. Participants were assumed to provide an unbiased and truthful response.

2. Participants were proficient in the English language and can read/comprehend at the eighth grade level, which is necessary in order to understand the questionnaires.

3. Participants were recruited from public places (local markets, shopping malls, recreational areas, gyms), online social organizations, and the SurveyMonkey participant population representing an as much possible unbiased population of AAW with T2D.

Scope and Delimitations

The focus of this study was on AAW's perceptions of behavioral and lifestyle changes to mitigate the risk of developing T2D. This study was chosen because the prevalence of T2D among AAW is twice that of non-Hispanic white counterparts. The association between perceptions and behavioral and lifestyle changes of AAW was evaluated due to a lack of research in this area. Most published research focuses on those

with type 1 diabetes (T1D) or mixed populations with T1D and T2D (Jones & Hattersley, 2013).

The HBM and TPB are two models on which the theoretical framework of this study was built. One disadvantage of the HBM is the disregard of a person's belief or individual determinant that litigates one's attitude toward health. A second disadvantage of using the HBM is that is does not consider unhealthy habitual behavior (i.e., smoking). As a result, personal beliefs and unhealthy habits are two potential risk factors for developing T2D, which were not included in this study. The TPB has similar constructs as the HBM. A disadvantage of both models is the assumption that individuals have the financial means and resources to successfully take the necessary action toward improving their health status.

The aim of this study was to examine the perceptions of behavioral and lifestyle changes in a population of AAW to identify factors associated with the risk of T2D. The specific aim was to identify additional risk factors for developing T2D that can be included in interventions that will mitigate the risk of developing T2D in a population of AAW. A convenience sample of AAW was selected to complete an online survey.

Limitations

The present study limitations are as follows. External validity is the extent to which the results of studies could be generalized (Steckler & McLeroy, 2008). Although studies should be generalized, this study focused on the perceptions of AAW and might not be generalizable to other populations, ethnic groups, and cultures with T2D. T2D risk factors such as diet, health beliefs, knowledge of diabetes, physical activity, obesity, and socioeconomic status are common contributing factors that increase health risks in the

population of AAW. Additional limitations to cross sectional design assessment include difficulty to assume cause and effect and the study is limited to a brief point in time and prevalence-incidence bias (Levin, 2006).

The instruments were designed to be easily understood. English may not be the primary language of some participants, and so some questions may not be comprehended, resulting in erroneous responses. The independent variable is perceptions of AAW with regard to behavioral and lifestyle changes, and the dependent variable is behavioral and lifestyle changes (diet, exercise, and blood sugar test results). The covariates include demographic and socioeconomic status, such as age, educational level, and marital status. The standardized validated instruments employed (please see more details in Chapter 3) in this study might introduce additional measurable covariates that may confound the instruments scores thereby introducing bias to the results.

External validity was addressed by using standardized instruments to measure the variables and a sample size justified in terms of adequate statistical power and effect size. Internal validity indicates how well the results of the study reflect the study intent. Inclusion of the covariates diet, health beliefs, knowledge of diabetes, physical activities, and socioeconomic status could increase internal validity and confidence when a change in the dependent variable affects the outcome of the independent variable.

Significance of the Study

Behavioral and lifestyle changes are considered one of the most effective strategies in preventing T2D. Understanding the perceptions of AAW toward behavioral and lifestyle changes is important in combating the complications associated with T2D,

which can impose significant health and economic burden on patients, the health care system, and society.

Social change implications of this study were to determine the relationship of the perceptions of AAW with T2D. These behavioral and lifestyle changes would assist in the development of strategies to mitigate the prevalence of T2D. Regardless of patient's perceptions of T2D, reliability and consistency of health care professionals recommendations and strategies to combat T2D could help mitigate the prevalence of this disease and the patient's appreciation of healthier lifestyles could be adopted (Stover, 2001). Information from this study could be used to tailor community based intervention programs for AAW living with T2D. Effective programs could aid in reducing health care cost and facilitate healthy lifestyles. Information obtained from this research project could increase awareness regarding the factors that influences the risks of developing T2D in the population of AAW. White et al. (2011) conducted an experimental study of 84 self-identified AAW in a 24-session group program. In this study, personal weight loss goals and expected satisfaction with a reasonable weight loss among AAW with T2D starting a behavioral obesity treatment program were investigated. The authors also reported relatively high-expected satisfaction with a reasonable weight loss (7%−10%). However, perceptions or the way one-view lifestyle changes may reduce the possibilities of developing T2D and prolong life for individuals living with T2D (White et al., 2011). Given the complications and health cost of T2D, an investigation of the perceptions toward behavioral and lifestyle changes is an imperative contribution to comprehending and understanding the benefits of reducing T2D. Understanding the relationship of the perceptions of AAW with T2D toward behavioral and lifestyle changes could be a

contributing factor in developing prevention methods and strategies that will mitigate the prevalence of T2D, which could lead to positive social change.

Summary

T2D is one of the leading causes of death in the United States, and the annual health care costs for T2D, as well as the comorbidities associated with the disease, is estimated at $245 billion (Clark, 2014). AAW are more susceptible to developing T2D compared with all other ethnic groups and gender. The question remains: Why are AAW more vulnerable to developing this chronic disease? Could it be that the perceptions toward behavioral and lifestyle changes of AAW affect their ability to make the appropriate changes to lower their risk of getting T2D? Actions regarding self-care depend on perceptions of the benefits of living a healthy lifestyle and the barriers restricting behavioral and lifestyle changes.

Strict management of T2D and the complications associated with the disease could be challenging for study participants due to their perspective of self-care and behavioral lifestyle changes. Miller (2012) reported that the perceptions of AAW affect their ability to make the appropriate behavioral lifestyle changes that can lower their risk of T2D and the associated complications. In Chapter 2, a literature review of AAW perceptions and behavioral and lifestyle changes research and theory will be provided. The literature review process will allow a thorough analysis of risk reduction behaviors of AAW with T2D. An overview of various studies on physical activities, diet, and other behavioral changes related to T2D will be included in Chapter 2.

Chapter 2: Literature Review

Introduction

This literature review covers relatively recent research associated with T2D among AAW, as well as the complications; perceptions toward behavioral and lifestyle changes; prevalence; and risk factors contributing to the disease. The prevalence of diabetes is an important public health issue in the United States and worldwide. More than 150 million people suffer from this debilitating disease worldwide and that number is projected to increase two-fold within the next 25 years (King, Aubert, & Herman, 1998). Diabetes is classified into four categories: (a) T1D (insulin-dependent), formerly known as juvenile diabetes, is an autoimmune form of diabetes that is diagnosed at an early age but can affect both children and adults; (b) T2D also affects both children and adults but occurs predominantly in adults due to environmental factors, genetics, diet, physical inactivity, obesity, and race/ethnicity; (c) gestational diabetes occurs during pregnancy due to hormonal release causing insulin resistance; and (d) a less common form of diabetes occurs due to genetic inheritance (Black, 2002; CDC, 2015).

T2D is a growing disparity based on race. African Americans are 50% to 100% more likely to develop diabetes than their white counterparts, and AAW bare a greater burden of T2D disparity, which may be major contributor to their life expectancy (Signorello et al., 2007). The vast majority of epidemiological studies indicate that the prevalence of T2D is influenced by ethnic and environmental factors (Abate & Chandalia, 2003). A genetic theory suggests that the prevalence of glucose-6-phosphate dehydrogenase (G6PD) deficiency in combination with a Western diet is a contributing factor to T2D development among African Americans (Gaskin, 1999). Another theory is

the "thrifty gene theory," regarding societies that have undergone repeated periods of famine. As a result, their bodies have a tendency to efficiently store fat. Hence, when exposed to a sustained food supply, they tend to become obese and consequently T2D (NEEL, 1962). A lot of risk factors and theories associated with T2D development among this high-risk population have been proposed and certain risk factors that contribute to AAW with T2D remain consistent throughout literature, which include, age, ethnicity, socioeconomic status, environmental, psychological, lifestyle, and obesity (Chen et al., 2015; Black, 2002).

The challenge is deciphering a risk factor or identifying new risk factor(s) for developing T2D that can distinguish those high-risk populations such as AAW. The purpose of this study was to quantitatively investigate the relationship of the perceptions of AAW not previously identified with regard to behavioral and lifestyle changes that could possibly reduce the risk of T2D in this high-risk population group.

Literature Search Strategy

A through literature search was conducted of databases such as PubMed, EBSCOhost, Google Scholar, and ProQuest comprising articles from peer-reviewed journals. Various government and private organization websites were also explored. These organizations and or websites include but are not limited to the American Psychological Association (APA), ADA, the CDC , the Diabetes Prevention Research Group, and the National Diabetes Education Program. A diligent process of random combination of keywords and phrases was initially used to search Google and PubMed. Typically these search engines provides additional resources which was also explored.

Keywords and phrases were used such as *diabetes*, *T2D*, *T2D in AAW populations*, *risk factors for developing T2D*, and *T2D prevalence and perceptions of T2D among AAW*.

The articles selected for citation were all directly related to the research topic. More than 80% of the cited work was obtained from peer-reviewed journals included clinical research, case reports, and reviews that date from 1994 to 2015. The remaining 20% of the cited work were obtained from secondary sources such as texts, organization reports, and news reports dating from 2010 to 2015.

Background

Diabetes mellitus (DM), typically referred to as diabetes, is a debilitating metabolic disorder that is characterized by prolonged high blood sugar levels (ADA, 2014c). It is one of the leading causes of death in the United States and remains a critical health issue. The three main types of DM are T1D, T2D, and gestational diabetes. T1D results from the destruction of beta cells, produced by the pancreas, by one's immune system. These beta cells play a key role in insulin production resulting in a build-up of sugar in the body (Pozzilli, Maddaloni, & Buzzetti, 2015). T2D develops due to the failure of cells to respond to insulin consequently resulting in insulin resistance. Gestational diabetes is a condition experienced by pregnant women whose glucose level is elevated during pregnancy (Singh & Singh, 2015).

T2D is the most prevalent form of DM accounting for 90% to 95% of the DM population of AAW (Tripathi & Srivastava, 2006; Chen, Magliano, & Zimmet, 2012). The number of people diagnosed with T2D, regardless of ethnicity and gender, is expected to increase dramatically to 439 million globally by 2030 (Tripathi & Srivastava, 2006; Chen et al., 2012). Racial and ethnic minorities such as American Indians and

Alaska Natives, African Americans, Hispanics, Asian Americans, Native Hawaiians, and

Pacific Islanders are at highest risk for developing T2D (Chow, Foster, Gonzalez, &

McIver, 2015). AAs have the highest occurrence of T2D second to American Indians and

Alaska Natives (CDC, 2014a). In addition, the risk is higher in women than men. AAW

are more vulnerable than any other ethnic group to develop complications associated with

T2D, which include cardiovascular disease, diabetic neuropathy, diabetic nephropathy,

diabetic retinopathy, and cancer (Chaturvedi, 2007; Vigersky, 2011; Fong, 2004; Elwing,

2006; Donadon, 2008; Larsson, 2008; CDC, 2014b). Many reasons can explain why

AAW are disproportionally affected by T2D comorbidities; however, the most common

reasons are lifestyle and environment. T2D development and T2D comorbidity

development can be attributed to obesity and lack of exercise. Close to 60% of AAW are

obese compared with 32% of white women and 41% of Hispanic women (APA, 2013).

Signorello et al. (2007) state AAs are typically poorer, are less educated, and are more

likely to live in distressed households and neighborhoods. Hence, AAW are less likely to

access recreational facilities that house gyms and lack proper health care making this

population more prone to T2D comorbidities.

Current drugs on the market for treating T2D are classified into biguanides,

sulfonylureas, thiazolidinesdiones, α-glucosidase inhibitors (AGIs), incretin-based

therapies, and GLP-1 receptor agonists (Wu, Ding, Tanaka & Zhang, 2014). Metformin is

considered the "go to" treatment for T2D and is the most popular biguanide. Metformin

is efficient in lowering blood glucose levels, which in turn increase insulin sensitivity by

reducing the risk for cardiovascular and hypoglycemia disease (Holman, 2007).

However, safety issues such as metformin-associated with lactic acidosis development in

patients remain a concern (Aldasouqui & Duick, 2015). Sulfonylureas like glimepiride

are the second line of defense and are quite effective but can cause a higher rate of

hypoglycemia especially in older T2D patients (Phung, Schwartzman, Allen, Engel, &

Rajpathak, 2013). AGIs including acarbose, voglibose, and miglitol are also effective for

treating T2D. However, they produce adverse reactions such as abdominal bloating,

diarrhea and flatulence and are not recommended for use for patients with renal

impairment. Other drugs such as dipeptidyl peptidase-4 (DPP-4) inhibitors, like oral

sitagliptin is used in the treatment of T2D as monotherapy or in combination with

metformin. This drug improves HbA1c and does not affect patient body weight (Plosker,

2014). However, side effect of sitagliptin may increase risks of pancreatic cancer

although negligible evidence is found. Another new drug used in T2D management is the

sodium-glucose transporter-2 (SGLT-2) (canaglifozin, dapagliflozin, empagliflozin),

which reduces glucose level by reabsorbing 90% of the glucose filtered by the renal

system. This drug causes minimal weight reduction and systolic pressure with low risk of

hypoglycemia (Whalen, Miller & St.Onge, 2015). However, SGLT-2 can induce genital

fungal infections, causes more frequent urination and increases potassium levels. A

plethora of safety concerns exists with the drugs on the market for T2D treatments,

however T2D is a chronic but manageable disease.

Risk factors for developing T2D

Modifiable and nonmodifiable risk factors for developing T2D have been studied

and reported in several systematic reviews, meta-analyses studies and diabetes

associations. Non-modifiable risk factors include age, race and ethnicity, gender and

family history (ADA, 2015b). The risk of developing T2D increases with age with 40%

of T2D population being 65 years or older (Black, 2002). Ethnicity is a leading risk factor

for developing T2D. American Indians and Alaska Natives, African Americans,

Hispanics, Asian Americans, Native Hawaiians, and other Pacific Islanders are at highest

risk for developing T2D (Chow et al., 2015). Prevalence of T2D is predominant among

women compared to men and AAW are disproportionally favored to develop the disease

(Black, 2013). Especially in the AA community women are the keepers of the household.

They are responsible for the cooking and passing on of cultural practices that typically

involved food (Liburd, 2003). In addition, the women suffer from gestational diabetes

during pregnancy leading to T2D associated complications.

Modifiable risk factors include lifestyle changes such as, diet, physical activity,

socioeconomic status, smoking, alcohol consumption and psychological factors (Black,

2002; Krishnan, 2010; Dipnall, 2015; Chen, 2014). AAW in particular are at a

disadvantage when considering modifiable risk factors. Among all the ethnic groups,

AAW are the least physically active, which places them at a higher risk for developing

T2D (Miller, 2012). Signorello et al. (2007) reported, in comparison to non-Hispanic

whites, AAW often have a lower socioeconomic status, live in environments that are less

than favorable and are less educated and are more susceptible to developing T2D.

Socioeconomic status can play a major role in the development of T2D as well as self-

care practices for preventing T2D. Forty percent of diabetics are less educated therefore

are within the lower income bracket and have less access to good health care (Black,

2002). Adequate access to health care is essential for people living with T2D. Being able

to afford a healthy lifestyle is also important, which is difficult to achieve when income is

poor. Similarly, a prospective study conducted by Krishan et al. (2010) reported

socioeconomic status plays a significant role in the prevalence of T2D in AAW population. Maintaining good dietary practices has long been a burden for AAW who typically have a high prevalence of obesity, which is one of the leading risk factors associated with T2D (Liburd, 2003). Food and the consumption of food is a major part of the African American culture and AAW play a significant role in its preparation. For example, "soul food" is a popular cuisine in the African American community (Kulkarni, 2004; Liburd, 2003)**.** This type of food is high in starch, fat, sodium, cholesterol, and calories and has been implicated in the development of cardiovascular disease, hypertension and T2D, just to name a few. In addition, factors that could contribute to the development of T2D in AAW include but is not limited to psychological factors such as depression, stress, health beliefs, lower socioeconomic status, and perceptions of T2D (Black, 2002; Webb, 1993, Bhattacharya, 2012). The perceptions of the psychological factors could help motivate AAW to change their health behavior are of utmost importance to understand. Even though poor diet, lack of exercise, and SES are well known contributors of T2D development, AAW still suffer disproportionately from the T2D disease. Therefore, psychological barriers like perceptions may prevent AAW from adhering to healthy lifestyle changes that could prevent the development of T2D in a population of AAW.

Perceptions of health and perceptions towards behavioral and lifestyle changes are psychological barriers to be taken into account when considering self-care for AAW with T2D. Stover et al. (2001) reported the importance of AAW perceptions of health and how it impacts their overall quality of life and attitude towards T2D. Within the AA culture there seems to be a misconception regarding individual health status. For example, AAW

tend to believe that they are healthy when they are not, and they self-diagnose and treat diseases, which is due to their perceptions of distrust of medical care (Bhattacharya, 2012). There is also disbelief that T2D-lifestyle change is beneficial to them (Bhattacharya, 2012). This stems from the fact that, the correlation of how one perceives one's health and the relationship to T2D is not completely understood among the AAW population (Bhattacharya, 2012). A community-based study conducted by Bhattacharya in 2012 reported the distrust AA have with the health care system. A quote from an AA participant, "My doctor told me to take pills regularly. Doctors always say that! I can take care of myself." Another quote was, "Doctors always ask me about my family history – my parents, grandpa, grandma, about all of them. They lived a long life …don't know how many years but did all normal things! These questions make me feel uncomfortable!"(Bhattacharya, 2012, p. 169). A general feeling of distrust and doubt was observed among this study population of AA, which leads to non-adherence to T2D self-management that is recommended by the doctors. Because their grandma and grandpa lived long lives, AAs believe if they follow similar practices they too will live long lives. However, life has changed the way people used to live off the land has changed. We typically drive everywhere now compared to the past where people walked a lot more. Many aspects of our daily life are so different from the old days. In addition, we know more about etiology of different disease and risk factors associated with developing these diseases now more than ever. Hence, we are able to take preventive measures as well as provide more targeted therapy for treating diseases.

Theoretical Framework

The HBM and TPB are the two theoretical frameworks that were used in this study. The HBM is popular and widely used model to predict and elucidate health-related behaviors (Ajzen, 1988). Key component that make up the HBM include perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action and self-efficacy. All of them provide a broad understanding of the effect of social, economic and environmental factors have on health-behaviors. The premise of HBM is individual's health belief; symptoms associated with their health issues, perceived benefits of action and barriers towards action impact self-care. Hence, the HBM is relevant to explain the perceptions toward behavioral and lifestyle changes among AAW with T2D and provide insight on how to improve upon these perceptions. By targeting key constructs of the HBM, the results of this study can be used to develop effective interventions to change health-related behaviors of AAW as well as AAW with T2D. Two major limitations of the HBM is the disregard of a person's belief or individual determinant that litigates one's attitude towards health and the HBM does not consider unhealthy habitual behaviors like smoking etc. (Janz, 1984).

The HBM has been applied to many research studies that seek to change health-related behaviors. A study conducted by Asci and Sahin (2011) successfully utilized the HBM to evaluate the beliefs and behaviors of mothers with children who have breast health (BH) issues as well as to evaluate BH perceptions. Kim et al. (2012) also used the HBM to evaluate how nutrition belief influences health behavior intention of a cohort of university students (Kim, Ahn, &No, 2012).

TPB is the improved model of the theory of reasoned action, which includes a measure of perceived behavioral control (Ajzen, 1991). Key components or considerations of the TPB include behavioral beliefs, normative beliefs and control beliefs. The limitation of TPB is the model relies on self-report, which is vulnerable to self-presentational biases (Armitage, 2001). However TPB has been successfully applied in thousands of research and is a powerful and accurate predictor of health behavior and intention. One such research conducted by Shope et al. (1997), used the TPB model to predict and explain the use of alcohol among a cohort of eight grade students.

Key Variables and Concepts

The strict management of T2D and its complications can be a challenging task. AAW's perceptions towards behavioral and lifestyle changes can significantly reduce risk factors for developing T2D by eating a healthy diet, and increasing physical activities, understanding health beliefs, knowledge of diabetes and improvement of one's socioeconomic status.

Diet

Obesity is one of the major causes of the development of T2D in AAW (Cheng, 2005; Shai, 2006). The prevalence rate of obesity in the population of AAW in the United States is four out of every five AAW (CDC, 2013). Adherence to a strict dietary regimen is particularly difficult in the AA community specifically AAW (CDC, 2013). Dietary management is a key component of diabetes self-care. Dietary management can include counting carbohydrates, reading, and understanding dietary labels to maintain a healthy diet (CDC, 2013). Unfortunately, (Burns & Skelky, 2005) reported that AAW are inadequately trained in dietary management because of lack of understanding.

Health Beliefs

The results of this research could provide an understanding and knowledge that could tailor effective community- based intervention programs for AAW that are at risk of developing T2D. Understanding how AAW perceive health beliefs as it relates to T2D can influence the perception towards lifestyle changes. A study conducted by Stover et al. (2001) indicated that AAW with T2D have a poorer perception of their health compared to other women. This result is mostly attributed to the number of symptoms experienced (neuropathy), lower income, lower education level, age, limited exercise, and other T2D related complications. However, Stover did not perform additional analysis to investigate a correlation if any between AAW health belief and perception toward lifestyle changes, which is one of the aims of this study.

Knowledge of Diabetes

AAW with T2D face the challenge of prioritizing their efforts to improve health and maintain a healthy lifestyle with little or no information regarding the associated risks and complications. Furthermore, AAW may be unfamiliar with how their lifestyle affects those risks (Abate & Chandalia, 2003). Due to a lack of knowledge and understanding, AAW have an inaccurate risk perception. Hence their risk reduction efforts, which include behavioral and lifestyle changes, are misguided and not beneficial towards reducing the risk of developing T2D. Saver et al. (2014) assessment of the knowledge and attitudes of patient with T2D concluded personalized, quantitative risk information alone is unlikely to help patients manage their diabetes-related risks. This was due to a lack of understanding and personal risk-perceptions about T2D (Saver et al., 2014).

It is necessary to try to elucidate the perceptions of T2D and health beliefs and how it affects the perceptions toward lifestyle changes in the AAW population. Talbot et al. (1997) reported the importance of having knowledge coupled with a clear understanding of the outcome expectancies and self-care practices as they relate to T2D in maintaining a healthy lifestyle.

Perception Toward Behavioral and Lifestyle Changes

Based on the concepts of the HBM and TPB, diet, health beliefs, knowledge of diabetes, physical activities, and socioeconomic status all could be related to the perceptions towards T2D and behavioral and lifestyle changes in AAW with T2D.

The self-management of T2D in the AAW community is a challenging issue. The self- management of T2D involves exercising, frequent visits to the doctor and foot care, as well as daily monitoring of diet and glucose levels (Toobert, 2000). The AAW inabilit y to maintain a healthy lifestyle because of their socioeconomic status, health beliefs and perceptions of T2D which could directly affect their ability to self-manage T2D (Toobert , 2000).

In a recent study conducted by Signorello et al. (2007), it was reported that the disproportionate prevalence rate of diabetes between AAW and whites, reflect a difference in risk factors such as socioeconomic status. AAW are poorer, less educated and are more likely to live in a distressed environment, which could lead to psychologically distress, hence are less able to adjust to a healthier lifestyle (Williams, 1997).

With that said, psychosocial factors also influence T2D self-management among AAW. A qualitative study conducted by Bhattacharya (2012) of 31 rural populations of A

A men and women indicated several psychosocial factors influencing T2D. Emerging themes from this study included; (a) a failure to follow guidelines, (b) distress over the re alization that the AA culturally relevant foods were unhealthy, (c) distress experienced by AAW regarding the inability to maintain physical exercise, (d) anxiety especially by AA W of medication compliance, (e) uncertainty of social support, (f) AAW especially had a feeling of alienation from other populations and, (g) a lack of belief regarding lifestyle changes that could benefiting them.

According to the above results, a lack of belief exits regarding medical care and lifestyle changes that may be beneficial to the AAW population with T2D. Thus, it is imperative that researchers explore factors that could influence the perceptions of AAW towards behavioral and lifestyle changes. Based on the concepts of the HBM and TPB, perception towards T2D and social support, perceptions of self-care activities, perception of outcome expectancies and self-efficacy may affect perceptions towards behavioral and lifestyle changes.

Physical Activities

T2D is one of the leading causes of death in the AAW community (Miller, 2012). A major factor affecting the prevalence of T2D and the development of T2D associated complications among AAW is the lack of physical activity (Miller, 2012). Given this known fact, AAW are the least active in the AA and Caucasian populations (Miller, 2012). Factors such as neighborhood safety and personal motivation are factors that influence the lack of physical activity among AAW with T2D (Miller, 2012). The socioeconomic status of many AAW is in general below than average, hence they tend to live in poorer neighborhoods with more crime and safety is a more important concern than exercise.

Socioeconomic Status

As it was previously mentioned, socioeconomic status is another risk factor of T2
D among AAW (Signorello, 2007; Chandalia, 2003). Socioeconomic status includes inco
me, environment and level of education. As reported by Bhattacharya (2012), safety conc
erns of the environment in which one lives can affect the ability of AAW's willingness   to
exercise, eat healthy, and get regular check-ups. For example, the lack of recreational fac
ilities, access to healthy foods and educational resources can affect one's ability to eat hea
lthy and exercise. The environment could be a source of stress and could lead to depressio
n that could ultimately influence the propensity towards AAW living a healthy lifestyle (A
bate & Chandalia, 2003). In addition, the level of education and income could affect one's
ability to financially facilitate the demanding lifestyle changes required for T2D,   such a
s a change in diet and exercise.   Educational level and income have been reported to hav
e an inverse association with T2D   among AAW (Robins, 2001). Krishnan et al. (2010) s
uggests socioeconomic status could play a key role in T2D development in AAW.

Summary and conclusions

T2D and its associated comorbidities could impose a significant health burden
among the AAW community, and no adequate effective measures are in place for AAW
to cope with the disease. This may be due to the lack of research specifically targeting A
AWwith T2D. The question remains, why is there a high prevalence of T2D among AA
W given the knowledge of the disease and the risk factors its poses? During the literature
search, no studies were found that have reported any research on the perceptions towards
behavioral and lifestyle changes in a population of AAW. The psychology and behavior
of AAW is strongly rooted in their perceptions and beliefs. This aspect must be

considered when trying to gain a clear and holistic understanding of factors associated to an increased risk of developing   T2D. Regimen adherence to diet and exercise is a huge factor associated with T2D among AAW. Glasgow et al. (1995) reported variables consistent with regimen adherence towards self-care behavior which include, (a) perception of self-efficacy, which is the confidence that patients have in performing self-care activities such as lifestyle changes like daily dieting and performing physical activities, (b) outcome expectancy, which is the perception of the effect of self-care activities on controlling T2D the associated complications (in this case, perception of T2D, health belief and knowledge of T2D is important), (c) perceptions of social and environmental influences, and (d) barriers that affect one's ability to perform self-care activities, such as socioeconomic status.

The purpose of this study was to quantitatively assess the perception towards behavioral and lifestyle changes among AAW with T2D, after taking into account covariates such as diet, health beliefs, knowledge of diabetes, physical activity, obesity, and socioeconomic status associated with T2D. In Chapter 3, I will describe in detail the research design, methodology, sample, and data   analysis plan to test for an association between perceptions towards behavioral and lifestyle changes in a population of AAW.

Chapter 3: Research Method

Introduction

T2D is a growing disparity in the AA community and AAW bear a greater burden of the T2D disparity (Zhang et al., 2009). According to several studies, the prevalence of T2D is influenced by ethnic, environmental, and genetic factors (Abate & Chandalia, 2003; Black, 2002; Cheng, 2005; Krishnan et al., 2010;Signorello et al., 2007). Although the risks for developing T2D are well known, and many therapies treat the disease, T2D remains an epidemic among AAW (Stover, Skelly, Holditch-Davis, & Dunn, 2011). Previous researchers suggested that AAW are less active, have poorer eating habits, and experience other difficulties, but most important, AA do not adhere to recommendations regarding lifestyle changes compared with their white counterparts (Abate & Chandalia, 2003; Miller & Marolem, 2012; Liburd, 2003). The question then becomes: How do AAW perceptions of self-care activities, self-efficacy, and outcome expectancies affect T2D risk behaviors such as diet and exercise? The purpose of this study was to quantitatively investigate the relationship of the perceptions of AAW, not previously identified, with regard to behavioral and lifestyle changes that could possibly lead to a reduced risk of T2D. In Chapter 3, I present the research methodology, instrumentation, data collection method, variables, instrumentation, research questions and hypotheses, data analysis, ethical considerations, informed consent, and a summary.

Research Design and Rationale

This quantitative nonexperimental study was conducted to determine whether a correlation exists among the independent and dependent variables. The independent variables include perceptions of AAW not previously identified with regard to behavioral

and lifestyle changes (e.g., perception of severity of T2D). The dependent variables are diet, exercise, and blood sugar test results. In addition, I used several covariates, such as age, and educational level. I selected a cross-sectional quantitative study design for this study because primary data will be collected at one point in time. Cross-sectional analysis is useful for the researchers to observe the outcome of an experiment naturally without interference (Field, 2013). Cross-sectional study is inexpensive, efficient, and fast. A major disadvantage is that the researcher is unable to collect multiple data for a defined period to observe any changes in the study population, and it is difficult to definitively access cause and effect (Levin, 2006). However, because the study was designed to evaluate risk factors associated with an outcome and not to compare pre- and postdata, a cross-sectional approach is convenient and sufficient for this study (Levin, 2006). The data collected were quantitative in nature and were analyzed using statistical methods like bivariate analysis and regression to determine the association between perception of behavioral and lifestyle changes with various T2D risk factors in the study population.

Methodology

Population

A convenience sample of AAW from Maryland and Virginia was recruited from public areas such as (a) local markets, shopping malls and recreational areas, (b) online social organizations, and (c) the SurveyMonkey participant population to gather the data. The advantage of using a convenience sample is to eliminate sampling bias and provide a synopsis of the sample size of the target population.

Sample and Power Analysis

The power of a statistical test is the probability that the null hypothesis is rejected according to test, and it is defined as 1-probability of Type II error (Biau, 2008). The power of a study is the probability of not having a false negative result. Therefore, the more power, the lower the probability of a Type II error. A Type II error (β) refers to determining whether a difference exists when, in reality, a difference does exist, which is also known as a false negative (Brace, 2013). To obtain an appropriate sample size, the statistical power, the effect size, and the alpha values should be determined (Sullivan, 2012). A high statistical power will improve the chance of detecting any real relationship between the dependent and independent variables. I used G* Power 3.1 calculator (Faul, Erdfelder, Lang, & Buchner, 2007) to determine the appropriate sample size given a 80% power (1-β) and a medium effect size of 0.32, based on the similar recent study of Cosansu and Erdogan (2014).

Most research in social studies use 80% to 90 % power similarly to 95% confidence level and a standard medium effect size of at least 0.15 to detect a meaningful difference (Sullivan, 2012; Cooper & Hedges, 1994). An a priori sample size calculation was conducted with 80% power, alpha value of 0.05, and a medium effect size of 0.32, using correlations of two independent Pearson's *r* functions. The result of the analysis was approximately a sample size of 200 for adequate power.

Procedures

Upon approval from Walden University Institutional Review Board (IRB), I dispersed flyers in the public places aforementioned and online for participant recruitment. A brief summary of the study as well as the SurveyMonkey link for

completing the questionnaire were provided in the flyers. Prior to completing the

questionnaires, participants were required to complete a consent form. The consent form

contained a summary and purpose of the study. Also, information regarding the risks and

benefits of participating in the study, the voluntary nature of the study, and a

confidentiality agreement were included in the consent forms. Participants were also

informed of their right to withdraw from the study at any time and were provided with the

IRB contact information and Walden IRB approval number. A check box indicating

participant agreement to participate in the study was provided and had to be checked to

move onto the questionnaires. Once the sample size of 200 participants had been met and

all participants have completed the questionnaires, I downloaded the data from

SurveyMonkey for analysis. Survey Monkey is an online software that allows researchers

to easily and securely set up, customize surveys, questionnaires, and collect data online.

SurveyMonkey also provides an option to recruit participants, who fit the target

population, from the SurveyMonkey audience.

Inclusion and Exclusion Criteria of the Study Sample

AAW between the ages 18 and 65 years diagnosed with T2D were recruited and

were eligible to participate in this study. Other minority women including Latinos and

Asians were excluded from this study. Participants were also able to read and

comprehend the English language at least at the eight-grade level and all the surveys were

presented in English. Study participants must be mentally apt to complete the

questionnaires honestly and without bias. Persons with a mental disability were not

recruited to participate in the study.

Study Instruments

Multidimensional Diabetes Questionnaire

The Multidimensional Diabetes Questionnaire (MDQ) (Appendix A) was developed by Talbot and colleagues in 1997 to assess patient's psychological adjustment to diabetes (Talbot, Nouwen, Gingras, Gosselin, & Audet, 1997). The development of the MDQ was guided by the social learning theory with which human behavior is explored by proposing that learning is a mental process that occurs as a result of observation or direct instruction and takes place in a social context (Bandura, 1971; Brusec, 1992). The social learning theory integrates both behavioral and cognitive learning theories. The MDQ is a 41 item questionnaire that is divided into three sections. The first section contains questions that address participant's perception of diabetes and social support, while the second and third section addresses perception of self-care activities and self-efficacy and outcome expectancies. Section I responses are rated on 7-point Likert psychometric scale with the higher scores indicating higher interference of diabetes to daily life, increased social support and increased awareness of severity of diabetes. Section II responses are also rated on 7-point Likert psychometric scale with higher scores indicating increased positive reinforcing behaviors and increased misguided support behaviors. Section III is rated on an importance and confidence 0 (not at all confident / important)-100 (very confident / important) scale. A higher score in section III indicates increased confidence in performing self-care activities and an increased knowledge of T2D and outcome expectancies.

The MDQ has been validated by Talbot et al. (1997) by conducting factor analysis on a cohort of 249 T2D patients and has been utilized by many researchers. Sections of

the MDQ have been used by Camp et al. (2015) to experimentally assess perception of self-efficacy pre intervention, 1 month and 3 months post intervention. The overall objective of the study was to assess whether a distance-based educational intervention was effective in causing a positive health outcome for patients with T2D and cognitive impairment (Camp, Fox, Skrajner, Antenucci & Haberman, 2015). Cosansu and Erdogan (2014) employed the MDQ to evaluate psychological factors associated with self-care activities on Turkish patients with T2D (Cosansu & Erdogan, 2014). Cosansu and Erdogan (2014) found that psychological factors affect such as perception of self-efficacy contribute to good glycemic control.

Summary of Diabetes Self-Care Activities

The Summary of Diabetes Self-Care Activities (SDSCA) developed and validated by Toobert is a brief self-report of diabetes self-management (Toobert & Glasgow, 1994). The SDSCA is a well-established and most popular tool for assessing the levels of various self-care activities such as diet, exercise, blood sugar testing, foot care and smoking (Toobert, Hampson & Glasgow, 2000; Sapkota, Brien, Greenfield, & Aslani, 2015). The questionnaire is used by clinicians, educators and researchers for evaluating different approaches and educational interventions for care. Many researchers have utilized the SDSCA for evaluating self-care behaviors. In particular, Yang et al. conducted a study to evaluate the effect of patient empowerment on diabetes self-care management (Yang, Hsue & Lou, 2015). Pearson et al. (2014) used the SDSCA to evaluate self-care behaviors of participants in efforts to correlate depression with foot ulcer incidence (Pearson, Nash & Ireland, 2014). Earlier studies adapted the SDSCA to evaluate interventions (Glasgow, Barrera, McKay & Boles, 1999; Glasgow et al., 1997).

Participant's diabetes self-care activities were assessed using the 11-item SDSCA scale. Each response is scored on a 0-7 days scale with an increase in value indicating better self-care management. The SDSCA has been used in conjunction with the MDQ to assess behaviors of T2D patients (Cosansu & Erdogan, 2014).

Operationalization of Variables

The aim of the study was to evaluate AAW's perceptions towards behavioral and lifestyle change and the risks of developing T2D. The risk factors associated with the development of T2D among AAW are included in this study as the independent variables (Black, 2002; Wu et al., 2014). Risk factors such as diet and exercise (i.e. self-care activities) were measured by the SDSCA (Appendix B) and socioeconomic status was included. Demographic (Appendix C) information such as age, marital status, educational level and A1C test were also collected as covariates in this study. The A1C test also known as the Hemoglobin A1C reflects a person's average blood sugar level (NIH, 2014). Typically diabetic patients measure their A1C levels daily to ensure appropriate blood sugar levels are maintained. Perception towards behavioral and lifestyle changes were measured by the MDQ (Appendix A) and is comprised of three categories which include, perceptions of T2D severity (health belief) and related social support, perceptions of self-care activities and perceptions of outcome expectancies (knowledge of diabetes) and self- efficacy (Talbot et al., 1997).

Table 1

Variables, Variable Type, and Instrument

Research question	Variable	Variable type	Instrument and items
RQ1 (descriptive) Perception towards behavioral and lifestyle changes	Perception of T2D severity and social support	-	MDQ – Section I Q 1-16
	Perception of self-care activities	-	MDQ - Section II Q 17-28
	Perception of self-efficacy and outcome expectancies	-	MDQ - Section III Q 29-41
RQ2 (inferential) Impact of perceptions on behavioral and lifestyle changes	Perception of T2D severity and social support	Independent	MDQ - Section II Q 1-16
	Perception of self-care activities	Independent	MDQ - Section II Q 17-28
	Perception of self-efficacy and outcome expectancies	Independent	MDQ - Section III Q 29-41
	Diet	Dependent	SDSCA Q 1-4
	Exercise	Dependent	SDSCA Q 5-6
	Blood sugar testing	Dependent	SDSCA Q 7-8
	Age	Covariate	Demographic Survey Q1
	Marital Status	Covariate	Demographic Survey Q2
	Educational level	Covariate	Demographic Survey Q3
	Employment status	Covariate	Demographic Survey Q4
	Income	Covariate	Demographic Survey Q5
	A1C test	Covariate	Demographic Survey Q6

Data Analysis Plan

Data collected from Survey Monkey were sorted and curated in Excel, and

missing data were removed. The remaining data were imported into IBM-SPSS statistical

software version 23 for descriptive analysis (RQ1), and bivariate inferential analysis

(Pearson's *r* or Spearman's *rho* correlation, depending on if the data were normally distributed or not) were conducted to determine the strength and direction of the association between the independent and dependent variables. In addition, multiple linear regression was used to test the relationship of all the independent variables with each of the dependent variables in various combinations once all the assumptions of multiple linear regressions were met. According to Green & Salkind (2014), the assumptions include:

1. The prediction errors must be normally distributed. In case some subsets of data have different statistical properties, they will be divided into separate models or discarded. If the error of distribution is due to large errors, an investigation will be conducted and these values will be rejected if they are simply errors that do not influence the models.

2. The independent and dependent variable(s) have a linear relationship.

3. Assumption of homoscedasticity or homogeneity of variance, which refers to the variance of errors across all the variables being similar or the same. If heteroscedasticity is observed, a log transformation of variable(s) will be conducted.

4. Assumption that there is no multicollinearity between independent variables. Multicollinearity happens when one or more independent variable are not independent of each other.

If the above assumptions were violated and could not be corrected, I would have explored

why the model assumptions did not hold and therefore I would have to transform, remove

variables as appropriate to meet the assumptions. But that was not the case.

Multiple regression was used to determine which predictor has the strongest association

with the dependent variable. A priori level of statistical significance was set at $p < 0.05$.

The data analysis plan is summarized in Table 2.

Research Questions and Hypotheses

The following research questions (RQs) and hypotheses guided this study:

1. RQ1 (descriptive): What are the perceptions of AAW with regard to

    behavioral and lifestyle changes, such as physical activities and healthy diet?

2. RQ2 (inferential): Do the aforementioned identified perceptions affect

    behavioral and lifestyle changes in AAW?

H$_{02}$: The aforementioned identified perceptions do not affect behavioral and

lifestyle changes in AAW.

H$_{a2}$: The aforementioned identified factors do affect behavioral and lifestyle

changes in AAW.

3. RQ3: Do the aforementioned identified perceptions affect behavioral and

    lifestyle changes in AAW, taking into account the demographics

    characteristics of the sample?

H$_{03}$ The aforementioned identified factors do not affect behavioral and lifestyle

changes in AAW, taking into account the demographics characteristics of the sample.

H$_{a3}$: The aforementioned identified factors do affect behavioral and lifestyle

changes in AAW, taking into account the demographics characteristics of the sample.

Table 2

Statistical Tests for Evaluating Each Research Question

Research question	*Data* elements	*Statistical* approach
RQ1	MDQ & SDSCA	Descriptive statistics
RQ2	MDQ & SDSCA	Bivariate Pearson's *r* or Spearman's *rho* Correlation
RQ3	MDQ & SDSCA, adjusted for age, A1C, education level, marital status and socioeconomic status	Multiple Linear Regression

Threats to Validity

Internal validity of a study refers to how well a study is able to establish cause and effect relationship between dependent variable and independent variables with the less possible bias (Cook & Campbell, 1976). The choice of instrument can include a threat to the internal validity of the study. However, the instruments being used in this study, MDQ and SDSCA, have been validated and have been used in previous research (Yang, Hsue & Lou, 2015; Pearson, Nash & Ireland, 2014; Cosansu & Erdogan, 2014). Therefore we anticipated no threats to validity with regard to the instruments being used. The sample size of 200 was calculated based on a significance level of 5% thereby reducing the chance of a type I error and a power of 80% (Biau, Kerneis & Porcher, 2008). In addition, we assumed the participants would answer truthfully each question, therefore we expected the less possible recall bias.

It also exists a threat to external validity of the study. According to Cook and Campbell (1976), external validity is the inference of the causal relationships that can be generalized to different measures, persons, settings and times. External validity is concerned with the generalizability of the study. Convenience sampling of study participants poses a threat to the external validity and introduces selection bias (Khorsan, 2014). However, the study was designed to analyze a specific group of individuals who are AAW, and this bias was addressed with the selection of the most appropriate statistical analysis.

Ethical Procedures

Ethical approval to conduct the study was obtained from Walden University with the assigned IRB approval number, 12-28-15-0323464. This IRB number was provided to the participants on the consent form for any questions regarding the study. Data collected from this study were anonymous and were kept confidential. The data were stored in a secure location and were accessible only to the researchers involved in the study. All data will be kept for five years and will be destroyed thereafter.

Summary

This quantitative study was designed to evaluate AAW's perceptions towards behavioral and lifestyle change and the risk of developing T2D. A convenience sample of 200 AAW with T2D was asked to complete two validated questionnaires, the MDQ and the SDSCA, along with demographic information. The perceptions towards behavioral and lifestyle changes were assessed by the MDQ, whereas lifestyle change such as diet and exercise were assessed with the SDSCA. Bivariate Pearson's or Spearman's correlation was used to determine if a correlation exists between perception towards

lifestyle changes and each risk factor such as diet, exercise and socioeconomic status. A multiple linear regression analysis was conducted to determine if a correlation exists between perception towards lifestyle changes and risk factor such as diet, exercise and socioeconomic status after accounting for the covariates.

Chapter 4: Results

Introduction

The purpose of this study was to quantitatively investigate the relationship of the perceptions of AAW not previously identified with regard to behavioral and lifestyle changes that could possibly lead to a reduced risk of T2D in this high-risk population group. Identifying and exploring the perceptions about the effects of T2D and the willingness of AAW to make behavioral lifestyle changes, such as dietary habits and physical activities, may efficiently reduce the risk of T2D in the target population and ultimately bring about positive social change in communities.

Data Collection

An approximate sample size of 200 was needed for this study to achieve significance from the hypothesis testing. However, 183 responses were valid and retained for the assessment. A post hoc analysis was performed to determine the significance of the results based on the sample size. Spearman's *rho* correlation coefficients ranged from .01 to .82. Therefore, the observed power ranged from .05 to 1.00 with a sample size of 183, an alpha level of .05, and for a two-tailed test (Faul, Erdfelder, Lang, & Buchner, 2009). This confirmed the adequacy of the data. Data collection consisted of a convenience sample of AAW from Maryland and Virginia recruited from public areas such as (a) local markets, shopping malls, recreational areas; (b) online social organizations; and (c) the SurveyMonkey participant population. AAW between the ages 18 to 65 years diagnosed with T2D met the inclusion criteria to participate in this study. Data were collected through SurveyMonkey, an online data collection tool.

Study instruments included the MDQ and the SDSCA. The MDQ (Appendix A) was developed by Talbot and colleagues in 1997 to assess patients' psychological adjustment to diabetes (Talbot et al., 1997). The MDQ is a 41-item questionnaire that is divided into three sections. The first section contains questions that address participant's perception of diabetes and social support, whereas the second and third section addresses perception of self-care activities and self-efficacy and outcome expectancies. Section I responses are rated on 7-point Likert psychometric scale with the higher scores indicating higher interference of diabetes to daily life, increased social support, and increased awareness of severity of diabetes. Section II responses are also rated on 7-point Likert psychometric scale with higher scores indicating increased positive reinforcing behaviors and increased misguided support behaviors. Section III is rated on an importance and confidence scale, with 0 = not at all confident/important and 100 = very confident/important. A higher score in Section III indicates increased confidence in performing self-care activities and an increased knowledge of T2D and outcome expectancies.

The SDSCA developed and validated by Toobert is a brief self-report of diabetes self-management (Toobert & Glasgow, 1994). The SDSCA is a well-established and the most popular tool for assessing the levels of various self-care activities such as diet, exercise, blood sugar testing, foot care, and smoking (Toobert et al., 2000; Sapkota et al., 2015). Participant's diabetes self-care activities were assessed using the 11-item SDSCA scale. Each response is scored on a 1- to 7-day scale with an increase in value indicating better self-care management.

Chapter 4 is organized by a discussion of the sample demographics, reliability

analysis, descriptive statistics, data screening, research question/hypothesis testing, and

conclusions. I collected the data from January 14, 2016 to March 18, 2016. I exported the

data from SurveyMonkey directly to the Statistical Package for Social Sciences (SPSS). I

analyzed the data with SPSS 23 for Windows. The following provides a discussion of the

sample demographics.

Sample Demographics

A total of 233 participants responded to the survey; however, 50 responses were

excluded for being incomplete or not meeting the inclusion criteria. Thus, the sample

consisted of 183 participants, ranging from ages 20 to 65 years ($M = 42.60$, $SD = 12.98$).

Regarding marital status, 35.5% ($n = 65$) were single; 32.2% ($n = 59$) were married; and

18% ($n = 33$) were living with a significant other. Marital status is presented in Table 3.

Table 3

Marital Status

Variable	n	%
Other (please specify)	26	14.2
Single	65	35.5
Married	59	32.2
Living with a significant other	33	18.0
Total	183	100.0

*Note. Other = divorced or widowed.

Regarding educational attainment, 14.2% ($n = 26$) had primary education; 20.8%

($n = 38$) had secondary education; and 33.9% ($n = 62$) had university education.

Educational attainment is presented in Table 4.

Table 4

Educational Attainment

Variable	*n*	%
Primary education	26	14.2
Secondary education	38	20.8
College education	57	31.1
University education	62	33.9
Total	183	100.0

The majority of respondents (67.8%, *n* = 124) were employed; 14.8% (*n* = 27) were students; and 11.5% (*n* = 21) were unemployed. Employment status is presented in Table 5.

Table 5

Employment Status

Employment status		*n*	%	Valid %
	Employed	124	67.8	68.5
	Unemployed	21	11.5	11.6
	Retired	9	4.9	5.0
	Student	27	14.8	14.9
	Total	181	98.9	100.0
No	answered	2	1.1	
Total		183	100.0	

Concerning annual income, 42.1% (*n* = 77) earned more than $35,000; 21.9% (*n* = 40) earned $25,000 to $34,999; 2.2% (*n* = 5) earned less than $9,000; and 13.5% (*n* = 26) earned no income. Annual income is presented in Table 6.

Table 6

Annual Income

Income	n	%
None	26	14.2
Less than $9,000	4	2.2
$9,000–$14,999	16	8.7
$15,000–$24,999	20	10.9
$25,000–$34,999	40	21.9
More than $35,000	77	42.1
Total	183	100.0

Respondents' last A1C test ranged from 4.5 to 14 ($M = 6.85$, $SD = 2.00$). The average A1C test result of the participants showed adequate blood glucose control. A normal blood glucose level should be less than 5.7%, diabetes is diagnosed at an A1C level $\geq 6.5\%$ (CDC, 2012). However, for diabetic patients, a good glycemic control is identified at an A1C $\leq 7\%$. An A1C value between 7-9 % is considered fair, and any value higher than 9% indicates poor blood glucose control (CDC, 2012).

Reliability Analyses

The reliability for the sample was investigated with Cronbach's alpha coefficient. The internal consistency of the variables of interest ranged from .53 for social support to .98 for outcome expectancies. The minimum acceptable reliability is .70. Therefore, the reliability for social support was less than ideal. Reliability coefficients are presented in Table 7.

Table 7

Reliability Coefficients

Variable	*N* of items	Cronbach's alpha
Diet	4	.88
Exercise	2	.751
Blood sugar testing	2	.784
Severity	2	.899
Interference	9	.968
Social support	4	.532
Outcome expectancies	6	.981
Self-efficacy	7	.969

Descriptive Statistics

Descriptive statistics, which consisted of measures of central tendency, were generated for the variables of interest. For the variables that were computed, the means were calculated for each respondent. For diet, as an example, scores ranged from 1 to 6.75 ($M = 4.41$, $SD = 1.27$). For exercise, scores ranged from 0 to 7 ($M = 2.86$, $SD = 1.33$). For blood sugar testing, scores ranged from 1 to 7 ($M = 6.22$, $SD = 1.07$). Descriptive statistics for the continuous variables are presented in Table 8.

Table 8

Descriptive Statistics

Variable	N	Minimum	Maximum	M	SD
Age	183	20	65	42.60	12.98
AIC Test	183	4.50	14.00	6.85	1.97
Diet	183	1.00	6.75	4.41	1.27
Exercise*	183	0	7.00	2.86	1.33
Blood sugar testing	183	1.00	7.00	6.22	1.07
Severity	183	1.00	7.00	2.53	1.61
Interference	183	1.00	7.00	2.11	1.37
Social support	183	1.00	7.00	3.43	1.17
Outcome expectancies	183	3.17	100.00	94.26	15.96
Self-efficacy	183	2.43	100.00	77.80	20.58

Note. *Once the variable was computed, cases with missing values ($n = 2$) were replaced with zeroes under the assumption that they had no exercise activities to report.

Preliminary Data Screening

The data were screened for normality with skewness and kurtosis statistics. In SPSS, when the absolute values of the skewness and kurtosis coefficients are less than two times the standard errors, the distributions are considered to be normal. The skewness values for age, diet, and exercise were within normal limits. The skewness values for the A1C test, blood sugar testing, severity, interference, social support, outcome expectancies, and self-efficacy were outside the range of normality. However, no data transformations were conducted at this time in order to preserve the nature of the data. Further data screening was conducted during the research question and hypothesis testing. Skewness and kurtosis coefficients are presented in Table 9.

Table 9

Skewness and Kurtosis Coefficients

Variables	N Statistic	Skewness Statistic	Std. Error	Kurtosis Statistic	Std. Error
Age	183	.103	.180	−1.18	.357
A1C Test	183	1.80	.180	2.67	.357
Diet	183	−.295	.180	−.609	.357
Exercise	183	.164	.180	−.412	.357
Blood Sugar Testing	183	−1.75	.180	3.90	.357
Severity	183	1.01	.180	.090	.357
Interference	183	1.32	.180	.907	.357
Social Support	183	.902	.180	.564	.357
Outcome Expectancies	183	−4.67	.180	22.85	.357
Self-Efficacy	183	−1.34	.180	2.12	.357

Research Questions and Hypothesis Testing

Three research questions and two associated hypotheses were formulated for investigation. They are as follows:

1. RQ1 (descriptive): What are the perceptions of AAW with regard to behavioral and lifestyle changes, such as physical activities and healthy diet?

2. RQ2 (inferential): Do the aforementioned identified perceptions affect behavioral and lifestyle changes in AAW?

H_{02}: The aforementioned identified perceptions do not affect behavioral and lifestyle changes in AAW.

H_{a2}: The aforementioned identified factors do affect behavioral and lifestyle changes in AAW.

3. RQ3: Do the aforementioned identified perceptions affect behavioral and

lifestyle changes in AAW, taking into account the demographic characteristics

of the sample?

H_{03}: The aforementioned identified factors do not affect behavioral and lifestyle

changes in AAW, taking into account the demographic characteristics of the sample.

H_{a3}: The aforementioned identified factors do affect behavioral and lifestyle

changes in AAW, taking into account the demographic characteristics of the sample.

Research Question 1

This question was investigated with descriptive statistics. Based on the computed

variables for perceptions of (a) psychological adjustment to diabetes (severity,

interference, social support, outcome expectancies) and (b) behavioral and lifestyles

changes relative to diabetes self-care activities (diet, exercise, blood sugar testing);

categories were created (low, moderate, high) based on the responses. From a scale of 1

to 7, the median was identified at 3.5, thus values below the median (3.5) were classified

as *low*. Median values were classified as *moderate* and values above the median (3.5)

were categorized as *high*. For diet, 34.4% ($n = 63$) had a low degree of healthy dieting,

7.1% ($n = 13$) had a moderate degree; and 58.5% ($n = 107$) had a high degree of healthy

dieting (see Figure 1). For diet, 34.4% ($n = 63$) had a low degree of healthy dieting, 7.1%

($n = 13$) had a moderate degree; and 58.5% ($n = 107$) had a high degree of healthy

dieting.

Regarding exercise, 61.7% ($n = 113$) had a low degree of physical activity, 7.7%

($n = 14$) had a moderate degree; and 30.6% ($n = 56$) had a high degree of physical

activity (see Figure 2).

For blood sugar testing, 1.6% ($n = 3$) had a low degree of testing, 4.9% ($n = 9$) had a moderate degree; and 93.4% ($n = 171$) had a high degree of blood sugar testing (see Figure 3).

Regarding the awareness of the severity of diabetes, 72.1% ($n = 132$) had low awareness, 8.7% ($n = 16$) had moderate awareness, and 19.1% ($n = 35$) had high awareness (see Figure 4).

For interference of diabetes to daily life, it was determined that 88% ($n = 161$) had low interference, 1.1% ($n = 2$) had moderate interference, and 10.9% ($n = 20$) experienced high interference (see Figure 4).

Concerning support, 74.3% ($n = 136$) had low social support for diabetes management; 5.5% ($n = 10$) had moderate support; and 20.2% ($n = 37$) had a high degree of social support (see Figure 6).

Relative to outcome expectancies pertaining to knowledge of diabetes, 2.7% ($n = 5$) perceived this to be of low importance, whereas 97.3% ($n = 178$) perceived this to be of high importance (see Figure 7).

Regarding the perception of self-efficacy, which is the confidence that patients have in performing self-care activities, 9.8% ($n = 18$) had low confidence; 2.2% ($n = 4$) had moderate confidence; and 88% ($n = 161$) had a high degree of confidence (see Figure 8).

Table 10 provides a summary of the variables of interest and the degree of endorsement for Research Question 1.

Table 10

Summary of Descriptive Statistics for Research Question 1

Variable		*n*	%
Diet	Low	63	34.4%
	Moderate	13	7.1%
	High	107	58.5%
Exercise	Low	113	61.7%
	Moderate	14	7.7%
	High	56	30.6%
Blood Sugar Testing	Low	3	1.6%
	Moderate	9	4.9%
	High	171	93.4%
Severity	Low	132	72.1%
	Moderate	16	8.7%
	High	35	19.1%
Interference	Low	161	88.0%
	Moderate	2	1.1%
	High	20	10.9%
Social Support	Low	136	74.3%
	Moderate	10	5.5%
	High	37	20.2%
Outcome Expectancies	Low Importance	5	2.7%
	High Importance	178	97.3%
Self-Efficacy	Low Confidence	18	9.8%
	Moderate Confidence	4	2.2%
	High Confidence	161	88.0%

Research Question 2

Research Question 2 was investigated with Spearman's *rho* rather than the

Pearson *r* as initially proposed since the majority of the data were non-normally

distributed. Significant correlations were categorized by magnitude based on the

guidelines indicated in Table 11. Values below 0.3 indicated low correlation between the

variables. Correlation coefficient between 0.3 and 0.7 signified moderate association, and

values greater than 0.7 revealed strong relationships between the variables (Kraska,

Ramsey, Haff & Fethke, 2009)

Table 11

Correlation Magnitude

Correlation	Magnitude
$r < 0.3$	Weak
$0.3 \leq r < 0.7$	Moderate
$r \geq 0.7$	Strong

A significant, negative, moderate relationship was found between severity and

diet, $r_{rho}(181) = -.54, p < .001$, two-tailed. As the awareness of the severity of diabetes

increased, there was a corresponding decrease in the healthy dieting. A significant,

negative, moderate relationship was found between interference and diet, $r_{rho}(181) =$

$-.67, p < .001$, two-tailed. As interference of diabetes to daily life increased, a

corresponding decrease in healthy dieting habits was observed. A significant, weak,

positive relationship was found between social support and diet, $r_{rho}(181) = .15, p = .04,$

two-tailed. As social support increased, there was a corresponding increase in dietary

habits. A significant, positive, moderate correlation was found between outcome

expectancies and diet, $r_{rho}(181) = .49, p < .001$, two-tailed. As outcome expectancies

increased, a corresponding increase in healthy dieting was noted. A strong, positive

relationship between self-efficacy and diet was observed, $r_{rho}(181) = .82, p < .001$, two-

tailed.

A significant, negative, moderate relationship was found between severity and exercise, $r_{rho}(181) = -.49$, $p < .001$, two-tailed. As the awareness of the severity of diabetes increased, there was a corresponding decrease in exercise. A significant, negative, moderate relationship was found between interference and exercise, $r_{rho}(181) = -.56$, $p < .001$, two-tailed. As interference of diabetes to daily life increased, a corresponding decrease in exercise was observed. There was no significant relationship between social support and exercise, $r_{rho}(181) = .01$, $p = .87$, two-tailed. A significant, positive, moderate, weak relationship was observed between outcome expectancies and exercise, $r_{rho}(181) = .33$, $p < .001$, two-tailed. As outcome expectancies increased, there was a corresponding increase in exercise. A significant, moderate, positive relationship was found between self-efficacy and exercise, $r_{rho}(181) = .63$, $p < .001$, two-tailed. As self-efficacy increased, a corresponding increase in exercise was observed.

A significant, negative, moderate relationship was found between severity and blood sugar testing, $r_{rho}(181) = -.37$, $p < .001$, two-tailed. As the awareness of the severity of diabetes increased, there was a corresponding decrease in blood sugar testing. A significant, negative, moderate relationship was found between interference and blood sugar testing, $r_{rho}(181) = -.43$, $p < .001$, two-tailed. As interference of diabetes to daily life increased, a corresponding decrease in blood sugar testing was observed. A significant, weak, positive relationship between social support and blood sugar testing was observed, $r_{rho}(181) = .25$, $p = .001$, two-tailed. As social support increased, there was a corresponding increase in blood sugar testing. A significant, positive, moderate, weak relationship was found between outcome expectancies and blood sugar testing, $r_{rho}(181) = .45$, $p < .001$, two-tailed. As outcome expectancies increased, a corresponding increase

in blood sugar testing was observed. A significant, moderate, positive relationship between self-efficacy and blood sugar testing was observed, $r_{rho}(181) = .60$, $p < .001$, two-tailed. As self-efficacy increased, there was a corresponding increase in blood sugar testing (see Table 12).

Table 12

Correlation Matrix

Variable	1	2	3	4	5	6	7	8
Diet (1)	_	.55***	.65***	−.54***	−.67***	.15*	.49***	.82***
Exercise (2)		_	.34***	−.49***	−.56***	.01	.33***	.63***
Blood Sugar Testing (3)			_	−.37***	−.43***	.25***	.45***	.60***
Severity (4)				_	.74***	−.04	−.34***	−.66***
Interference (5)					_	−.04	−.37***	−.78***
Social Support (6)						_	.07	.08
Outcome Expectancies (7)							_	.50***
Self-Efficacy (8)								_

***$p < .001$ (2-tailed), *$p < .05$; *N*=183.

H_{02} stated that the aforementioned identified perceptions do not affect behavioral and lifestyle changes in AAW. Since 14 out of 15 relationships of interest were significant, and one was not significant, the null hypothesis was partially rejected.

Research Question 3

Research Question 3 was investigated with multiple linear regression; one model for each dependent variable. The independent variables were severity, interference, social support, outcome expectancies, self-efficacy, age, marital status, education level, employment status, annual income, and A1C test results. The dependent variables were diet, exercise, and blood sugar testing. Prior to the analyses, the assumptions of multiple regression were tested. According to Green & Salkind (2014), the assumptions include:

1. The independent and dependent variable(s) have a linear relationship.

2. The prediction errors must be normally distributed. In case some subsets of data have different statistical properties, they will be divided into separate models or discarded. If the error of distribution is due to large errors, an investigation will be conducted and these values will be rejected if they are simply errors that do not influence the models.

3. Assumption of homoscedasticity or homogeneity of variance, which refers to the variance of errors across all the variables being similar or the same. If heteroscedasticity is observed, a log transformation of variable(s) will be conducted.

4. Assumption that there is no multicollinearity between independent variables. Multicollinearity happens when one or more independent variables are not independent of each other.

The linearity of the relationships between the independent and dependent

variables were confirmed in answering Research Question 2. A scatterplot matrix provides an illustration of the linearity of relationships (see Figure 9).

Diet

The residuals were analyzed. A residual is the difference between the observed and the model-predicted values of the dependent variable. Residuals are also referred to as prediction errors. Residuals were excluded from the analyses if they exceeded ±3 standard deviations. In the first regression model, one residual was excluded and the remaining residuals ranged from −2.87 to 2.33 for a sample size of 180 (two cases were excluded for missing employment information through the casewise deletion method). A normal histogram of the residuals is presented in Figure 10.

A scatterplot of the regression standardized values by the regression standardized predicted values indicated that the assumption of homoscedasticity had been met, which means that the variance of errors across all the variables were equal (see Figure 11).

The model was assessed for multicollinearity with variance inflation factors (VIF). Values ranged from 1.61 to 7.90. VIF values greater than 10 indicate serious problems with multicollinearity. Since the VIF values for the model were less than 10, multicollinearity was not problematic (Forthofer, Lee, & Hernandez, 2007). The regression model with diet as the dependent variable was statistically significant, $F(11, 168) = 38.07, p < .001$; Adjusted $R^2 =$ .70. Regression coefficients are presented in Table 13.

Table 13

Regression Coefficients for Diet

Variable	B	SEB	β	t	p
(Constant)	2.44	.505		4.84	.000
Severity	.064	.069	.081	0.92	.359
Interference	−.094	.107	−.102	−0.88	.381
Social Support**	.152	.054	.139	2.80	.006
Outcome Expectancies***	−.029	.005	−.370	−5.65	.000
Self-Efficacy***	.051	.006	.839	8.89	.000
Age*	.011	.005	.108	2.09	.038
Marital Status	−.131	.139	−.048	−0.94	.350
Education Level	.062	.063	.051	0.97	.332
Employment Status	−.253	.168	−.093	−1.51	.134
Annual Income**	.129	.048	.181	2.69	.008
AIC Test	−.090	.052	−.140	−1.74	.084

Note. $N = 180$; Marital Status: 1 = Married, 0 = Non-Married; Employment Status: 1 = Employed, 0 = Unemployed; ***$p < .001$, **$p < .01$, *$p < .05$.

Examination of the univariate statistics revealed five significant outcomes. Social support was significantly and positively related to diet, ($\beta = 0.14$, $t = 2.80$, $p = .006$). When social support increases by one standard deviation, diet increases by 0.14 standard deviations. Outcome expectancies was significantly and negatively related to diet, ($\beta = −0.37$, $t = −5.65$, $p < .001$). As outcome expectancies increases by one standard deviation, healthy dieting decreases by 0.37 standard deviations. Using Spearman *rho* correlation, outcome expectancies showed a positive association in research question one. However, as a predictor variable among several predictors in multiple linear regression, the same relationships that were positive, became negative. This is probably due to a confounding variable in the regression equation. Self-efficacy was significantly and positively related to diet, ($\beta = 0.84$, $t = 8.89$, $p < .001$). As self-efficacy increased by one standard deviation, healthy dieting increased by 0.84

standard deviations. A significant, positive relationship was found between age and diet, (β = 0.11, t = 2.09, p = .038). As age increased by one standard deviation, healthy dieting increased by 0.11 standard deviations. There was a significant, positive relationship between annual income and healthy dieting, (β = 0.18, t = 2.69, p = .008). As annual income increased by one standard deviation, healthy dieting increased by 0.18 standard deviations.

Six outcomes were not significant. No significant relationship was found between severity and diet, (β = 0.08, t = 0.92, p = .359). No significant relationship was found between interference and diet, (β = −.10, t = −0.88, p = .381). No significant relationship was found between marital status and diet, (β = −.05, t = −0.94, p = .35). No significant relationship was found between education level and diet, (β = 0.05, t = 0.97, p = .332). No ignificant relationship was found between employment status and diet, (β = −0.09, t = −1.51, p = .134). No significant relationship was found between A1C tests results and diet, (β = −0.14, t = −1.74, p = .084).

Exercise

The residuals were analyzed with exercise as the dependent variable. After three iterations of excluding outliers, the final model yielded a sample size of 178. In the final model, residual ranged from −2.85 to 2.88. A normal histogram of the residuals is presented in Figure 12. A scatterplot of the regression standardized values by the regression standardized predicted values indicated that the assumption of homoscedasticity had been met (see Figure 13). The model was assessed for multicollinearity with variance inflation factors. Values ranged from 1.45 to 8.19. Since the VIF values for the model were less than 10, multicollinearity was not problematic. The regression model with exercise as the dependent

variable was statistically significant, $F(11, 166) = 18.35$, $p < .001$; Adjusted $R^2 = .52$.

Regression coefficients are presented in Table 14.

Table 14
Regression Coefficients for Exercise

Variable	*B*	SE *B*	β	*t*	*p*
(Constant)	1.93	.689		2.80	.006
Severity	−.046	.088	−.058	−0.52	.601
Interference	.156	.140	.166	1.11	.268
Social Support	.042	.069	.038	0.61	.545
Outcome Expectancies***	−.030	.007	−.347	−4.40	.000
Self-Efficacy***	.056	.007	.878	7.65	.000
Age***	−.028	.006	−.289	−4.45	.000
Marital Status	−.334	.178	−.121	−1.88	.062
Education Level	−.026	.081	−.022	−0.32	.747
Employment Status	−202	.214	−.074	−0.94	.347
Annual Income	.069	.061	.096	1.13	.261
AIC Test	.043	.070	.064	0.61	.543

Note. $N = 178$; Marital Status: 1 = Married, 0 = Non-Married; Employment Status: 1 = Employed, 0 = Unemployed; ***$p < .001$.

Examination of the univariate statistics revealed three significant outcomes. There was a

significant, negative relationship between outcome expectancies and exercise, ($β = −0.35$, $t = $

$−4.40$, $p < .001$). As outcome expectancies increased by one standard deviation, exercise

decreased by 0.35 standard deviations. The Spearman *rho* correlation coefficient value for

outcome expectancies showed a positive relationship in research question one. Whereas, as a

predictor variable among numerous predictors in multiple linear regression, the same

relationships that were positive, became negative. This variation is explained by the presence

of a confounding variable in the regression equation.

A significant, positive relationship was found between self-efficacy and exercise, (β = 0.88, t = 7.65, $p < .001$). As self-efficacy increased by one standard deviation, exercise increased by 0.88 standard deviations. Asignificant, negative relationship was found between age and exercise, (β = −0.29, t = −4.45, $p < .001$). As age increased by one standard deviation, exercise decreased by 0.29 standard deviations.

Eight outcomes were not significant. No significant relationship was found between severity and exercise, (β = −0.06, t = 0.52, $p = .601$). No significant relationship was found between interference and exercise, (β = 0.17, t = 1.11, $p = .268$). No significant relationship was found between social support and exercise, (β = 0.04, t = 0.61, $p = .545$). No significant relationship was found between marital status and exercise, (β = 0.12, t = −1.88, $p = .062$). No significant relationship was found between education level and exercise, (β = −0.02, t = −0.32, $p = .747$). No significant relationship was found between employment status and exercise, (β = −0.07, t = − 0.94, $p = .347$). No significant relationship was found between annual income and exercise, (β = 0.10, t = 1.13, $p = .261$). No significant relationship was found between A1C tests results and exercise, (β = 0.06, t = 0.61, $p = .543$).

Blood Sugar Testing

The residuals were analyzed with blood sugar testing as the dependent variable. After three iterations of excluding outliers, the final model yielded a sample size of 177. In the final model, residual ranged from −2.76 to 2.76. A normal histogram of the residuals is presented in Figure 14. A scatterplot of the regression standardized values by the regression standardized predicted values indicated that the assumption of homoscedasticity had been met (see Figure 15). The model was assessed for multicollinearity with variance inflation factors.

Values ranged from 1.51 to 9.91. Since the VIF values for the model were less than 10,

multicollinearity was not problematic. The regression model with blood sugar testing as the

dependent variable was statistically significant, $F(11, 165) = 23.92$, $p < .001$; Adjusted $R^2 =$

.59. Regression coefficients are presented in Table 15.

Table 15
Regression Coefficients for Blood Sugar Testing

Variables	B	SE B	β	t	p
(Constant)	.325	.571		.568	.571
Severity	.019	.065	.030	.289	.773
Interference*	−.257	.113	−.347	−2.28	.024
Social Support**	.145	.052	.167	2.81	.006
Outcome Expectancies**	.018	.005	.238	3.39	.001
Self-Efficacy***	.028	.005	.532	5.14	.000
Age**	.017	.005	.212	3.53	.001
Marital Status	−.038	.133	−.017	−0.29	.776
Education Level	.024	.060	.025	0.41	.686
Employment Status	.273	.159	.126	1.72	.087
Annual Income	.000	.046	−.001	−0.01	.993
AIC Test**	.150	.055	.293	2.71	.007

Note. $N = 177$; Marital Status: 1 = Married, 0 = Non-Married; Employment Status: 1 = Employed, 0 = Unemployed; ***$p < .001$, **$p < .01$, *$p < .05$.

Examination of the univariate statistics revealed six significant outcomes. A

significant, negative relationship was found between interference and blood sugar testing, ($\beta =$

-0.35, $t = -2.28$, $p = .024$). As interference of diabetes to daily life increased by one standard

deviation, blood sugar testing decreased by 0.35 standard deviations. A significant, positive

relationship was found between social support and blood sugar testing, ($\beta = 0.17$, $t = 2.81$, $p =$

.006). As social support increased by one standard deviation, blood sugar testing increased by

0.17 standard deviations. A significant, positive relationship was found between outcome

expectancies and blood sugar testing, ($\beta = 0.24$, $t = 3.39$, $p = .001$). As outcome expectancies increased by one standard deviation, blood sugar testing increased by 0.24 standard deviations. A significant, positive relationship was found between self-efficacy and blood sugar testing, ($\beta = 0.53$, $t = 5.14$, $p < .001$). As self-efficacy increased by one standard deviation, blood sugar testing increased by 0.53 standard deviations. A significant, positive relationship was found between age and blood sugar testing, ($\beta = 0.21$, $t = 3.53$, $p = .001$). As age increased by one standard deviation, blood sugar testing increased by 0.21 standard deviations. A significant, positive relationship was found between A1C test results and blood sugar testing, ($\beta = 0.29$, $t = 2.71$, $p = .007$). As A1C tests results increased by one standard deviation, blood sugar testing increased by 0.29 standard deviations.

Five outcomes were not significant. No significant relationship was found between severity and blood sugar testing, ($\beta = 0.03$, $t = 0.29$, $p = .773$). There was no significant relationship between marital status and blood sugar testing, ($\beta = -0.02$, $t = -0.29$, $p = .776$). No significant relationship was found between education level and blood sugar testing, ($\beta = 0.03$, $t = 0.41$, $p = .686$). No significant relationship was found between employment status and blood sugar testing, ($\beta = 0.13$, $t = 1.72$, $p = .087$). No significant relationship was found between annual income and blood sugar testing, ($\beta = -0.001$, $t = -0.01$, $p = .993$).

H_{03} stated that the aforementioned identified factors do not affect behavioral and lifestyle changes in AAW, taking into account the demographic characteristics of the sample. Taking into account the aforementioned identified factors two to four factors were determined to be significantly related to lifestyle changes. Therefore, the null hypothesis was partially rejected.

Summary

Three research questions and two associated hypotheses were investigated. The majority of respondents had moderate to high lifestyle and behavior changes relative to diet and blood sugar testing. However, for exercise, the majority of participants had a low degree of participation. Regarding the psychological adjustment to diabetes, the majority of participants had low awareness of the severity of diabetes, low interference of diabetes to their daily activities, and low social support for diabetes management. Outcome expectancies relative to the knowledge about diabetes were of high importance to the majority of respondents. Most participants had a high degree of confidence in self-efficacy, which is the confidence that patients have in performing self-care activities.

Fifteen zero-order correlations were tested. Fourteen were significant. A significant, negative, moderate relationship was found between severity and diet. A significant, negative, moderate relationship was found between interference and diet. A significant, weak, positive relationship was found between social support and diet. A significant, positive, moderate correlation was found between outcome expectancies and diet. A significant, strong, positive relationship was found between self-efficacy and diet.

A significant, negative, moderate relationship was found between severity and exercise. A significant, negative, moderate relationship was found between interference and exercise. A significant relationship was found between social support and exercise. A significant, positive, moderate, weak relationship was found between outcome expectancies and exercise. A significant, moderate, positive relationship was found between self-efficacy and exercise.

A significant, negative, moderate relationship was found between severity and blood sugar testing. A significant, negative, moderate relationship was found between interference and blood sugar testing. A significant, weak, positive relationship was found between social support and blood sugar testing. A significant, positive, moderate, weak relationship was found between outcome expectancies and blood sugar testing. A significant, moderate, positive relationship was found between self-efficacy and blood sugar testing.

Controlling for the demographic variables of age, marital status, education level, employment status, annual income, and A1C testing results, it was determined that social support, outcome expectancies, and self-efficacy were significantly related to diet. Demographic variables related to diet included age and annual income. The relationships were positive, with the exception of outcome expectancies, which was negatively related to diet. Controlling for the demographic variables of age, marital status, education level, employment status, annual income, and A1C testing results, it was determined that outcome expectancies and self-efficacy were significantly related to exercise. Both outcome expectancies and age were negatively related to exercise, whereas self-efficacy was positively related to exercise. Outcome expectancies showed a positive association in research question one. As a predictor variable in multiple linear regression, the same relationships became negative. Whereas the VIF values were below the value of 10, the highest value for the VIF was observed with self-efficacy. Therefore, outcome expectancies is confounded with self-efficacy.

Controlling for the demographic variables of age, marital status, education level, employment status, annual income, and A1C testing results, it was determined that interference, social support, outcome expectancies and self-efficacy were significantly related

to blood sugar testing. Interference was negatively related to blood sugar testing. Social support, outcome expectancies, and self-efficacy were positively related to blood sugar testing. Likewise, age and A1C test results were positively related to blood sugar testing. I will discuss the implications in Chapter 5.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

The purpose of this study was to provide a quantitative assessment of the perceptions of AWW not previously identified regarding their behavior and lifestyle changes to mitigate the risks of T2D. This investigation was conducted with a convenience sample of AAW living in Maryland and Virginia in the age range of 20 to 65 years. This research was guided by the TPB and the HBM. The study instrument was composed of two standardized questionnaires, the MDQ and the SDSCA including demographic information. Based on the theoretical framework, the perceptions of this group toward positive behavioral changes were assessed through their health belief of T2D (severity) and related social support, self-care activities, knowledge of diabetes (outcome expectancies), and self- efficacy (Talbot et al., 1997). Their perceptions shed more light on their willingness to implement a healthier diet and increase physical activity (Glassgow, 1994). Various studies have concluded that risks factors responsible for AAW high prevalence for T2D include age, ethnicity, socioeconomic status, environmental, psychological and obesity, and lifestyle (Chen et al., 2015; Black, 2002). This analysis reveals their opinions on their lifestyle, health and required alterations to improve their health (Stover, 2001). Assessing this group's knowledge on T2D provides a better understanding of the outcome expectancies and self-efficacy habits to focus on reducing these risks (Saver, 2014). The data were collected online, within a 2-month period, via a commercial tool, SurveyMonkey. In Chapter 5, I provide a synopsis of the study's main findings, interpretation of the results, limitations, recommendations for further research, and implications for social changes.

Key Findings of the Study and Interpretation

The basis of this study was guided by the TPB and the HBM. Based on these two constructs, the perceptions of the AAW with T2D toward changing their behavior and lifestyle changes could be associated with their diet, physical activity, health beliefs, knowledge of diabetes, and socioeconomic status. The MDQ addressed the readiness of the population to modify its lifestyle, whereas the SDSCA evaluated the lifestyle changes. Three research questions with two related hypotheses were used to conduct this assessment. Descriptive statistics were used for research question one to illustrate the sample's profile and to demonstrate the distribution of the data prior to testing the hypotheses (McHugh, 2003). Inferential statistics were used to test the hypotheses in questions two and three, and to assess the strength and direction of the relationships between the variables (Field, 2013). Although the findings of this research are aligned with previous works, it also presents new caveats that may require further interventions among T2D patients.

Research Question 1

There was no hypothesis associated with this question: What are the perceptions of AAW in regard to behavioral and lifestyle changes, such as physical activities and healthy diet?

The perceptions of the AAW respondents derived from their current lifestyle measurements through their views of the disease severity, interference, social support, and outcome expectancies (Stover, 2001; Glasgow, 1994). Their behavioral and lifestyles changes relative to diabetes were assessed through their diet, exercise and blood sugar testing measurements. According to the demographic characteristics of this group, the findings

showed that the majority (61.7%) had a low degree of participation regarding exercise, and (93.4%) had high score on blood sugar testing. More than half of the respondents (58.5%) followed a healthy dietary regimen. Because half of the respondents were college educated, there was a high percentage of healthy diet noted in the sample. Sixty-five percent of the respondents had a college education implying that education and income may contribute to a positive change in maintaining a healthy dietary habit. However, several studies suggest that few AAW are capable of adapting to healthier lifestyle such as healthier diet (Signorello et al., 2007; Miller, 2012; Bhattacharya, 2012).

Contrary to the data, the trends in literature imply that traditional food preferences cause AAW to eat food saturated with animal fats and high carbohydrate. Thus, they are unable to adhere to a heathy dietary regimen (Miller, 2012; Bhattacharya, 2012; Rodriguez-Santos et al., 2005). Due to cultural habits, they tend to eat food high in fats (fried pork, barbequed pork, or chicken) and rich desserts like pound cake; and fruit juice with high fructose level (Bhattacharya, 2012).They perceive as succulent foods those that are rich in calories, and they see food as a source of comfort. Their views are from an historical background, and they are convinced that the foods they are accustomed to give them strength to perform hard labor. The historical and social-cultural practices make it more challenging for AAW to adhere to healthy dietary habits (Liburd, 2003; Bhattacharya, 2012). Hence, previous works have determined this effort to be challenging for AAW to adhere to healthy dietary habits based on history and social-cultural practices (Liburd, 2003).

Research Question 2

The second research question, "Do the aforementioned identified perceptions affect behavioral and lifestyle changes in AAW?" addressed the women's readiness to change their diet and exercise level.

Concerning the group's diet, the results of this study demonstrate a significant negative association between T2D awareness and healthy dieting. Knowledge of disease severity did not correlate to healthier diet among this group. This finding confirmed previous research explaining the involvement of AAW in food and cultural factors responsible for dietary intake and the importance T2D patients' views of their health (Liburd, 2003; Stover et al., 2001). Although, a high percentage achieved higher education and maintained a healthy diet, cultural factors may still influence their diet. Knowledge of the severity of T2D did not positively correlate to the healthier food intake noted in this group of AAW. Their cultural rituals may render their dietary habit more challenging regardless of their education level (Liburd, 2003). As daily activities became more intense, healthy dietary habits of the group decreased as well, hence regular activities pose a barrier in adherence to recommended dietary change. However, the data show that social support, outcome expectancies and self-efficacy play a crucial role in maintaining a healthy diet among the group. As the scores for these variables increased, it automatically created a positive increase in adherence to a healthy dietary regimen among the respondents. The findings suggest that social support, knowledge of T2D and self-efficacy are necessary to maintain adequate glycemic control (Cosansu & Erdogan, 2014). But the findings also refute the fact that AAW cannot follow a strict dietary regimen due to lack of understanding (CDC, 2013; Burns & Skelly, 2005).

Relative to physical activity, being aware of the severity of T2D did not change their behavior to increase their level of exercise. In addition, daily activities seemed to interfere with their level of participation for any type of exercise. The amount of exercise in this group decreased even though they were well aware of the disease's acuteness. This finding supports Miller's (1997) assumption relating prevalence of T2D to lack of exercise in AAW. Other routine events seemed to create barriers in regard to their physical performance. The finding is consistent regarding previous studies confirming how chronic disease may decrease AAW's views of quality of life; hence lower level of exercise (Stover et al., 2001). Several studies have isolated socioeconomic factors and routine daily activities as barriers to increase physical activity (Miller, 2012; Stover, 2001). The data show high level of T2D understanding based on outcome expectancies and self-efficacy responses in this group, which did not generate informed decisions toward exercise level. One possible explanation is the fact that a high percentage of college graduate AAW and students are in this group, which could make them already cognizant of the threat to T2D (Kim & No, 2012). Social support was not a significant factor for exercise.

In reference to blood sugar monitoring among these AAW, health knowledge of T2D created a positive response in maintaining this activity. However, higher interference to routine activities affects their commitment to blood sugar testing. The perception they have of their health, social support and their confidence level created a significant positive effect on glycemic control.

Thus, the null hypothesis (*H_{02}: The aforementioned identified factors do not affect behavioral and lifestyle changes in AAW*) was rejected for all 14 associations, and retained for

social support. Social support did not show a significant association with exercise in term of making informed decision to increase this activity. According to the findings, we can't assume education automatically corresponds to positive health beliefs. Their perceptions of health and knowledge of T2D did not lead to an informed decision regarding physical activity which might be due to limited social support and interference with regular occupations.

Research Question 3

This question, "Do the aforementioned identified perceptions affect behavioral and lifestyle changes in AAW, taking into account the demographic characteristics of the sample?" assessed the respondents' willingness to adapt to healthier behavior taking into account the sample's demographic characteristics.

The findings of this investigation demonstrate a significant negative relationship between outcome expectancies and diet as opposed to the positive association in response to question two. In addition, outcome expectancies also show a significant positive association with exercise in question 2, whereas the same association showed the opposite direction for exercise in question 3. As a predictor variable with other variables, the same variable changed direction. This can be explained by a confounding variable in the multiple regression model (Szklo & Nieto, 2004). As a matter of fact, self-efficacy had the highest VIF value comparing to the VIF for the other variables. This demonstrates that outcome expectancies is confounded with self-efficacy.

In regard to changing their lifestyle through healthier diet, the elderly respondents are more likely to observe a healthier diet. The same positive response was observed regarding the participants' income and their age. Higher income corresponds to positive change in

healthier food intake. This result confirms previous studies stipulating that socioeconomic

status, health literacy and education play an important role in healthier food choices among

AAW (Kulkarni, 2004). The current result provides evidence that higher income influences

behavioral change in regard to better dietary pattern. It also concurs with previous studies

showing how the elderly population may be more apt to make behavioral change in their

eating habits (Kim & No, 2012). There was no significant relationships between severity and

diet; marital status and diet; interference and diet; education and diet; employment status and

diet; and A1C test results and diet among this group of AAW.

The findings from the hypothesis test in question three, concerning physical activity,

reveal three significant associations. The confidence of this group concerning the ability to

perform routine activities created a significantly positive attitude in response to exercise. This

result demonstrates that this group displays great confidence in their ability to perform various

routine functions. However, there is a barrier in increasing exercise level. It clearly

demonstrates that the ability of this group to perform an activity does not necessarily generate

a positive intent to behavioral change (Kim & No, 2012). The elderly population shows more

restriction in increasing exercise level. The negative association between outcome

expectancies and exercise clearly demonstrates that the perceived health belief of this

population does not necessarily correlates to appropriate behavioral change to improve their

health. This might be related to the fact that this barrier may exceed the perceived benefits of

exercise (Kim & No, 2012; Bhattachaya, 2012). As noted in previous works, AAW do not

have a clear perception of their health and may not understand the benefits of making certain

changes to improve their health (Bhattacharya, 2012). This is also confirmed through the

literature search that AAW are unable to maintain adequate physical activity to reduce their risks (Bhattacharya, 2012).

Regarding adherence to blood sugar testing, the results show six significant outcomes with the demographic variables. Lifestyle change response was positive in response to monitoring blood sugar testing including social support. This favorable attitude in the group might be related to encouragement from family members and relatives. This finding is supported by Bhattacharya (2012) study confirming that social support, perception of outcome expectancies and self-efficacy may affect behavioral changes in a population.

Taking into account the demographic profile of the AAW participants, knowledge of T2D, interference, self-efficacy and social support contribute significantly to behavioral changes among this group. Thus, the null hypothesis was rejected for these four tests. Health belief (severity) did not contribute significantly to this result. As noted by (Stover et al., 2001), AAW have poorer perception of their health.

Study Limitations

Besides being aligned with several studies, this research has multiple limitations that should be addressed. The primary one relates to the sampling method. The study was conducted with a convenience sample of AAW from Virginia and Maryland. Thus, the perceptions and behavioral lifestyle change of this group of AAW might not be generalizable to the national AAW population and other sub-ethnic groups. The convenience sampling allowed a faster mean to collect the data, focusing on the study's main interests, but the results may not be attributed to the general population under study. The perceptions of numerous other groups or all T2D patients may not have been represented in this research. In

addition, other risks factors that affect the prevalence of T2D are not accounted for in this research, such as alcohol consumption and smoking. The HBM construct does not take into consideration these unhealthy behaviors or the person's views on health (Janz, 1984). These are also important risk factors related to T2D.

The cross sectional method may also introduce additional drawbacks to the study as the research was limited to only one point in time, hence cause and effect may not be well determined (Levin 2006). Other factors such as cofounders may also alter the association between variables and the outcome (Szklo & Nieto, 2014). This problem was addressed with the variable outcome expectancies and self-efficacy confounding the effect of both diet and exercise. The correlation coefficients were used to assess the strength of the relationships between these variables to ensure true representation of these outcomes.

Although the study instruments were written in simple English, it may not have been the primary language of some respondents. Hence, it may constitute a barrier resulting in inaccurate responses that could probably introduce bias in the data. In addition, all the responses are self-reported, thus subjective. The fact that the participants did not receive any compensation may create a lack of motivation for honest answers or carelessness in expediting the process. Another limitation may be related to a selective group of respondents only with access to computers. The absence of a personal computer or access to one may eliminate a broader population at risk.

Besides these weaknesses, this study provides valuable information on AAW's views and willingness to adapt to certain lifestyle changes to mitigate the risks of T2D. The findings

of these perceptions may be used to create specific intervention programs that may help T2D

patients to modify their lifestyle to reduce complications associated with T2D.

Recommendations for Action and Further Research

This quantitative study was effective in assessing any probable correlation between

AAW perceptions toward lifestyle changes as intended. However, other factors that were not

included in this research could also impact the views or aptitude toward positive behavioral

changes to improve health conditions. One of the most important aspects is the cultural factor

that can represent a barrier in several communities. Thus, one specific recommendation

derived from this project is to tailor specific community intervention programs addressing the

cultural factors among AAW. Special events in local churches, community activities, and

health fairs can be beneficial to evaluate the perceptions of the various Afro-Caribbean groups

in the area and determine their specific needs. Educational programs can be incorporated into

community events and school to address specific demands, thus focusing on reeducating the

population on the benefits of physical activity in diabetes management. Recreational centers

and exercise classes in community centers can also assist in lowering the safety concern

responsible for the lack of exercise. In addition, a buddy system program can motivate and

also make-up for the lack of support noted in the group under study. This system can reduce

the sedentary lifestyle and promote exercise and wellness among AAW. Another

recommendation is the assessment of health literacy comprehension of AAW in the area

including their cultural background to understand their perception of health prior to

recommending specific self-care management. Health care workers should understand the

cultural background of the patients with T2D prior to teaching behavioral changes. This

knowledge would help in reinforcing positive behaviors and lifestyle changes to increase

wellness and reduce health disparity in the AA population.

Implications for Practice

This information can bring awareness among health care practitioners in daily practice

to understand the need of the population and cover those deficiencies. Since many AAs are

not necessarily born in the United States, but are from either Africa or the Caribbean, it is

worth to comprehend the root cause of their behavior in order to address it efficiently (Santos-

Rodriguez et al., 2005). Assessment of those different cultural backgrounds may provide

additional information relative to positive behavioral and lifestyle changes among AAs. The

data also clearly implies the need for clinical assessment on the impact of depression and

smoking on people affected with diabetes. These risk factors were not assessed in this study,

and exercise is known to reduce depression among T2D patients (Rodriguez-Santos et al.,

2005). Hence, strategies to incorporate depression evaluation among these individuals would

assist in increasing the exercise level, thus reducing T2D risks. One of the major finding of

this study is the lack of motivation of AAW to change behavioral lifestyle in regard to

physical activity. Thus, further works in this aspect may be valuable to reduce morbidity

associated with T2D. Although the group has adequate health knowledge concerning T2D,

there is no consequential change in this particular case. This factor might be related to a lack

of social support, lack of confidence in the medical system to adhere to recommended

lifestyle changes, self-diagnosis conducted by these AAW and also denial of their condition

(Bhattacharya, 2012). Thus, it might be worth exploring the effect of depression in regard to

adherence to physical activity. This is an important factor among obese patients and consequently in T2D patients (Rodriguez-Santos et al., 2005).

Implications for Future Research

This study suggest a need for additional research on the cultural impact to capture the perceptions of different cultural subgroups. Thi swill provide a broader view of diabetic patients in various areas. Cultural aspects play a major role in lifestyle changes among immigrants including exercise improvement. It would be beneficial to conduct a qualitative analysis to explore more in depth the population's views on modifiable T2D risk factors, specifically in regard to exercise. This may provide a better understanding of the lack of motivation to increase participation in physical activity. Based on the level of education of the group and high concern for healthy dietary regimen, other factors besides culture could be responsible for the lack of motivation to attain adequate exercise level. Thus, studies focusing on the impact of depression on T2D and cultural aspects might be highly relevant. As socioeconomic status and environmental factors seemed to be fundamental in altering participants' lifestyle, it would be recommended to evaluate the perceptions of other groups of AAW from middle to upper income households. This assessment would provide specific data on the impact of the environment on T2D among AAW living in Maryland and Virginia. The perception of the group concerning the severity of the disease is low, which prevent beneficial lifestyle changes to incorporate exercise in their routine. Thus, future works should also focus on understanding the relationship between education and perception of diabetes severity. The data would help in reducing the economic burden caused by T2D complications. This effort

will also bring light on determining the correlation between awareness of diabetes and actually performing positive actions to reduce T2D morbidity.

Social Change Implications

In this study the perceptions of AAW toward behavioral and lifestyle changes are highlighted. The findings indicate the need for implementation of better strategies focusing on health education, environmental factors, and community intervention programs to reduce the risks of diabetes and mitigate the prevalence of T2D. The data imply a demand for health care professionals to educate the population living with T2D, and also to emphasize on the benefits of adopting healthier lifestyles. Dissemination of the information will allow public health officials to incorporate educational materials in several communities. Health care workers in those areas could also emphasize on the importance of exercise to bring awareness to the AAW population of Maryland and Virginia.

Another social change implication is for policy makers to address environmental changes causing barriers for the population to adhere some type of exercise. Those changes may address neighborhood factors related to safety in addition to building more recreational centers, parks and gyms. AAW have the tendency to live in distress neighborhoods although they may be well-educated with high income jobs (Krishnan et al., 2009). Safer environments may motivate the population to be more active, even the elderly, since the data reveals that age is one of the demographic barriers responsible for the lack of mobility in this group. Creating more community recreational centers offering various activities for the older groups, including gyms at affordable rate may eliminate environmental barriers and promote positive outcomes.

Introduction of other interventions programs in the communities targeting different AA subgroups may address other perceptions related to cultural factors affecting positive behavioral changes. Hence, information from this study may help community leaders to craft specific community based programs targeting the population living at risk. Other community-based interventions may also address educational activities focusing on the severity of diabetes and a support system to attain better health outcomes.

This research provides valuable information to meet the national objectives of Healthy People 2020. The recommended changes highlighted in this study may contribute to healthy behavioral adjustments and wellness among all ethnic groups in particular in the states aforementioned (CDC, 2015). After all, the major objective of Healthy People 2020 is to achieve better quality of life, reduce health disparity and lower premature death (CDC, 2015).

Conclusion

In this study the health perceptions of AAW toward positive behavioral and lifestyle changes to reduce T2D risks were analyzed. Talbot et al. (1997) argue convincingly that knowledge of T2D combined with a clear understanding of the outcome expectancies and self-care practices are crucial in maintaining a healthy lifestyle. The findings clearly implicate a positive attitude among AAW relative to healthy diet and blood sugar testing. Unfortunately, exercise represents a barrier in achieving a healthier lifestyle. Additionally, AAW with T2D do not fully perceive the severity of the disease to make informed changes. Thus, the need for specific community-based interventions to incorporate exercise and educational resources to promote healthy behavior among AAW living with T2D. Furthermore, more educational events are recommended to enhance health literacy focusing

on the benefits of exercise for T2D patients, and awareness to glycemic control. Concerning psychological changes, the population had low perception of the severity of diabetes, low interference issues, and inadequate social support to ensure proper management of the disease. The respondents had a clear understanding of the outcome expectancies concerning knowledge of diabetes. The findings also indicate high confidence in the AAW to perform routine activities. Better understanding of the severity of T2D is crucial to generate positive behavioral change. According to the study results, outcome expectancies, social support and self-efficacy are key factors in making positive behavioral changes in healthy dietary pattern; whereas, outcome expectancies and self-efficacy are positively associated with exercise. This research can contribute to existing studies on T2D to reduce health disparity and promote wellness among all ethnic groups.

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Appendix A: Multidimensional Diabetes Questionnaire

Section I

Interference

1.   To what extent does your diabetes interfere with your daily activities?

0 1   2 3 4 5 6 7

2.   To what extent does your diabetes decrease your satisfaction or pleasure from social or

recreational activities?

0 1   2 3 4 5 6 7

3.   To what extent does your diabetes interfere with your effectiveness at work?

0 1   2 3 4 5 6 7

4.   To what extent does your diabetes interfere with your relationship with your spouse

(or significant other)?

0 1   2 3 4 5 6 7

5.   To what extent does your diabetes prevent you from traveling as much as you would

like?

0 1   2 3 4 5 6 7

6.   To what extent does your diabetes interfere with your ability to participate in social or

recreational activities?

0 1   2 3 4 5 6 7

7.   To what extent does your diabetes interfere with your ability to plan your activities?

0 1 2 3 4 5 6 7

8.   To what extent does your diabetes prevent you from being as active as you would

like?

0 1 2 3 4 5 6 7

9.   To what extent does your diabetes prevent you from having a schedule that you like

(e.g., to sleep late)?

0 1 2 3 4 5 6 7

Social Support
10.   To what extent does your spouse (or significant other) support you with your diabetes?

0 1 2 3 4 5 6 7

11.   To what extent do your family and friends support you or help you with your diabetes?

0 1 2 3 4 5 6 7

12.   To what extent does your spouse (or significant other) pay attention to you because of

your diabetes?

0 1 2 3 4 5 6 7

13.   To what extent does your doctor or health care team support you or help you with your

diabetes?

0 1 2 3 4 5 6 7

Severity

14.   To what extent do you consider your diabetes to be a severe health problem?

0 1   2 3 4 5 6 7

15.   To what extent do you worry about long-term complications of diabetes?

0 1   2 3 4 5 6 7

16.   To what extent do you worry about your diabetes?

0 1   2 3 4 5 6 7

Section II

Positive Reinforcing Behaviors
My spouse (or significant other):
17.   Congratulates me when I follow my diet.

0 1   2 3 4 5 6 7

18.   Congratulates me for regularly measuring my blood glucose level.

0 1   2 3 4 5 6 7

19.   Reminds me to take care of my feet.

0 1   2 3 4 5 6 7

20.   Congratulates me when I follow my meal schedule (meals and snacks).

0 1   2 3 4 5 6 7

21.   Reminds me to take my diabetes medication (pills, insulin).

0 1   2 3 4 5 6 7

22.   Helps me to adjust my food intake when I exercise.

0 1   2 3 4 5 6 7

23.   Plans family activities in a way that allows me to take my medication at the right time.

0 1 2 3 4 5 6 7

24.   Encourages me to exercise.

0 1 2 3 4 5 6 7

Misguided Support Behaviors
My spouse (or significant other):
25.   Hassles me about my diabetes medication (pills, insulin).

0 1 2 3 4 5 6 7

26.   Hassles me about exercise.

0 1 2 3 4 5 6 7

27.   Hassles me about my diet.

0 1 2 3 4 5 6 7

28. Hassles me about measuring my blood sugar.
       0 1 2 3 4 5 6 7

Section III

Self-Efficacy
29. How confident are you in your ability to follow your diet?

30. How confident are you in your ability to test your blood sugar at the recommended

    frequency?

31. How confident are you in your ability to exercise regularly?

32. How confident are you in your ability to keep your weight under control?

33. How confident are you in your ability to keep your blood sugar level under control?

34. How confident are you in your ability to resist food temptations?

35. How confident are you in your ability to follow your diabetes treatment (diet, medication,

blood sugar testing, exercise)?

Outcome Expectancies

36. To what extent do you think that following your diet is important for controlling your

diabetes?

37. To what extent do you think that taking your medication as recommended (pills, insulin)

is important for controlling your diabetes?

38. To what extent do you think that exercise is important for controlling your diabetes?

39. To what extent do you think that measuring your blood sugar is important for controlling

your diabetes?

40. To what extent do you think that following your diabetes treatment (diet, medication,

blood sugar testing, exercise) is important for controlling your diabetes?

41. To what extent do you think that following your diabetes treatment (diet, medication,

blood sugar testing, exercise) is important for delaying and/or preventing long-term

diabetes complications (problems related to eyes, kidneys, heart, or feet).

Appendix B: The Summary of Diabetes Self-Care Activities

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
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

Exercise
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

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

Appendix C: Multidimensional Diabetes Questionnaire

Demographics

What is your age? _____ years

What is your marital status?

Single

Married

Living with a significant other

Other

What is your education level?

Primary education

Secondary education

College education

University education

Are you currently:

Employed

Unemployed

 Retired

Student

What is your annual income?

a.   < $9,000

b. $9,000 - $14,999

c. $15,000 - $24,999

d. $25,000 - $34,999

e.   > $35,000

f.   None

6. What was the result of your last A1C test? _____
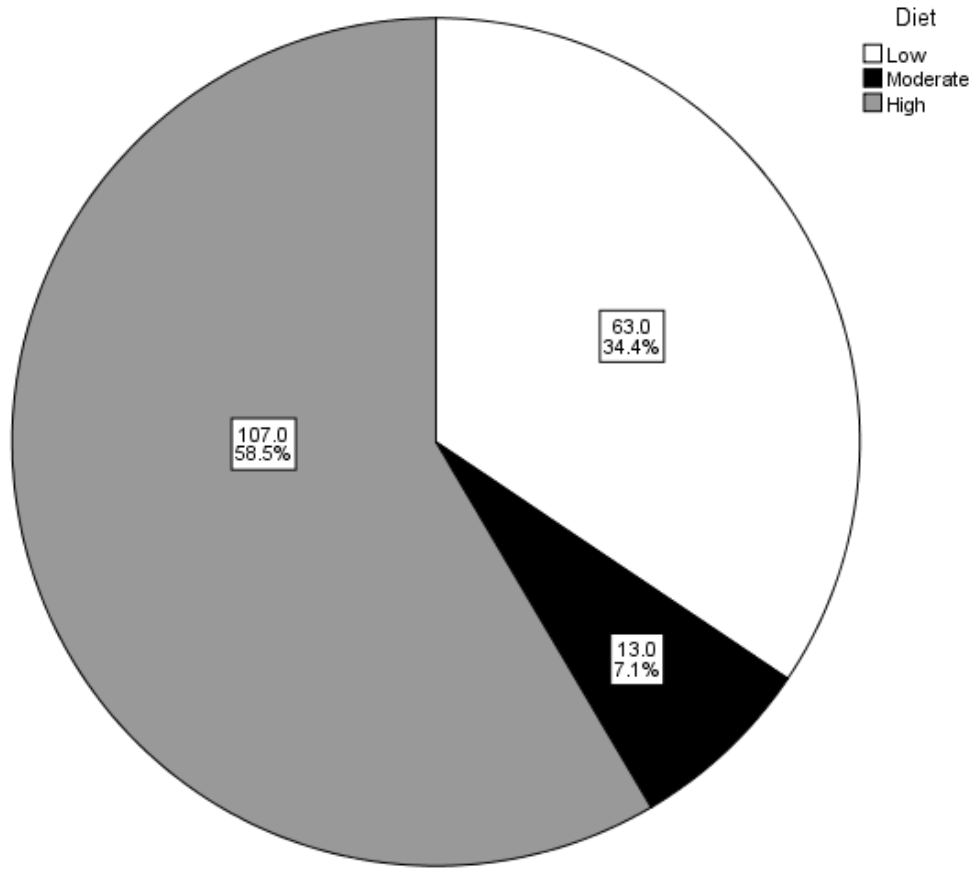
Figure 1. Diabetes self-care activities: Diet.
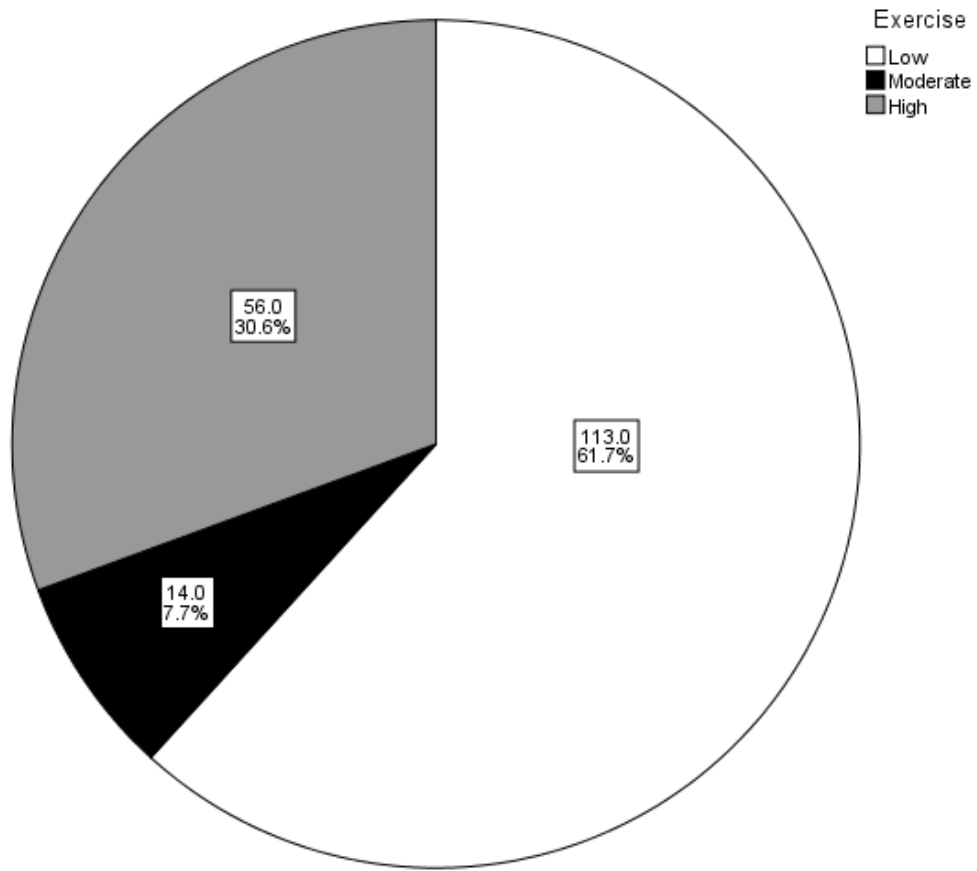
Figure 2. Diabetes self-care activities: Exercise.
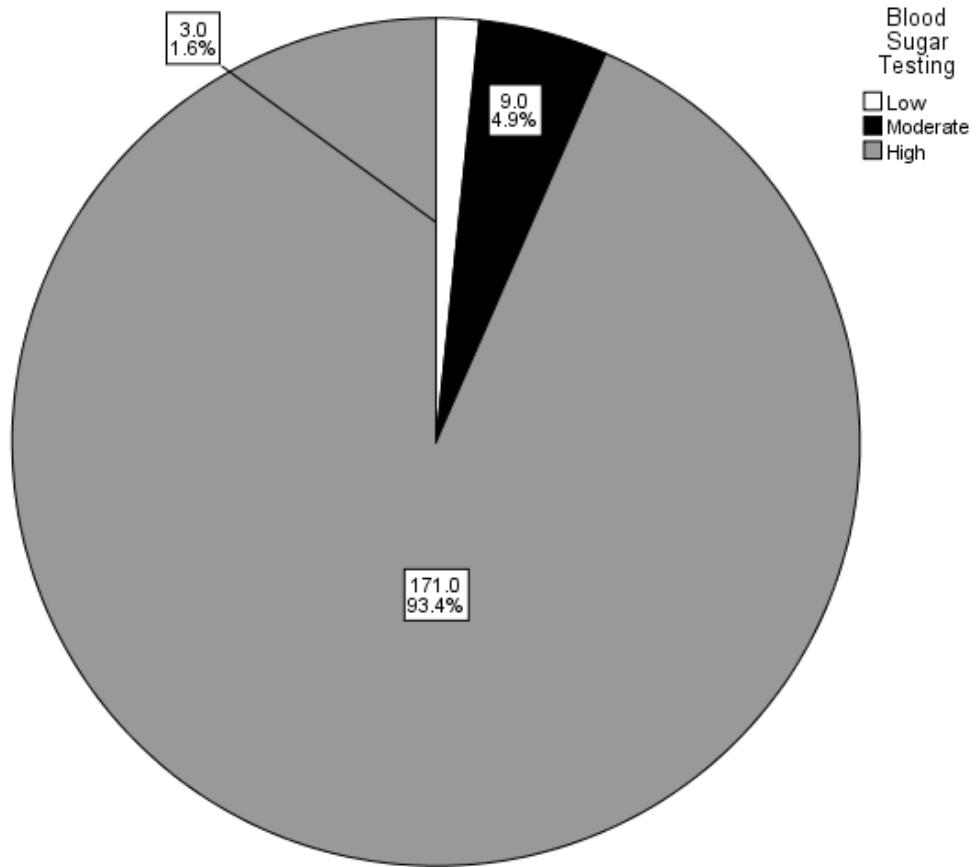
Figure 3. Diabetes self-care activities: Blood sugar testing.
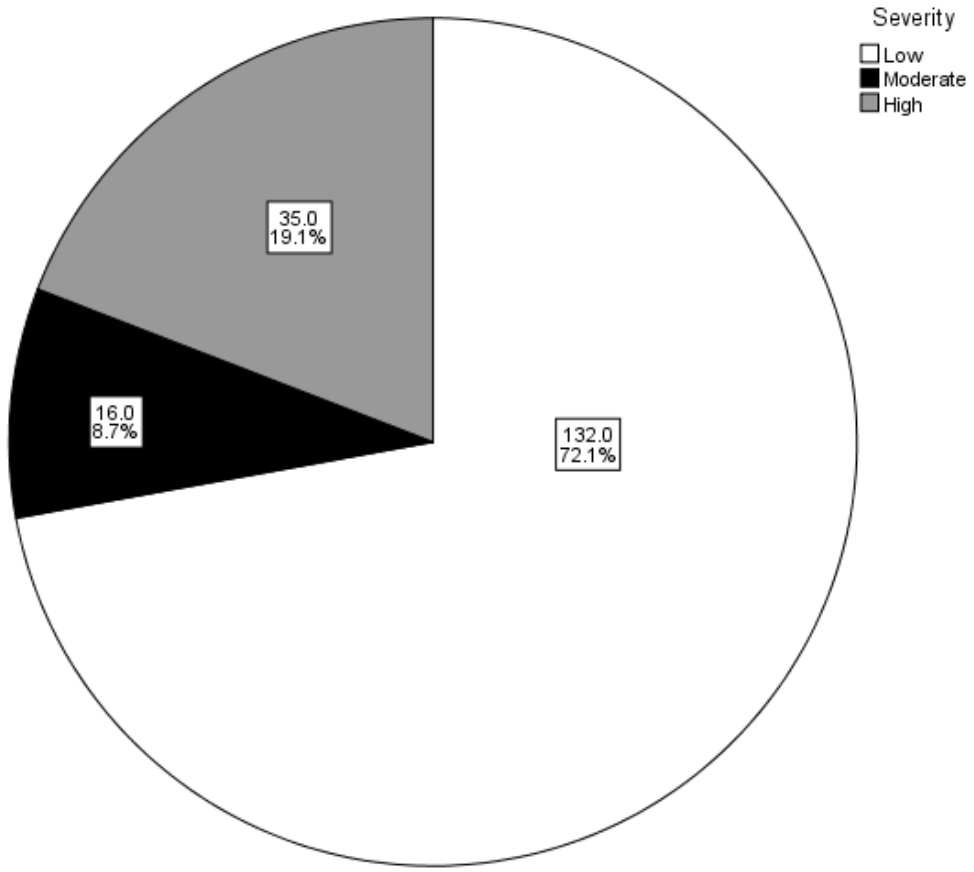
Figure 4. Severity of diabetes.
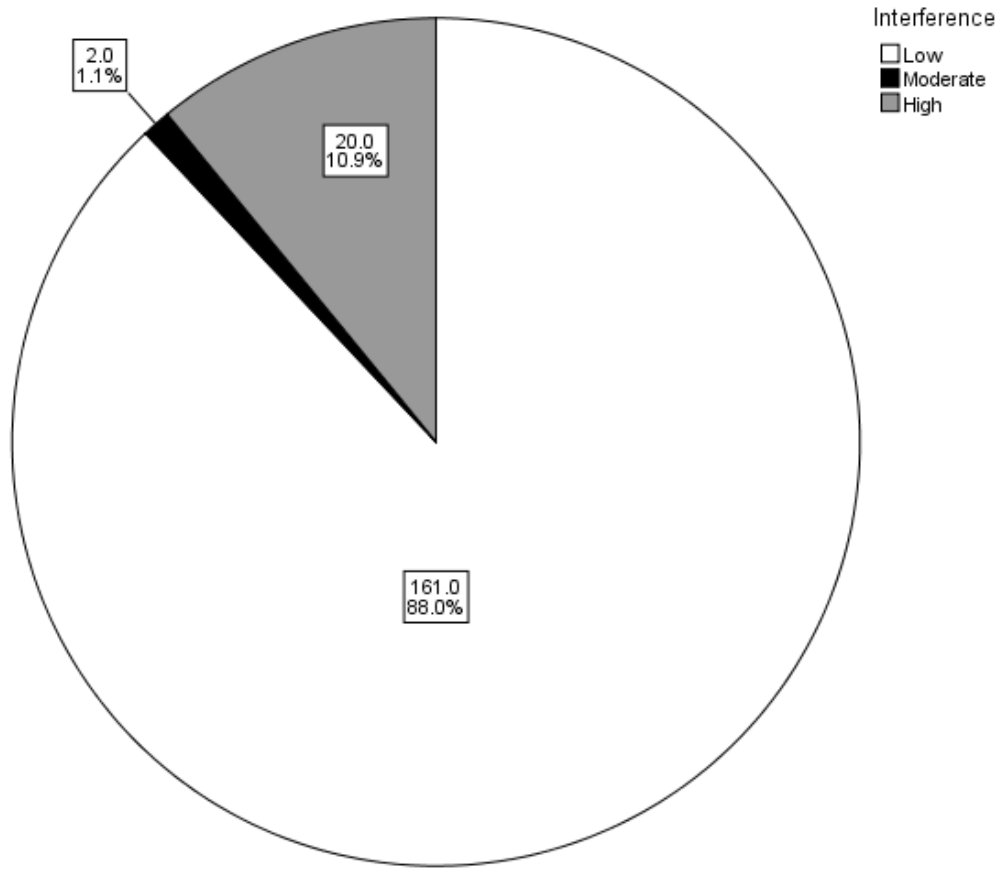
Figure 5. Interference of diabetes.
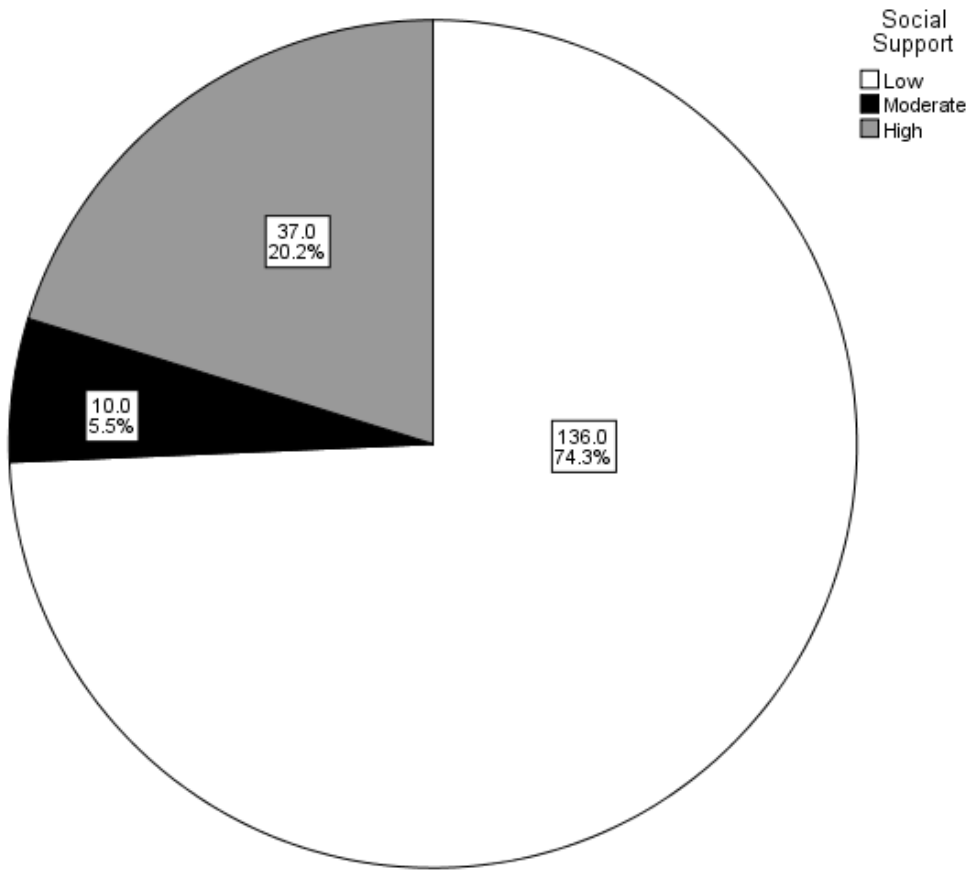
Figure 6. Social support for diabetes management.
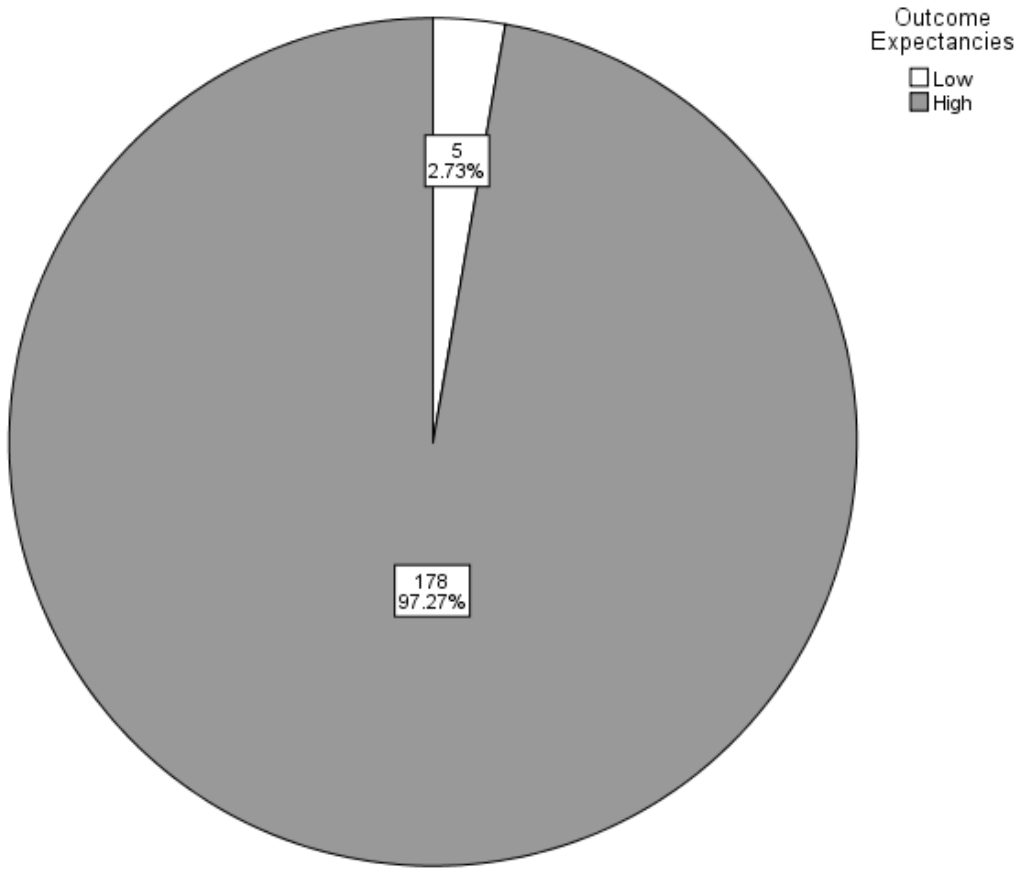
Figure 7. Outcome expectancies regarding knowledge of diabetes.
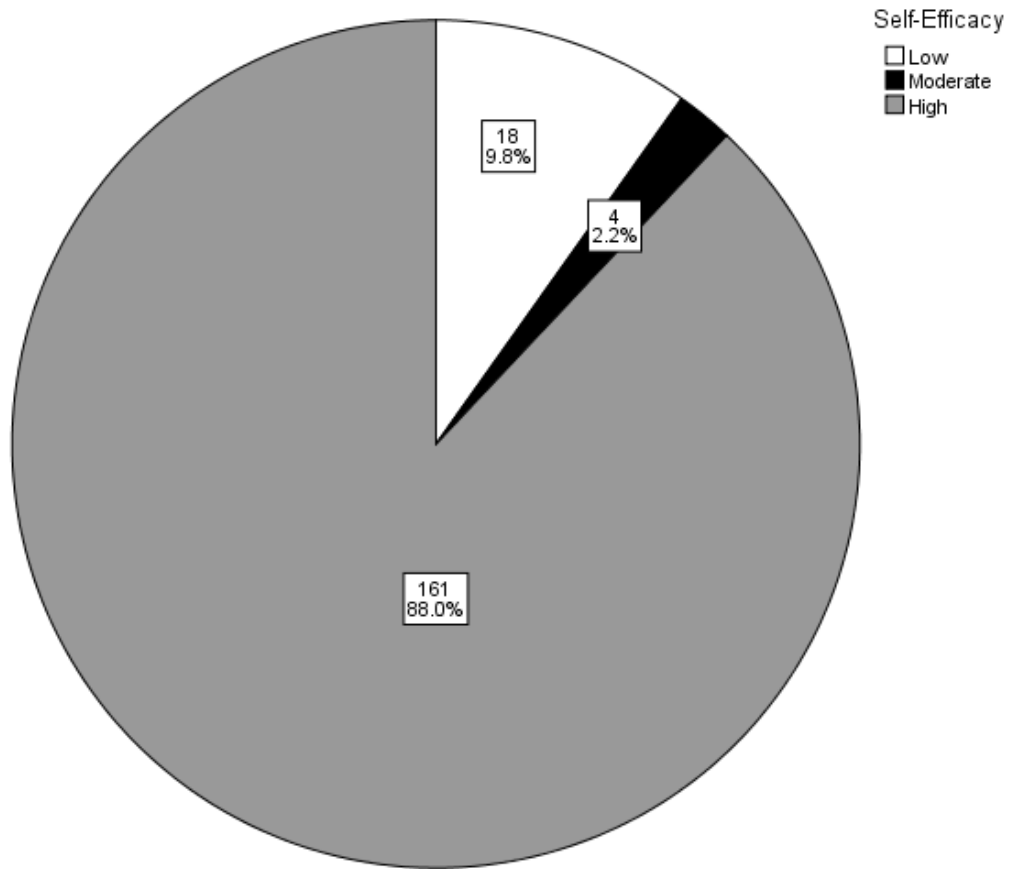
Figure 8. Perception of self-efficacy.
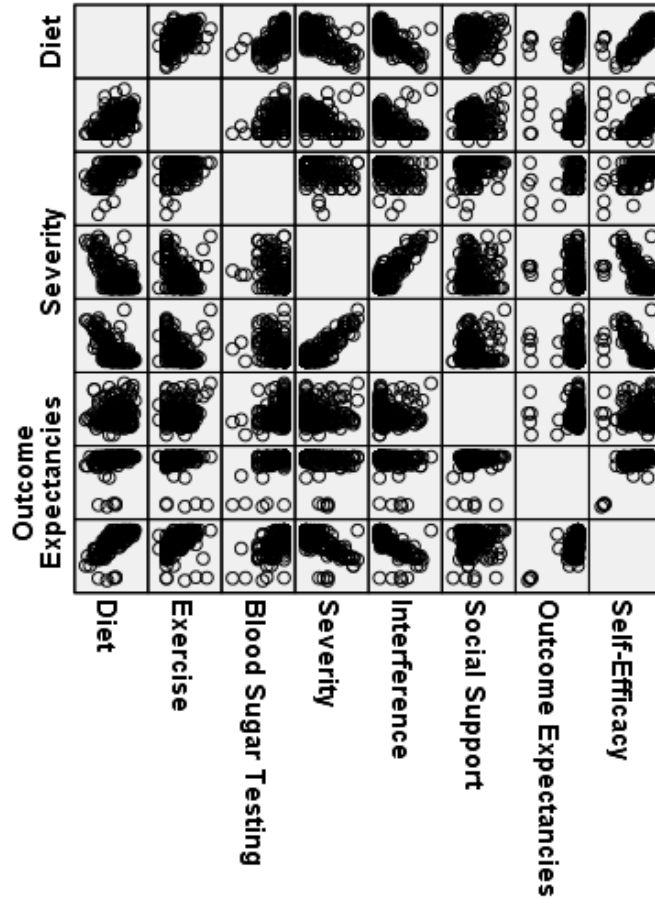
Figure 9. Scatterplot Matrix: Linearity relationships.
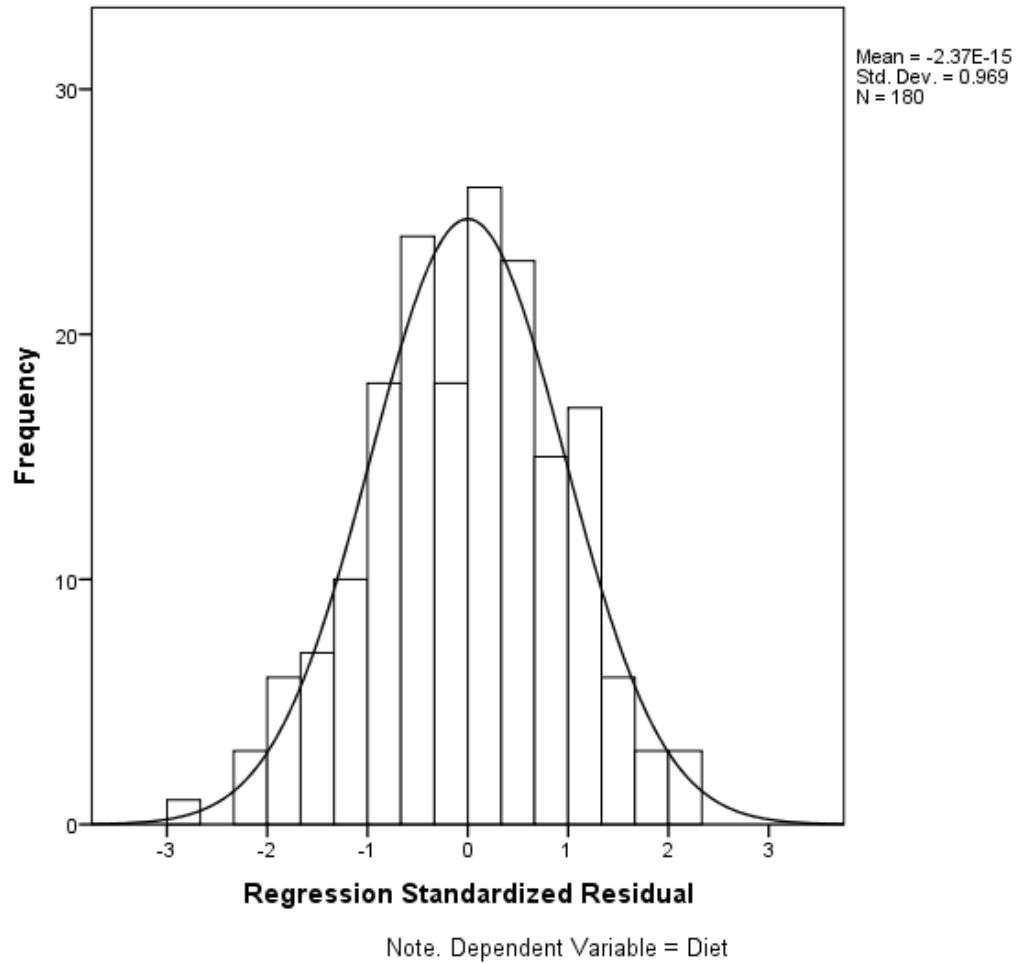
Figure 10. Histogram of standardized residuals for diet.
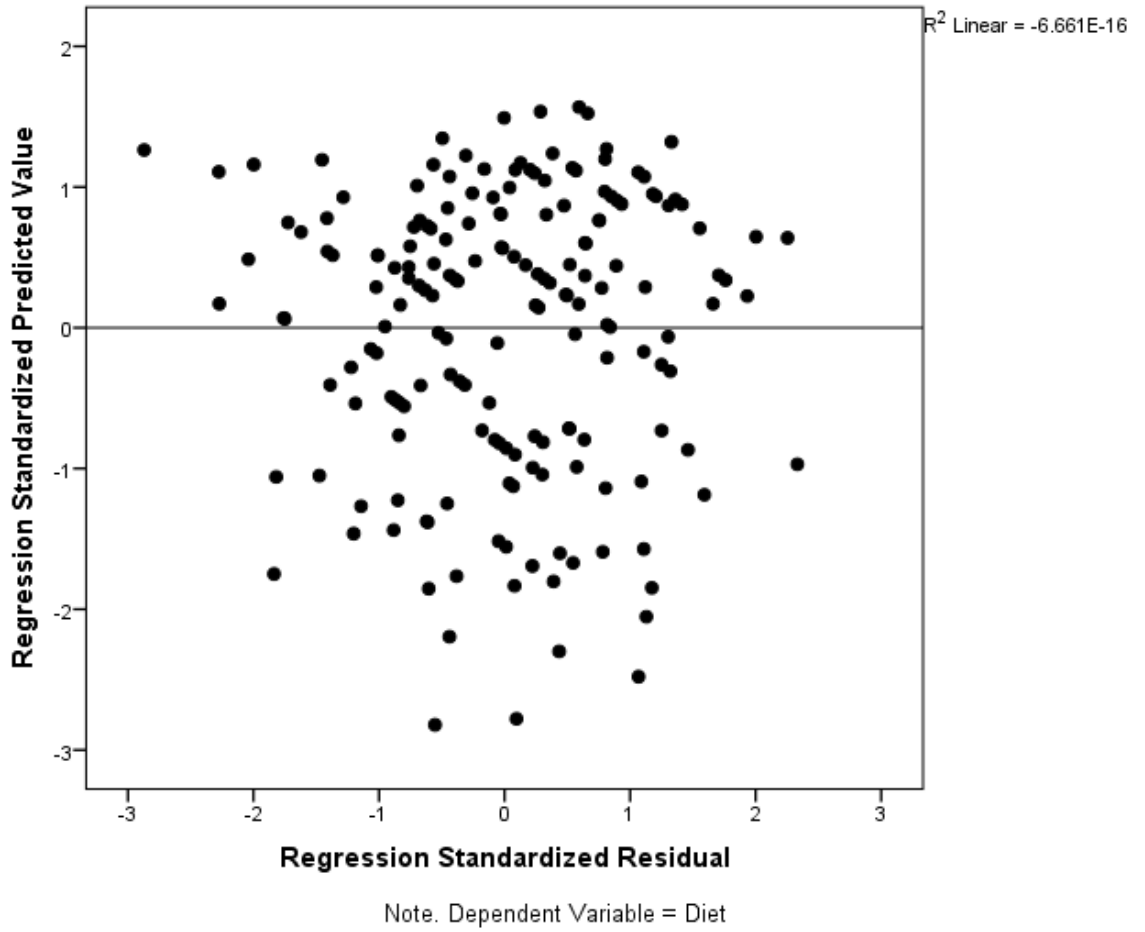
Figure 11. Scatterplot for diet assessing homoscedasticity.

Mean = -8.40E-16
Std. Dev. = 0.968
N = 178

Note. Dependent Variable = Exercise
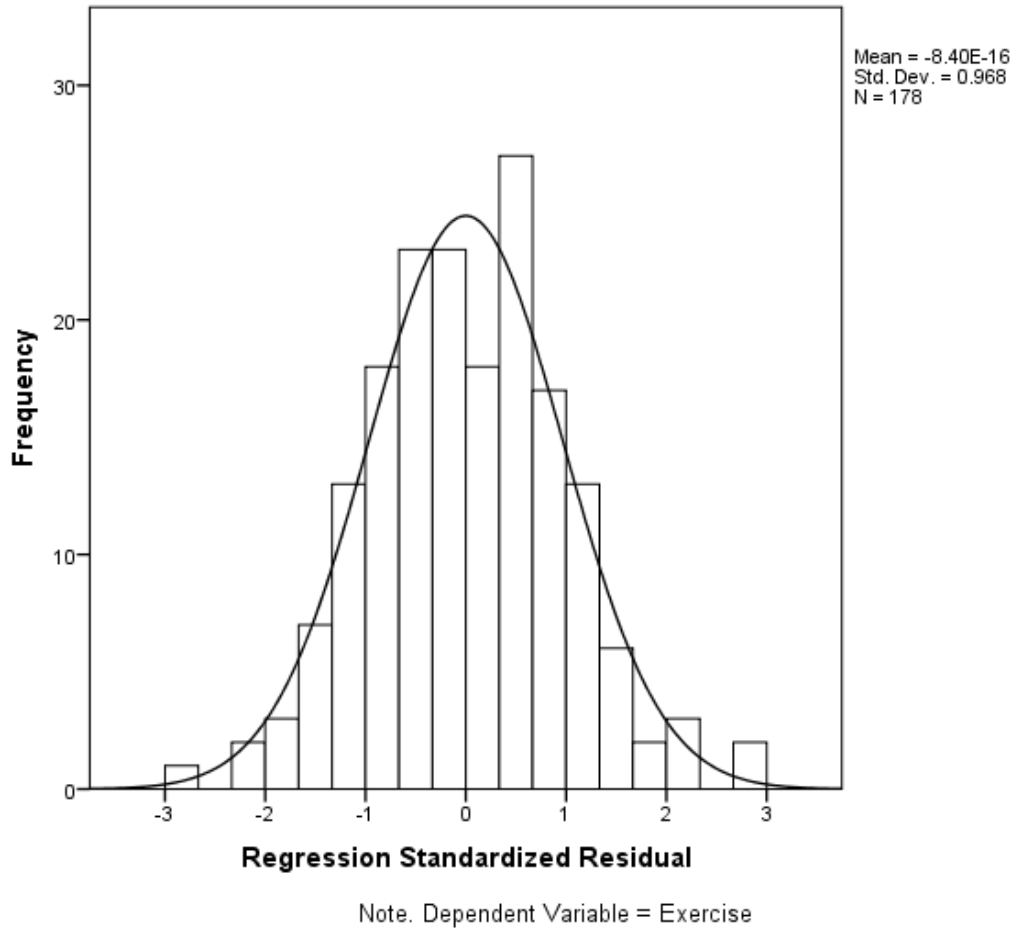
Figure 12. Histogram of standardized residuals for exercise.
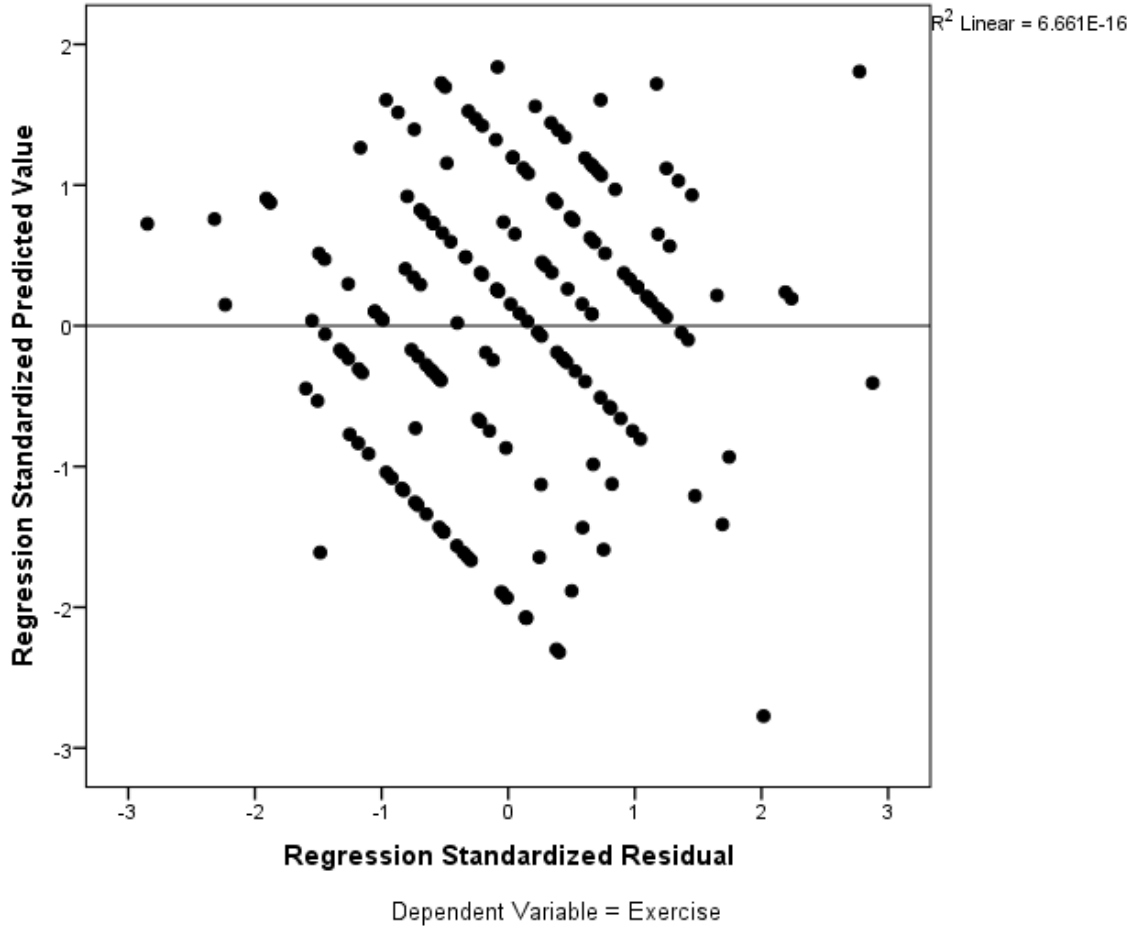
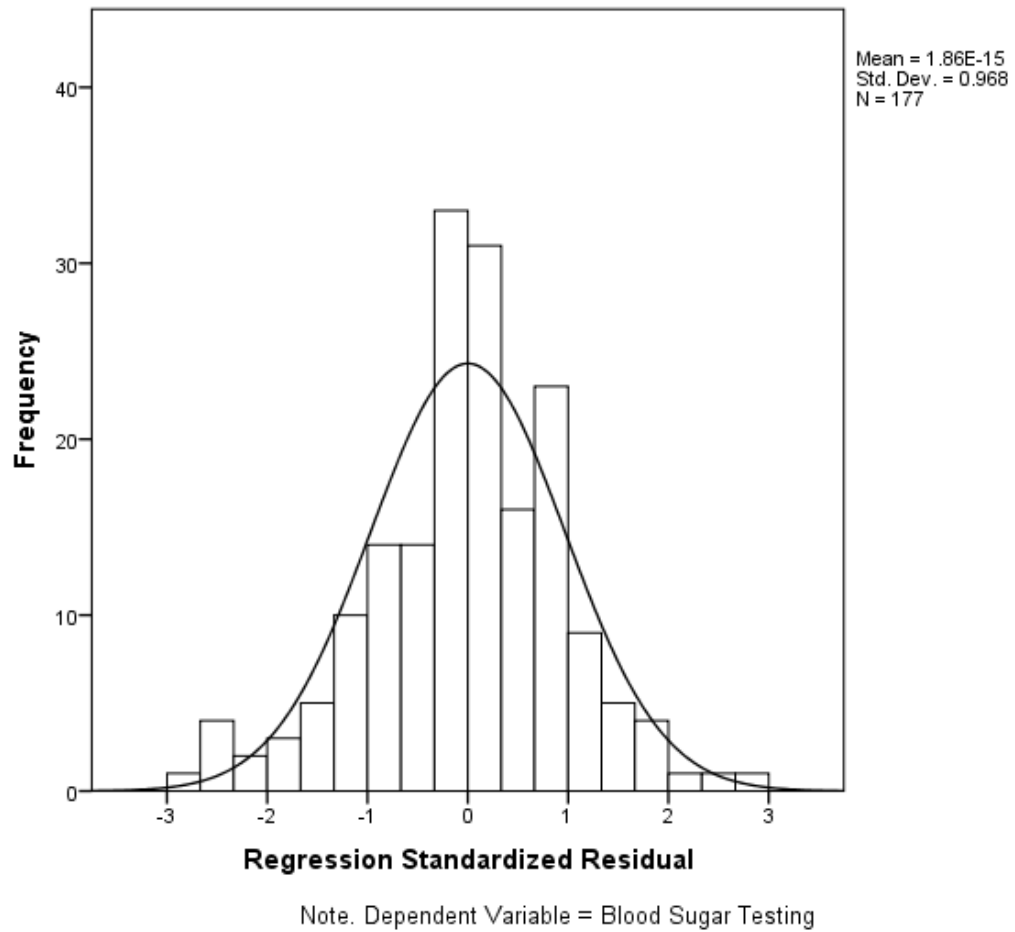*Figure 13*. Scatterplot for exercise assessing homoscedasticity.

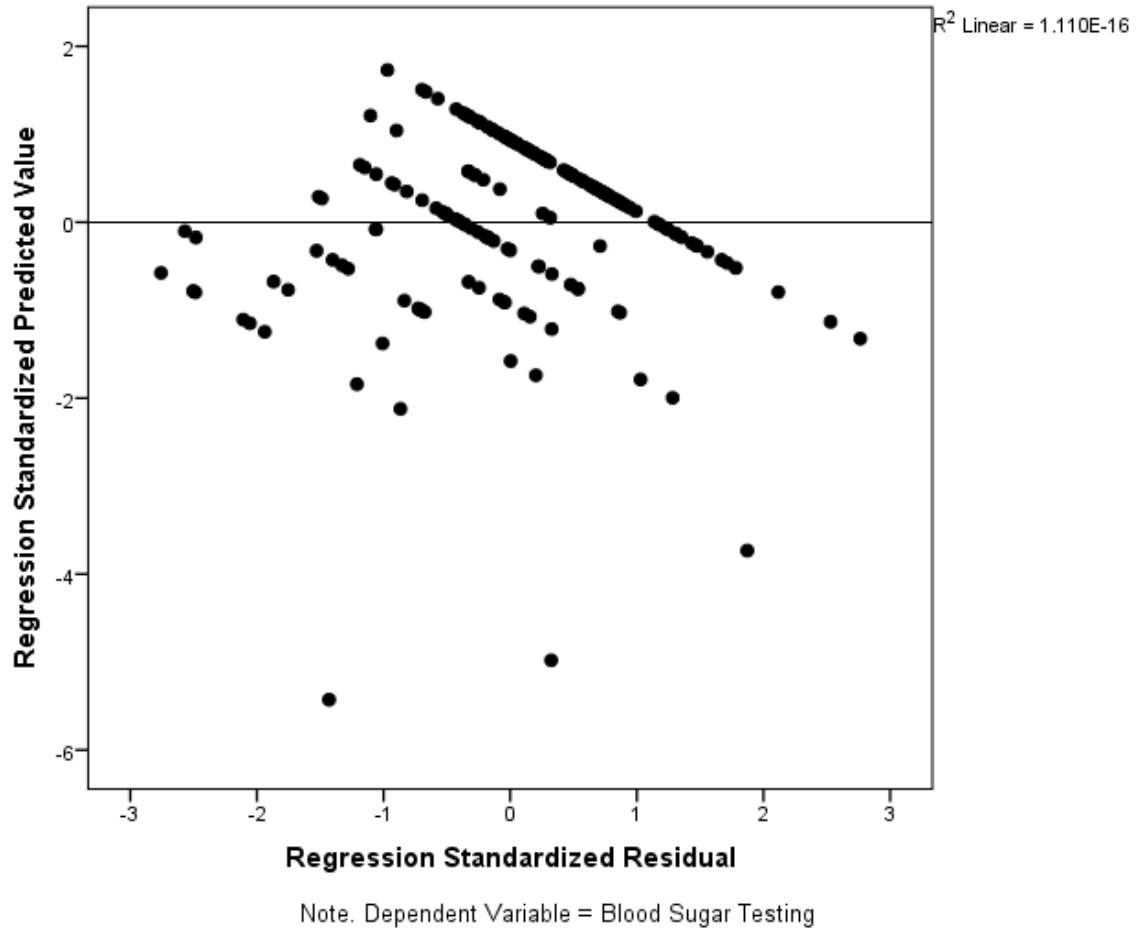*Figure 14*. Histogram of standardized residuals for blood sugar testing.

Figure 15. Scatterplot for blood sugar testing: Homoscedasticity.