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Using the DES-28 Tool to Determine the Relationship Among Diabetes Self-Empowerment, Diet Quality, and Glycemic Control in a Southeastern United States African American Population

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To the Dean of the Graduate School:

We are submitting a thesis written by Makala Katuscak Smith entitled, “Using the DES-28 Tool to Determine the Relationship Among Diabetes Self-Empowerment, Diet Quality, and Glycemic Control in a Southeastern United States African American Population.” We recommend acceptance in partial fulfillment of the requirements for the degree of Master of Science in Human Nutrition.

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USING THE DES-28 TOOL TO DETERMINE THE RELATIONSHIP AMONG DIABETES SELF-EMPOWERMENT, DIET QUALITY, AND GLYCEMIC CONTROL IN A SOUTHEASTERN UNITED STATES AFRICAN AMERICAN POPULATION

A Thesis
Presented to the Faculty
Of the
College of Arts and Sciences
In Partial Fulfillment
Of the
Requirements for the Degree
Of
Master of Science
In Human Nutrition
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By

Makala Katuscak Smith
ABSTRACT

Diabetes Mellitus (DM) is a disease affecting individuals in epidemic proportions. Approximately 29.1 million Americans suffer from diabetes, and 13.2% of African Americans have type II diabetes and bear the undue burden of chronic diabetes complications ("Statistics About Diabetes," 2014). The purpose of this study was to determine if patient empowerment was related to diet quality and glycemic control in Southern African Americans with type II diabetes in South Carolina. A convenience sample of 35 adults receiving treatment at Sumter Medical Specialists, PA, located in Sumter, SC was obtained. Baseline empowerment, prior to diabetes self-management was measured through the Diabetes Empowerment Scale-28, diet quality was scored with the Healthy Eating Index, and glycemic control was measured by hemoglobin A1C levels. Participants in this study were predominantly female, had a family history of type II diabetes, had completed a high school education or less, and were on a combination of oral hypoglycemic agents and insulin therapies. Pearson’s Correlations indicated a positive, significant relationship between diabetes empowerment and diet quality. However, no relationship was found between diabetes empowerment and glycemic control in this sample. No research to date has been published using the Healthy Eating Index with this group. The Healthy Eating Index scores revealed that diet quality in Southern African Americans with T2DM is low, and that areas of lowest diet quality in this sample are those most commonly associated with poor glycemic control. Future research should explore the effect of empowerment strategies as a part of an intervention on glycemic control and diet quality. Additional research is needed to validate the Diabetes Empowerment Scale-28 in this subgroup of Southern African Americans.
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CHAPTER I
INTRODUCTION

Problem Statement

Diabetes Mellitus (DM) is a disease affecting individuals in epidemic proportions. In 2012, approximately 29.1 million Americans had a diagnosis of DM. Even more staggering, 13.2% of African Americans have been diagnosed with DM compared to 6.7% of their Caucasian counterparts ("Statistics About Diabetes," 2014). Along with a higher incidence of diabetes, African Americans also suffer from more diabetes-related complications, such as chronic kidney disease, retinopathy, cardiovascular disease, poor glycemic control, and lesser diet quality than Caucasians (Norris, Lau, Smith, Schmid, & Engelgau, 2002). Diabetes Self-Management Education (DSME) has been shown to be effective in improving glycemic control, diet quality, and diabetes related outcomes, though improvements are often lost within 6 to 12 months of initial intervention (Norris et al., 2002). Gaining insight into factors that improve glycemic control and ultimately disease outcomes in African Americans is critical.

The current literature on racial and health disparities between African Americans and Caucasians with type II diabetes (T2DM) supports the need for more tailored interventions to improve disease outcomes among African Americans. An empowerment based approach may aid in improving patient-provider trust in this population, as the literature revealed that although process care measures are equivalent for African Americans and non-Hispanic Whites, shared decision-making (SDM) is perceived to be low in African Americans (Peek et al., 2013).
Purpose Statement

The purpose of this study is to determine if patient empowerment is related to glycemic control and diet quality in Southern African American patients in South Carolina.

Research Question

Is diabetes empowerment related to glycemic control and diet quality among African Americans with type II diabetes in South Carolina?

1) Does the level of patient empowerment as measured by the diabetes empowerment scale-28 relate to glycemic control as measured by glycosylated hemoglobin?

2) Does the level of patient empowerment as measured by the diabetes empowerment scale-28 relate to diet quality as measured by the healthy eating index (HEI)?

Null Hypothesis (H₀)

Diabetes self-empowerment is not associated with diet quality and glycemic control in African Americans with Type II diabetes in South Carolina.

Hypothesis (H₁)

Diabetes empowerment is positively associated with diet quality and glycemic control in African Americans with Type II diabetes in South Carolina.
CHAPTER II
REVIEW OF LITERATURE

This literature review seeks to critically evaluate the available literature related to all major components of the proposed study. Factors influencing health outcomes in African Americans with diabetes, patient empowerment, diabetes empowerment, and diabetes self-management education will be discussed. Also, the tools employed in this study will be reviewed. They include the Diabetes Empowerment Scale (DES) as a measure of diabetes related psycho-social self-efficacy, the Healthy Eating Index (HEI) as measure of diet quality, the Automated Self-Administered 24-hour recall (ASA24) as a method of obtaining 24-hour dietary recall, and A1C level as a measure of glycemic control.

Factors Influencing Health Outcomes in African Americans with Diabetes

African Americans suffer disproportionately from DM and its related complications as compared to their Caucasian counterparts. In South Carolina, DM is the fifth leading cause of death in African Americans, claiming approximately 1200 lives per year (Heidari & Myers, 2013). Also, in South Carolina, hospitalizations caused by DM are twice has high in African Americans as compared to Caucasian counterparts (Heidari & Myers, 2013). Nationally, African Americans experience 2-4 times the rate of chronic kidney disease, retinopathy, amputations, and amputation-related mortality and Caucasians are more likely to have lipid profiles and eye examinations yearly than all other races (Peek et al., 2008). Peek et al. (2008) also describes that the provision of lower quality care to African Americans may be a major factor contributing to the current prevalence of diabetes related complications in this population.
Historically, it has been determined that the approach to healthcare and counseling should take an unbiased approach across race and demographics. Evidence is clear that providers across disciplines should be taking a culturally competent approach to patient care (Gavin & Wright, 2007). However, research conducted in the past decade indicates that this has not been the case. The cultural gap in patient care has been most evident in African Americans with T2DM, possibly stemming from the long-time oppression of this group, particularly in the Southern US, and the relatively low representation of African Americans as health-care providers. The disconnect between diabetes care and poor health outcomes for African Americans is strong and the etiology multifactorial. Factors include: healthcare attitudes, diet, religious beliefs, socioeconomic status, genetics, and interactions with health care systems (Baptiste-Roberts et al., 2007; Chatterjee, Maruthur, & Edelman, 2015; Gavin & Wright, 2007; Hasson, Apovian, & Istfan, 2015).

It is well documented that environmental and genetic factors are partially responsible for the high incidence of T2DM in the US African American population. Three genome-wide associated studies sought to determine the genetic contribution to T2DM in African Americans (Ardisson Korat, Willett, & Hu, 2014; Hasson et al., 2015; Jeff et al., 2014). Hasson et al. (2015) reviewed biological differences in glucose metabolism in African Americans. They found that African Americans are more insulin resistant and have up-regulated beta cell function as compared to non-Hispanic Whites (Hasson et al., 2015). Hasson et al. (2015) inferred that increased insulin secretion may be a cause of T2DM in African Americans rather than a consequence of (Hasson et al., 2015). Though many genes are associated with the development of DM, researchers
determined the genetic risk did not significantly improve prediction of DM more so than traditional risk factors. However, researchers did find that there was a pronounced increase in genetic risk score in those that consumed a traditional western diet and that carbohydrate quality and quantity significantly modified the association.

Bulger, Shubrook, & Snow (2012), Peek et al. (2010), and Peek et al. (2013) sought to explore racial disparities and their impact on diabetes care in African Americans. Both Peek et al. (2010, 2013) studies used interview techniques to determine if race and patient trust played a role in shared decision-making between the patient and the health care provider. They conducted focus groups (n = 27) and in depth interviews (n = 24). The studies found that race influenced trust between the African American patients and the non-African American healthcare providers, and that there was a bidirectional relationship between trust and shared decision-making. Meaning, the more healthcare providers engaged patients in their own care, the more perceived trust the patient had in the healthcare provider. Concurrently, they found that African American patients perceived Caucasian providers as less engaged in shared decision-making, making them seemingly less trustworthy to the patients (Peek et al., 2013; Peek et al., 2010).

Bulger, Shubrook & Snow (2012) performed a retrospective analysis of data retrieved from the American Osteopathic Association Clinical Assessment Program (AOA-CAP). African American patients represented 29% (n = 3,123) of the participants and Caucasian patients 71% (n = 7,576) of the participants. The researchers examined process of care and health outcomes between ethnicities and found that African Americans were just as likely to have recommended process care measures (n = 10, 699, P = 0.02) as their Caucasian counterparts. Meaning, providers prescribed medications and
provided health maintenance care equivalently in both groups. However, diabetes control was lower in African American patients (P < 0.02) as compared to Caucasians (8.1% versus 12.3%) (Bulger, Shubrook, & Snow, 2012).

In addition to well-documented complications and comorbidities related to T2DM in African Americans such as hypertension, chronic kidney disease, and retinopathy; diet quality has been shown to play an integral role in the development of the disease. Higher intake of red and processed meats, sweets, refined grains, and french fries were associated with a 49% greater chance of developing T2DM in a representative US population (Jeff et al., 2014). Observational evidence gathered in the Ardisson Korat et al. (2014) study found that diets of higher quality, included high-fiber cereals, appropriate polyunsaturated to saturated fat ratios, increased fruits and vegetables, coffee, lower glycemic index foods, less sugar sweetened beverages, and limited consumption of red and processed meats, proved to be protective against T2DM.

Interestingly, some sociocultural factors appear to be protective in the development of T2DM in African Americans. One study examined the role of family history of diabetes in the awareness of diabetes and engagement in health behaviors (Baptiste-Roberts et al., 2007). The researchers found that after adjustment for age, income, education, BMI, and perceived health status, African Americans with a family history of diabetes were more aware of diabetes risk factors and engaged in more health protective behaviors. These behaviors included eating five or more servings of fruits and vegetables per day (n= 1122, RR=1.31, 95% CI= 1.02, 1.66) and having been screened for diabetes (n= 1122, RR=1.21, 95% CI= 1.12, 1.29). This research demonstrates the
importance of the role of family history to health issues in the African American community.

Due to the reported lack of shared decision-making between the healthcare provider and the African American patient, a paradigm shift toward patient-centered disease management goals is explicitly needed in diabetes care, as opposed to population wide goals for all demographics (Gavin & Wright, 2007). Because, African American patients do not perceive non-African American healthcare providers as engaged in their care, providers need to examine ways in which to be both culturally competent and to engage patients. Dialogue between the patient and the provider is imperative in creating a bidirectional relationship between the two to develop a patient-centered disease management plan.

**Diabetes Self-Management Education (DSME): a Component of Standard Care**

Diabetes is a chronic disease that requires a great amount of patient responsibility to manage the disease effectively. This personal responsibility includes a myriad of self-management behaviors such as daily monitoring of blood glucose levels, nutrition management, and physical activity to prevent acute and chronic complications. In order for the patient to develop the sense of self-empowerment necessary to support these self-monitoring behaviors, a DSME program must be part of the treatment plan. DSME empowers the patient to make self-care decisions. According the Joint Position Statement of the American Diabetes Association (ADA),

“DSME is the process of facilitating the knowledge, skill, and ability necessary for diabetes self-care, with the objective of supporting informed decision-making, self-
care behaviors, problem solving, and active collaboration with the health care team
to improve clinical and personal outcomes” (Powers et al., 2015).

Powers et al. (2015) reports that initial DSME is typically provided by a healthcare
professional and is designed to address the patient’s “health beliefs, cultural needs,
current knowledge, physical limitations, emotional concerns, family support, financial
status, medical history, health literacy and numeracy, and other factors that influence the
patient’s ability to employ self-management behaviors.” Several researchers have sought
to determine the effectiveness of such education in various patient populations and
settings. The following summarizes and critically reviews DSME research of varying
study types, including those conducted exclusively in African American populations.

While DSME is a critical component of DM care, studies reporting its efficacy do
not typically include adequate representation of African Americans and therefore do not
address the relationships between caregivers and African Americans, nor the poorly
controlled DM that persists even after standard DSME intervention is provided to this
population. The following studies sought to provide a culturally tailored DSME
intervention to African American populations within the United States.

Collins-McNeil et al. (2012), Lynch et al. (2014), and Tang et al. (2015),
conducted community based interventions that sought to provide culturally tailored
diabetes education to African Americans. Collins-McNeil et al. (2012) conducted a 12-
week church based intervention with 12 participants (n =10 women, n = 2 men) in the
Southeastern United States. Lynch et al. (2014) conducted a 6-month randomized
controlled trial in an urban African American population (n = 61) in Chicago, Illinois.
Tang et al. (2015) also conducted a randomized control trial lasting 15 months (3 month
DSME program, 12 months follow up) with 106 community dwelling African Americans with T2DM in Michigan. These studies incorporated peer involvement, extended follow up, and culturally tailored educational materials, while still seeking to educate patients on the diet for diabetes, physical activity, blood glucose monitoring, medication adherence, problem solving, reducing risks, and healthy coping (Collins-McNeil et al., 2012; Lynch, Liebman, Ventrelle, Avery, & Richardson, 2014; Tang, Funnell, Sinco, Spencer, & Heisler, 2015). Collins-McNeil et al. (2012), found significant increases in medication adherence ($x^2 = 14.38$, $p = .006$, Cramer’s $V = .85$, $p = .006$), healthy eating ($x^2 = 26.67$, $p = .009$, Cramer’s $V = .94$, $p = .009$), and foot care adherence ($x^2 = 25.57$, $p = .003$, Cramer’s $V = .83$, $p = .003$). An average reduction in waist circumference of 5.3cm and average weight loss of 2.2 pounds across participants were also found with a retention rate of 87%.

Lynch et al. (2014) included a control group that completed two diabetes education classes and an experimental group that completed DM education plus six months of provider and peer follow up. Ninety percent of the intervention group completed the 6 month follow up period, and peer supporters completed 53% of attempted follow up phone calls (Lynch et al., 2014). After six months a greater proportion of the intervention group (50.0%) achieved a one-half point reduction or greater in A1C levels versus control (21.4%) ($p = 0.03$) (Lynch et al., 2014). Overall, no difference in medication adherence for experimental or control groups was found, but there was significant improvement in diet adherence ($n = 29$, 95% CI = 0.6, 3.1, $p < .001$) and calories burned performing physical activity ($n = 29$, 95% CI = 590.3 to 4,443.8, $p = 0.01$).
The Tang et al. (2015) study experienced a 40% participant attrition rate at the 15-month mark, which was not different between the intervention and control groups. They also found no significant change in A1C levels at 3, 9, or 15 months. However, similar to Collins-McNeil et al., 2012, they observed progressive reductions in waist circumference, with a mean reduction of 1.4 inches at 15 months ($P = 0.03$) and a mean decrease in BMI of 1.0 kg/m$^2$ ($P < .001$), which was 0.8 kg/m$^2$ lower than the control group ($P = .003$). Through the Summary of Diabetes Self Care Activities Scale, Yang et al (2015) found that levels of social support increased in the intervention group at 3 months (0.5, $P = .02$), and were sustained at 15 months (0.4, $P = .04$), while the control group did not experience changes in social support at any point.

While these studies, attempted to provide culturally competent care to African Americans through peer support and tailored educational materials, there were minimal differences seen in glycemic control overall, except in the study conducted in Collin-McNeil et al. (2012). Though culturally competent DSME is a step in the right direction when it comes to providing patient-centered care, it seems that there is still more to be learned about successful self-management of T2DM among African Americans. The following studies, seek measure the efficacy of DSME in the general population.

Randomized controlled trials conducted by Polonksy et al. (2003), Wattana et al. (2007) and Ko et al. (2007), sought to determine whether a DSME program would positively affect glycemic control and self care behaviors in adults. The study conducted by Polonsky et al. (2003) took place at the Triple Army Medical Center in Hawaii and included 167 adult participants ($n=78$ controls, $n=89$ experimental participants). Eligible participants had an A1C level of 8.5% or higher in the three months prior to the study.
The experimental group received three and a half days of diabetes education, skills training using an ADA based curriculum, and daily medical management while in the hospital. After discharge, a nurse provided follow up phone calls to discuss diabetes-related laboratory levels. In addition, the nurse administered the Diabetes Self-Care Activities 12-item scale to assess compliance to the diabetes self-management regimen. Over the six-month study period, Polonsky et al. (2003) found a significant decrease in mean group A1C level in the experimental group when compared to the control group (n = 89, M =10.2; SD = 1.7; P < 0.02). Glycemic improvements within the experimental group were also significantly associated with dietary intake (r (89) = -0.41; P < 0.02). Lastly, the number of follow up contacts was positively associated with improvement in A1C level over the six-month follow up period (unstandardized β = -0.12; P < 0.04).

Wattana et al. (2007) examined the effects of DSME on glycemic control and heart disease risk in outpatient clinics at community hospitals in eastern Thailand. In this study, participants were required to be aged 35 years or older, have T2DM, not be on insulin therapy, and have had a fasting plasma glucose (FPG) >140 mg/dL for two follow up visits. The experimental group was educated using the “Living Well with Diabetes” curriculum, which is suggested for use by the ADA. They received an initial group class, four small group sessions, and two individual follow up appointments. A1C levels were drawn before and after the intervention and participants completed the Quality of Life survey (QOL) to assess the impact of education. Post-test results from the ANCOVA analysis revealed that the experimental group had significantly lower A1C levels at 24 weeks: F(1,143) = 6.19, P < 0.05 and a significant difference in the experimental group
towards improvement in QOL over the control group (F(1,143) = 24.05, P < 0.001) (Wattana, Srisuphan, Pothiban, & Upchurch, 2007).

Ko et al. (2007) studied how structured DSME in patients with T2DM and regular follow-up appointments influenced self-management behaviors and glycemic control. They, like the studies conducted by Polonsky et al. (2003) and Wattana et al. (2007) sought to measure the effectiveness of an educational intervention. This study was conducted in Korea and included 547 participants hospitalized from December 1999 to December of 2000. All participants had no previous diabetes education and were divided into an experimental group (n = 219) that received the education program and control group that received conventional treatment. Patients were given a five-item self-care behavior tool to determine baseline and annual adherence to education. The following were obtained at baseline and from annual follow-up visits: blood pressure (BP), body mass index (BMI), blood glucose level (BGL), and mean A1C level (Ko et al., 2007). After four years, A1C levels were found to be significantly lower in the experimental group when compared to the control group (7.9 ± 1.2 versus 8.7 ± 1.6, P < 0.005). The experimental group was also found to adhere more closely to self-care behaviors when compared to the control group (Ko et al., 2007). These findings demonstrated the long-term benefits of the intervention.

All three of the studies described above were randomized control trials utilizing an evidenced based education curriculum (Ko et al., 2007; Polonsky et al., 2003; Wattana et al., 2007). Poor retention rates were noted as a limitation of these studies. Polonksy et al. (2003) and Ko et al. (2007) had retention rates of 55% and 80% respectively. Ko et al. (2007) and Watanna et al. (2007) had subjects with relatively well-controlled diabetes,
were predominantly married females, and were conducted outside of the contiguous US, which limits generalizability. This further points for the need for more diabetes self-management education research in the US, specifically in Southern regions of the US, where T2DM is rampant.

Two studies utilizing quasi-experimental cohort designs were reviewed. The education program studied by Bannister et al. (2004) was aimed at the “working poor.” Participants were predominantly African American and Hispanic, with 75% falling below the federal poverty line. The diabetes education program was provided without charge, through physician referral, and included a four-hour group class, one or more consultations with a registered dietitian (RD), and monthly support group meetings.

Each participant was given a blood glucose meter and instruction on its use. They were followed for three to six months after the intervention. In a consultant service study conducted by Garrett & Bluml (2005), a pharmacy was utilized as the provider of the DSME for company employees in Greenville and Wilson, NC, Dublin GA, and Columbus, OH. The service used scheduled consultations, clinical goal setting and monitoring, collaborative drug therapy management with physicians, and referrals to diabetes educators. The studies sought to measure change in A1C level, medications, body weight, blood pressure, and goal setting.

Using paired t-tests, Banister et al. (2004) found that mean A1C levels improved from 9.7+/-2.4% to 8.2+/-2.0% (P < .001). Garret & Bluml (2005) used a two-tailed student t-test for paired data analysis and found that mean A1C levels decreased from 7.9+/- 1.8% to 7.1+/- 1.4% (n = 256; P < 0.001). The percentage of patients with overall satisfaction with diabetes self-management increased from 57% at baseline to 87% after
six-months of participation (Garrett & Bluml, 2005). Both studies were representative of the populations served, and together illustrate that DSME is applicable to different regions of the United States and people of different socioeconomic statuses (SES). A limitation of the studies was the limited length of observation of post-intervention (up to 12 months) and the lack of a control group for comparison (Banister, Jastrow, Hodges, Loop, & Gillham, 2004; Garrett & Bluml, 2005).

Meta-analyses of randomized controlled trials by Norris et al. (2002) and Pigmouguet et al. (2011) sought to evaluate the effect of self-management education on blood glucose control in adults with type I and II diabetes (Norris et al., 2002; Pigmouguet, Le Goff, Thiebaut, Dartigues, & Helmer, 2011). Norris et al. (2002) examined thirty-one articles and extrapolated age, treatment (oral, insulin), baseline A1C levels, and psychosocial attribute data. Included participants in each study had any degree of the disease, any co-morbidity, and had measured GHB, HbA1c, or HbA1. Pigmouguet et al. (2011) found 41 randomized control trials that included adults with type I, or type II diabetes with more stringent inclusion criteria. Studies had to report pre and post A1C levels (post-program, 12 weeks after follow up) and no study could have used exclusively Internet or email contact. Characteristics examined were gender, mean age, sample size, sample drop off, intervention mode, and adverse events with the potential to effect clinical outcomes. Pigmouguet et al. (2011) also classified the contact between study participants and clinicians as low, moderate, or high.

The authors found that the mean A1C levels among all trials corresponded to significant improvement in glycemic control in the intervention groups between baseline and post-intervention A1C levels (95% CI = 0.47 to -0.29 absolute mean difference
0.51%). They also found that in programs where a disease manager was allowed to modify treatment without PCP approval, there was a greater reduction in A1C level (standardized mean difference –0.60 versus –0.28, \( p < 0.001 \)). Also, programs with moderate or high frequency of contact also related to a significantly greater reduction in A1C levels compared to low frequency contact programs (standardized mean difference –0.56 v. –0.30, \( p = 0.03 \)) (Pimouguet et al., 2011). The Norris et al. (2002) intervention decreased A1C level by 0.76% (95% CI 0.34 –1.18) as compared to the control and also found that the duration of contact time was the only other significant predictor of a decrease in A1C levels. Contact time of 23.6 hours was needed for a 1% absolute decrease in A1C levels, which was consistent with the literature (Norris et al., 2002).

Norris et al. (2002) and Pigmouguet et al. (2011) utilized randomized control trials for their meta-analyses and meta-regression for analysis, which allowed for maximum validity and causal inference. The studies were generalizable to adult populations in various clinical settings because a broad range of patient ages, medication types, intervention characteristics, and geographic settings were examined. Norris et al. (2002) reported possible threats to internal validity due to the fact that no study in the analysis met all inclusion criteria. Also, only five trials were more than 5 months in length, rendering researchers unable to capture long-term effects of DSME intervention.

A retrospective case-control analysis conducted by Brunisholz et al. (2014) sought to determine the impact of DSME on improving processes and outcomes of diabetes care as measured by a five component diabetes bundle, where multiple aspects of diabetes care and process outcomes are rolled into one measure (Brunisholz et al., 2014). Intermountain Health Care's Enterprise (IHC) Data Warehouse was searched for
all eligible participants (384 controls, 1536 intervention) that were 18-75 years of age with T2DM. Additional inclusion criteria were: 1) A1C level between 6-14%, 2) main provider was a primary care provider (PCP), 3) met the National Healthcare Effectiveness Data and Information Set criteria for inclusion in the IH registry (includes retinal eye exam, nephropathy screening, or prescription of ACE or ACE blocker and measurements of BP, LDL and A1C, 4) received DSME from 2011-2013 from an ADA center at IHC 5) had an A1C level in the prior 3-month period and 2-6 months after completing the first DSME visit. Controls were selected from same clinics as case-patients using a random number generator to achieve a 1:4 cases to controls ratio.

Brunisholz et al. (2014) compared the change in A1C levels using Student's t-test and the effect of time by computing the difference of means to determine if there was a significant difference between the groups. A1C levels in the DSME group improved significantly (-1.36 +/- 1.81; P <=0.01) (Brunisholz et al., 2014). Compliance between the two groups, in regards to bundle achievement were significantly different when measured at follow-up (32.03% compared to 23.05%) and the magnitude of improvement (17.45% versus 10.62%) was also significant (P < 0.01). Similar results over time were seen for the difference in A1C level. There was a 1.5 fold greater chance of achieving bundle in the DSME group (Brunisholz et al., 2014). Brunisholz et al. (2014) used a validated ADA curriculum and the findings support existing literature on effectiveness of DSME programs. Limitations included possible variation in practice across clinics, lack of adjustment for medication adherence, inclusion of both between Type I and II diabetics, and a largely Caucasian study population.
To date, the literature reviewed supports DSME as a way of improving glycemic control in people with T2DM. However, most studies overlooked the necessity of cultural competency, empowerment, and shared decision-making in DSME in African Americans.

**Patient Empowerment**

Empowerment is “defined as helping patients discover and develop the inherent capacity to be responsible for one's own life” (Anderson & Funnell, 2005). While education is vital to disease management, empowerment provides a means for building patient capacity to manage disease. It also requires facilitating patient goal setting and goal achievement. It is more than the transmission of information from one individual to another, but rather, the practitioner motivating the patient toward positive behavior change with the patient’s goals and capabilities shaping the self-management plan. This strategy requires individualized patient care and follow-up with the entire healthcare team. This type of care is illustrated in research conducted by Anderson (1995), Anderson & Funnell (2005), Anderson et al. (2009), Anderson et al. (1991), Funnell & Anderson (2004) & Funnell et al. (2005). These studies have reported positive outcomes and general health empowerment. Due to these findings, this method has been quickly applied to diabetes care. There are now additional empowerment studies in the literature related to diabetes self-empowerment. However, there have been no studies comparing empowerment level between African American and Caucasians or studies examining empowerment level in an exclusively African American sample. There is not enough evidence at this time to explain the extent to which African American patients are empowered as it related to their diabetes self-management.
Empowerment Theory focuses on self-efficacy, patient directed goal setting, and how the healthcare provider can facilitate the development of those attributes (Anderson, Funnell, Barr, Dedrick, & Davis, 1991). Research suggests that patients who are more empowered are more likely to achieve glycemic control and sustained behavior change (such as changes in diet and self-monitoring behaviors) (Anderson et al., 1995).

Empowerment research related to DM shows that those with uncontrolled DM have lower levels of perceived self-efficacy around diabetes self-management (Anderson & Funnell, 2005; Anderson et al., 2009; Anderson et al., 1995; Funnell, Anderson, & Ahroni, 2005; Hernandez-Tejada et al., 2012; Rossi et al., 2015; Tang et al., 2015; Tol, Shojaeezadeh, Sharifirad, Alhani, & Tehrani, 2012; Yang, Hsue, & Lou, 2015).

Anderson et al. (1991) taught Empowerment Theory to a group of registered nurses and dietitians and then measured their success in counseling using an empowerment-centered method. The program was entitled, "Empowering Your Patients: A Hands-On Approach To Teaching, Counseling, and Behavior Change." Participants (n = 22) attended four workshops. Prior to the workshops, the professionals followed a simulated diabetes care regimen for three days that included taking two injections of saline solutions daily, as if they were on insulin, self-monitored blood glucose levels, performed daily aerobic exercise, foot care, followed a 1200 calorie per day diet, and kept a journal of activities. The first workshop provided education related to Empowerment Theory. The second was observation of an actual counseling session using Empowerment Theory. The third included the participant conducting a counseling session, which was videotaped; and during the fourth session, tapes of the counseling session were reviewed and critiqued. Pre-tests and post-tests were administered. Internal
consistencies of the pre-test and post-test scores, as measured by Cronbach’s alpha, were 0.73 and 0.80 respectively. For the video recorded counseling workshop, the participants showed significant improvement in their counseling skills (t = 8.74, df = 22, P < 0.001). The mean test score increased from 0.07 (range -1.50-1.67) to 1.49 (range 0.17-2.00). Pretest and posttest scores of those who returned both tapes and questionnaires (n = 19) increased from a mean of 0.53 (range 0.39-1.20) to 0.92 (range 0.40-1.64.) Lastly, attitudes of participants toward patient self-efficacy shifted significantly from baseline to the end of the program (P < 0.05).

Anderson et al. (2009) also sought to determine if an empowerment-based Diabetes Self-Management Consultant (DSMC) was more effective than a group receiving a mailed Metabolic Assessments Only (MAO) in improving diabetes-related quality of life and glycemic control in participants with T2DM. This randomized two-year clinical trial was conducted by the University of Michigan through the Department of Family Medicine in the Detroit Department of Community Health. The DSMC met participants (n=310) to review baseline diabetes assessment results then participants were contacted monthly via telephone by the DSMC. Participants in this sample were Caucasian, African American, or Hispanic. The DSMC used the empowerment approach as described in Anderson et al. (1991) to help patients identify self-management problems, set goals, and make self-determined adjustments to their diabetes self-management care plan (Anderson et al., 2009). Participant clinical indices, health practices/healthcare climate, and psychosocial values were compared. The DSMC intervention showed improvements in diabetes related quality of life (p= .008), patient empowerment (p= .024), A1C (p= .016), perceived understanding of diabetes (p= .001),
and satisfaction with diabetes care \((p = .019)\) as compared to the MAO group (Anderson et al., 2009). These findings support the effectiveness of an empowerment-based approach for DM care, however differences in empowerment between racial groups studied was not examined.

Review of the previous studies conducted indicates that the use of empowerment based counseling techniques could be successful in shifting the provider-patient relationship, though more research is needed in exclusively African American samples to determine if empowerment based counseling techniques would be beneficial to this population. The Anderson et al. (1991) study first showed that adopting an empowerment based counseling technique improved provider empathy, while the second study conducted, particularly with respect to counseling, revealed that Empowerment Theory integrated into care, also improved clinical and psychosocial outcomes in patients with DM. These studies were the first of their kind to examine the topic of empowerment as it relates to health and self-management behaviors. The impact of these studies shows that there is much more to be done on the providers’ part to empower patients to have better health outcomes.

Anderson and Funnell have pioneered the concept of patient empowerment as it relates to diabetes over the past several decades (Anderson, 1995; Anderson & Funnell, 2005; Anderson et al., 2009; Funnell et al., 2005; Funnell et al., 1991). The overall goal of their research efforts was to support a patient-centered approach in diabetes self-management that is believed to be more effective than practitioner dictated goals. Though this research began approximately 20 years ago, a shift in the way diabetes care is conducted has only begun to occur, particularly among dietetics professionals. This will
require accepting a shift from the traditional didactic approach of patient education to a patient-centered approach to disease management that includes patient empowerment.

According to Funnell et al.,

“Empowerment is not a technique or strategy, but rather a vision that guides each encounter with our patients... The role of patients is to be well-informed active partners or collaborators in their own care. The role of health professionals is to help patients make informed decisions to achieve their goals and overcome barriers through education, appropriate care recommendations, expert advice, and support” (2004).

As the prevalence of T2DM continues to increase, particularly in African Americans, it is imperative that vision for effective care be considered and implemented, as it is clear that there is much more to be achieved. The following studies elucidate the necessity for a paradigm shift in diabetes management and provider support (Anderson & Funnell, 2005; Anderson et al., 1995; D'Souza, Karkada, Hanrahan, Venkatesaperumal, & Amirtharaj, 2015; Hernandez-Tejada et al., 2012; Rossi et al., 2015; Tol, Shojaeezadeh, et al., 2012; Yang et al., 2015).

Anderson et al. (1995, 2005) conducted two randomized control studies. The earlier study sought to determine whether people with diabetes enrolled in a patient empowerment program would achieve improved glycemic control and self-efficacy toward diabetes self-management. The latter study had similar objectives, but the design of the empowerment program was tailored toward African American patients with T2DM. In both studies, patients were randomly assigned to either a six-week intervention group or a six-week wait-listed control group. The interview was then conducted by a
registered nurse (RN), or registered dietitian (RD). Post-intervention assessment measures obtained by the two studies were A1C levels, lipids, blood pressure, weight, self-management behavior, and psychosocial adaptation. Additional measures were obtained using the Diabetes Care Profile (DCP), the Diabetes Empowerment Scale (DES), and the Diabetes Empowerment Scale Short Form (DES-SF). In both studies, lecture-style classes were avoided. Rather, discussion topics were presented and participants dialogued with one another and the presenter. Strict documentation was kept to make sure all nine required ADA content areas were covered. Both studies (Anderson et al., 1995; Anderson et al., 2005) used chi-square tests and student t-tests to determine differences between groups. An ANOVA with repeated measures was used to test for concurrent differences over time in empowerment between groups and in individuals (Anderson, 1995; Anderson & Funnell, 2005).

Results from the earlier study showed gains over the control group in four of the eight self-efficacy subscales and two of the five diabetes attitude subscales. The intervention group had significant reductions in A1C levels, and within groups, analysis of data from program participants showed improvements in all self-efficacy areas and in two out of the five diabetes attitude subscales. Results differed in the 2005 study. Both control and intervention patients showed small-to-modest positive changes during the six-week study. These gains were maintained or improved upon during the follow up period. For patients attending the support group or receiving follow up calls from a nurse, a positive correlation was seen between the number of follow-up contacts and their one-year A1C level values (p < .001). However the study was unable to demonstrate a statistically significant impact of the intervention due to the small sample size of follow
up participants. The authors identified that a limitation of both studies was that volunteers were relied upon for their participants, meaning that outcomes may have been more successful if they were randomly selected.

D’Souza et al. (2015), Hernandez-Tejada et al. (2012), Rossi et al. (2015), Tol et al. (2012), and Yang et al. (2015) conducted cross-sectional studies to explore patient empowerment and diabetes self-management. The D’Souza et al. (2015) study took place in Oman, Hernandez-Tejada et al. (2012)’s in the Southeastern United States, Rossi et al. (2015)’s in Italy, Tol et al. (2012) in Iran, and Yang et al. (2015)’s in China. Between the five studies, 4,113 people with T2DM, >18 years of age were studied. D’ Souza et al. (2015) and Tol et al. (2012) used the Diabetes Empowerment Scale (DES) and A1C level to assess diabetes empowerment in their participants, while the other studies used the Diabetes Empowerment Scale-Short Form (DES-SF) and A1C level. D’Souza et al. (2015) and Tol et al. (2012) recruited patients from local medical clinics and had nurse educators administer the survey at baseline and two weeks later. ANOVA, regression analysis, and structural equation modeling were employed for analysis. Tol et al. (2012) used univariate analysis, performed using Kendall's tau for categorical variables and Spearman correlations for quantitative variables to assess their relationship to empowerment variables. Multivariate analysis was completed using ordinal regression. Because the two studies were designed similarly, results are comparable. D’ Souza et al. (2015) and Tol et al. (2012) found the composite score and three subscales of the DES were significant and strong predictors of glycemic control among Omani and Iranian adults with T2DM (p<0.01). Age, education, duration of DM, prior DM education
program, and medications were also significantly associated with DES scores in both studies.

Hernandez-Tejada et al. (2012) and Rossi et al. (2015) recruited subjects from medical clinics and Yang et al. (2015) recruited subjects from hospitals in Nanjing, Changsha, Yunnan, and Chongqing, China. All three studies utilized self-administered surveys. Hernandez-Tejada et al. (2012) calculated Spearman correlations to test the association among diabetes empowerment, self care behaviors, and medication adherence. Yang et al. (2015) employed multiple regression to assess the aforementioned relationships, and both Yang et al. (2015) and Hernandez et al. (2012) also used multiple linear regression to assess the independent effect of diabetes empowerment on medication adherence and self-care behaviors. Rossi et al. (2015) calculated correlates of the DES-SF, which were identified through univariate and multivariate analyses. For person-centered outcomes, ORs were used to show the likelihood of being in the upper quartile of DES-SF. All three studies had similar results revealing that greater empowerment was associated with both greater knowledge about diabetes and a significant difference in self-monitoring behaviors, such as self-monitoring of blood glucose levels, diet, and medication adherence. Higher level of empowerment was also associated with lower A1C levels in all three groups (Hernandez-Tejada et al., 2012; Rossi et al., 2015; Yang et al., 2015). Because these studies were cross-sectional in design, positive associations between empowerment and glycemic control were established, rather than a causative relationship that could be drawn in randomized control design studies.
Cumulatively, the seven studies reviewed related to diabetes self-empowerment and T2DM, using the DES-28 or DES-SF, have shown strong, positive associations between the level of empowerment and glycemic control (Anderson et al., 1995; Anderson et al., 2005; D'Souza et al., 2015; Hernandez-Tejada et al., 2012; Rossi et al., 2015; Tol, Shojaeezadeh, et al., 2012; Yang et al., 2015). The literature also revealed the need for more studies to validate the use of the tool globally, with other subgroups, and with other diabetes self-management indicators, specifically in African Americans. Empowerment has yet to be conclusively linked with diet quality, nor has it been fully evaluated in Southern African Americans. Observing how empowerment is related to other areas of self-management would be an important step in further validating its use as a part of a comprehensive methodology in DSME. Demonstrating the importance of a patient-centered empowerment based education program in African Americans, could revolutionize the way diabetes self-management education is conducted and improve patient outcomes in this population with such poor diabetes related outcomes.

**Diabetes Empowerment Scale (DES)**

Anderson & Funnell developed the DES in 2000 as a way of measuring diabetes empowerment. The initial scale contained 37 items representing 8 domains; “assessing need for change, developing a plan, overcoming barriers, asking for support, supporting oneself, coping with emotion, motivating oneself, and making diabetes care choices appropriate for oneself” (Anderson & Funnell, 2000). Using factor analysis, the questionnaire was then reduced to 28 items and 3 subscales. The three subscales are “1) managing the psychosocial aspects of diabetes with 9 items, (alpha= 0.93); 2) assessing dissatisfaction and readiness to change with 9 items (alpha = 0.81); and 3) setting and
achieving goals with 10 items, (alpha = 0.91).” Later, in an effort to reduce administration time, the DES short form (DES-SF) an 8-item questionnaire was developed. Each item used was the highest rated in each of the original sub-scales. The reliability test of the DES-SF using the original data yielded a Cronbach’s alpha = .85 (Anderson, Fitzgerald, Gruppen, Funnell, & Oh, 2003) Several studies have been conducted that support use of the DES-28 and DES-SF. Anderson & Funnel, (2000) and Anderson et al. (2003), validated its use for the first time. Shiu, Wong, & Thompson (2003) and Tol (2012) validated its use in Chinese and Iranian populations, and Rasbach et al. (2015) reviewed several self-efficacy tools against each other (including the DES). These studies demonstrate that both the DES and DES-SF have been validated in various populations, substantiating their use as measures of diabetes psychosocial self-efficacy (Anderson et al., 2003; Anderson, Funnell, Fitzgerald, & Marrero, 2000; Rasbach, Jenkins, & Laffel, 2015; Shiu, Wong, & Thompson, 2003; Tol, Sharifirad, et al., 2012). While empowerment techniques have been implemented in interventions targeted exclusively at African American populations, baseline empowerment has not previously been measured in this group; therefore the effectiveness of an empowerment intervention in African Americans has not previously been measured.

**Healthy Eating Index (HEI)**

The HEI is a measure of diet quality that conforms to the US dietary guidelines (Guenther et al., 2013). The most recent versions of the HEI are the HEI-2005 and HEI-2010 (Guenther et al., 2013; Guenther, Reedy, Krebs-Smith, & Reeve, 2008). Both versions measure diet adequacy and moderation using a density-based approach (per 1,000 kcal), making it unique in comparison to other measures of diet quality. The HEI is
comprised of 12 components adding to 100 as a total score, nine measuring adequacy (whole fruit, total fruits, total vegetables, greens and beans, whole grains, dairy, total protein foods, seafood and plant proteins, and fatty acids) and 3 measuring moderation (refined grains, sodium, empty calories). The scores are expressed per 1,000 calories and can computed using a pre-programmed SAS Macros. The HEI-2010 was updated to reflect additional recommendations for seafood intake, and limitation of refined grains (Guenther et al., 2013). The HEI-2010 has a Cronbach’s co-efficient of .68, and the HEI-2005, .65 (Guenther et al., 2014).

Several studies were conducted to validate both the HEI-2005 and the HEI-2010 (Guenther et al., 2013; Guenther, Reedy, & Krebs-Smith, 2008; Guenther, Reedy, Krebs-Smith, et al., 2008). A number of studies have used the HEI to determine diet quality in a variety of populations, ethnicities, disease states, and regions of the United States (Freedman, Guenther, Krebs-Smith, & Kott, 2008; Miller et al., 2011; Reedy, Krebs-Smith, & Bosire, 2010; Savoca et al., 2009; Shah, Freeland-Graves, Cahill, Lu, & Graves, 2010). However, no studies have validated the use of the HEI with African Americans as a sole subject group, only as a subgroup as NHANES participants. Miller et al. (2008) used NHANES data from 2001-2002 to validate the use of the Nutrition Data System for Research to calculate HEI component scores from its food and nutrient database. Reedy et al. (2010) used the tool to measure diet quality of the food environment by calculating HEI component scores from the dollar menu at McDonalds (community level analysis) and the 2005 US Food Supply data (macro level analysis). Sovaca et al. (2009) used the HEI to determine the diet quality of a multi-ethnic, elderly population, and Shah et al. (2010) used the tool to assess diet quality of post-partum, multi-ethnic, and
obese/overweight women. The HEI has also been used to assess diet quality in several diabetic populations with much success (Direktor & Ozer, 2013; Exebio, Zarini, Exebio, & Huffman, 2011; Huffman, De La Cera, et al., 2011; Huffman, Zarini, McNamara, & Nagarajan, 2011; Lin, Guo, & Deng, 2004). According to Reedy et al. (2010), “because the HEI can be applied to such diverse populations at the individual and macro level, it provides a useful metric for studies linking data over the various levels of the socio-ecologic framework of dietary behavior” (Reedy et al., 2010).

**Automated Self-Administered 24-Hour Dietary Recall**

The Automated Self-Administered 24-hour Recall (ASA24) system, developed by the National Cancer Institute, Bethesda, MD, is a validated web-based tool assessing an individual's intake over the past 24 hour period ("ASA24," 2014). This is a public tool that can be used at no cost through the National Cancer Institute. The ASA24 includes questions related to portion size, food brand, fluid intake, location of meal, whom the meal was eaten with, whether a secondary activity took place during the meal (ex. TV, computer use), and is administered in a web-based user-friendly format ("ASA24," 2014; Subar et al., 2012). This tool is necessary to create a file that is uploaded into SAS Macros to calculate HEI component scores and the total HEI score from 24-hour recall data.

The ASA24 has been validated in adults and children ages 9 to 11 (Diep et al., 2015; Kirkpatrick et al., 2014). Validation studies were conducted by comparing observed versus reported intakes of participants. The true intakes for meals in the two studies were known through weighing the meals, making the results of the two studies very powerful (Diep et al., 2015; Kirkpatrick et al., 2014). The accuracy of the portion
sizes used within the ASA24 databases was calibrated using computer based photography aids. It was found that use of aerial photographs, helped participants choose portions for mealtime more accurately (Subar et al., 2012). Findings aided researchers in choosing the type/angle of plate representation in the database to yield the most accurate portion estimate from the participants. Lastly, one study, examining the use of the ASA24 against the Automated Multiple Pass Method (ASMPM) found the ASA24 was preferred over ASMPM by 70% of respondents (Blanton, Moshfegh, Baer, & Kretsch, 2006; Thompson et al., 2015). According to Thompson et al. (2015) the ASA24 allows researchers to, “collect high-quality dietary intake information at low cost and less attrition” (Thompson et al., 2015). The overall testing and validity of the ASA24 makes it a reliable choice for assessing intake of participants at the individual and group level.

**Glycemic Control and Hemoglobin A1C (A1C)**

According to the National Institute of Health (NIH), the A1C is a blood test that provides information about a person’s average serum glucose level over the previous 2-3 month period. This test is sometimes called A1C, HbA1c, or glycohemoglobin (GHB) test and is the most common test used for diabetes research and diabetes management. The test measures the attachment of glucose to hemoglobin, and because red blood cells regenerate approximately every 90 days, the test is reflective of the average blood glucose over this period of time. A1C levels are represented as a percentage, the higher the percentage, the higher the average blood glucose level. Retrospective epidemiological studies were conducted by Droumaguet et al. (2006), Selvin et al. (2011), and Olson et al. (2010). Droumaguet et al. (2006) sought to find an early identification method for persons at risk for diabetes through measuring A1C levels. The researchers evaluated the
predictive value of A1C levels in comparison to fasting plasma glucose (FPG) levels to determine the six-year incidence of diabetes in a sample of volunteers from the DESIR study. The initial sample included 3,627 participants, of those 2,824 were re-examined at the six-year mark (Droumaguet et al., 2006). A medical interview and records provided information about lifestyle, use of medication, social and family history, weight, height, waist circumference, BP, A1C level, fasting insulin, and serum lipids (Droumaguet et al., 2006).

Likewise, Olson et al. (2010) assessed the predictive value of A1C levels against single and repeat glucose measurements for the diagnosis of diabetes. Olson’s sample included non-Hispanic Whites and African American adult subjects without previous DSME from the data sets of the Screening for Impaired Glucose (SGIT) study, NHANES III and, NHANES 2005-2006. In the SGIT study, health care system employees and community members in Atlanta, GA were considered eligible if they were eighteen years or older, were not pregnant or breastfeeding, were not taking glucocorticoids, and were eligible to work. After screening, 1,581 subjects were included. NHANES 2005-2006 data included 1,111 subjects, greater than 18 years of age and NHANES III had 2,014 subjects aged 40 years or older, with no DM history (Olson et al., 2010). Following a baseline measure of A1C level, participants were given an oral glucose tolerance test (OGTT). Glucose tolerance was classified by ADA criteria on which identified A1C level <6% as normal, 6.0-6.4% as high risk for diabetes, and >/= 6.5% as having diabetes whereas new ADA criteria identified subjects at high risk for developing DM with (A1C <5.7%), high risk (A1C 5.7-6.4%) and diabetes (A1C >/= 6.5%) (Olson et al., 2010).
Selvin et al. (2011) had similar objectives to the previous two studies. Their study sample included of participants from the Atherosclerosis Risk in Communities (ARIC) study (n=12,485) and the NHANES III (n=691). ARIC included African American and Caucasian adults aged 45 to 65 years old, from four US communities. NHANES III was a non-random sample of individual all >18 years of age, with no history of diabetes. Both studies used pre and post intervention A1C levels as measures.

All three studies above found A1C levels to be less specific and less sensitive than FPG or OGTT as a means of diagnosing T2DM (Droumaguet et al., 2006; Olson et al., 2010; Selvin, Steffes, Gregg, Brancati, & Coresh, 2011) However, the studies concluded that A1C level is valid as a screening tool for diabetes or for diagnosis in conjunction with an OGTT.

While the studies included large samples and were fairly representative of the US population, the NHANES data reflected an under-sampling of African Americans, who comprise a large portion of the diabetic population in the United States. There was also a relatively small sample of subjects with diabetes, limiting generalizability (Olson et al., 2010; Selvin et al., 2011). Droumaguet et al. (2006) had self-selected participants, based on a general health evaluation, who may have been healthier or more concerned about their health in general, possibly skewing the A1C results and DM prevalence in the data.
CHAPTER III
METHODOLOGY

Overview

Because diabetes affects US African Americans disproportionately, it is vital to determine self-perceived diabetes empowerment at the individual level before determining a care plan and education plan for each patient. Determining diabetes self-empowerment enables the provider to individualize care, which in turn should result in the best long-term outcomes. This study seeks to determine the relationship between diabetes self-empowerment, diet quality, and glycemic control in a Southern African American population with T2DM.

Design

This descriptive, correlational study seeks to measure whether diabetes empowerment is related to diet quality and glycemic control in African American participants. Patients from Sumter Medical Specialists, PA were invited to participate in the study. Those greater than 18 years of age, who were African American, with a diagnosis of T2DM, and had not been previously referred to the RD’s clinic were eligible to participate. Patients were identified through the clinic scheduling system, and were invited to join the study on the day of their appointment. A script describing the study was read by staff at check-in (Appendix C), and an informed consent was described thoroughly (Appendix B). If the patient consented they were given a packet with instructions for completing the questionnaire (DES-28) measuring diabetes empowerment (Appendix E). They were given ample time to complete the questionnaire which was estimated to take five to ten minutes. After completion of the DES-28 the medical
assistant obtained the patient’s height, weight, and blood pressure measurements. The medical assistant is trained in this role, as these measurements are standardly obtained at each appointment at Sumter Medical Specialists, PA. Next, the medical assistant escorted the patient to be seen by the primary researcher (RD) in a private patient room. The researcher reviewed the DES-28 to identify any unanswered questions, and then administered the 24-hour dietary recall utilizing the ASA24. Approximately 30-45 minutes was allotted for this review and for conducting the initial nutrition assessment of the patient, the latter as a part of standard practice. During this initial assessment the information related to dietary habits, history of previous diabetes or nutrition education, and diabetes self-management behaviors was obtained. Routine behaviors assessed include: foot care, medication management, and frequency of eye, dental, and podiatry examinations. At the end of the appointment, the patient and the RD set goals for their diabetes self-management. The patient was then referred to two diabetes education classes. The purpose of this study was not related to patient counseling techniques, but rather sought to measure how baseline empowerment level relates to baseline diet quality and A1C level prior to counseling. Regular counseling techniques or methods were not altered in any way during the study. After the initial counseling session, the primary researcher abstracted the medical records for demographic characteristics (age, sex, marital status, level of education obtained, employments status, family history of DM), insurance information (primary only), medical characteristics (diabetes diagnosis code (ICD-10), diabetes duration, medications used to treat type II diabetes), and laboratory test results (A1C level). Lab draws occur as standard practice, not as requested by the
researcher for the purposes of the study. Standard care was not altered for the purposes of the study in any way.

Participants

Subjects included adult African American patients with T2DM receiving treatment at Sumter Medical Specialists, PA, located in Sumter, SC. A minimum study enrollment of 50 individuals was targeted to take into account a potential of 25% of questionnaires missing data, resulting in a final sample size of 35 patients. Inclusion criteria included having a recent A1C level (drawn within the last two month period), a clinic appointment between December 2015 and February 2016, and English speaking. Pregnant or lactating were excluded from the study.

Demographic Variables

Age in years, gender, and marital status were obtained. Marital status was classified as married, single, or undefined. Educational attainment was classified as less than high school, high school graduate, some college, or college graduate. History of diabetes education was determined by asking patients to choose, “Yes, I have received diabetes education in the past” or, “No, I have not received diabetes education in the past.” If yes, the patient was asked to respond, “Yes, I have participated in goal setting related to my diabetes in the past” or “No, I have not participated in goal setting related to my diabetes in the past.” Medications for diabetes were classified as oral agents alone, insulin therapy alone, or a combination of oral agents and insulin therapy. Duration of time in years since diabetes diagnosis was obtained from the medical record.
Instrumentation

**Anthropometric Variables.** A Scale-Tronix 6102 scale was used to measure weight. This scale is compatible with stretchers, wheelchairs, chairs, and stand-on weighing. The scale also has a 1,000-pound capacity, automatic zero after each patient, and digital display of weight. Height was measured using a Seca Stadiometer model 274. BMI was calculated as weight in Kg/height in m$^2$. Blood pressure will be measured using a WelchAllyn Vital Signs Monitor 6000 Series.

**Hemoglobin A1C (A1C).** A1C levels were categorized as 1) good glycemic control if A1C level is <7.5% and 2) poor glycemic control if A1C level is >/= 7.5% (American Diabetes Association, 2015).

**Diabetes Empowerment Scale-28 (DES-28).** The DES-28 was used to measure diabetes related psychosocial self-efficacy. The DES-28 is a scale designed by Anderson et al. (2000), which measures three subscales from the 28-item scale. Subscales include: managing the psychosocial aspects of diabetes (9 items), assessing dissatisfaction and readiness to change (9 items), and setting and achieving goals (10 items). The higher the score achieved on the DES-28 the greater diabetes empowerment. Tool reliability and validity was previously discussed in the review of literature.

**Diet Intake and Healthy Eating Index (HEI).** Dietary intake data was collected and analyzed using the Automated Self-Administered 24-hour Recall (ASA24) system, developed by the National Cancer Institute, Bethesda, MD, which is a validated web-based tool ("ASA24," 2014). This tool is available for public use through the National Cancer Institute. This version of the ASA24 assessed intake over the past 24-hour period and includes questions related to portion size, food brand, fluid intake, location of meal,
whom meal was eaten with, whether a secondary activity took place during the meal (ex. TV, computer use). It was administered in a web-based user-friendly format ("ASA24," 2014). The RD conducted the 24-hour dietary recall and as the respondent dictated the recall, the RD entered the reported intake into ASA24. The research website then analyzed the intake data for its individual-nutrient levels based on the USDA’s Food and Nutrient Database for Dietary Studies (FNDDS) (" USDA Food and Nutrient Database for Dietary Studies 2011-2012 "). These nutrient values (in serving size form) were then used to determine the HEI score of each participant.

The HEI-2010, the latest version of the Healthy Eating Index, measures diet quality independent of quantity against the US Dietary Guidelines (Guenther et al., 2014). The HEI scores 12 components of the diet for a maximum score of 100. Nine components measure adequacy (whole fruit, total fruits, total vegetables, greens and beans, whole grains, dairy, total protein foods, seafood and plant proteins, and fatty acids) and three, measure moderation (refined grains, sodium, and empty calories). The scores are expressed per 1,000 calories and can be computed using a pre-programmed SAS Macros (Guenther et al., 2014). A score is also assigned to each food category within each HEI component assessed. Total fruit is assigned 5 points if intake is equal to or greater than .8 cups per 1,000 calories; whole fruit is assigned 5 points if the intake is equal or more than 0.4 cups per 1000 kcal; total vegetables receives 5 points if the intake is equal or more than 1.1 cups per 1000 kcal; dark green, orange vegetables and legumes are given 5 points if intake is equal or greater than 0.4 cups per 1000 kcal; and grains are assigned 5 points if intake is equal or greater than 3.0 ounces per 1000 kcal; whole grains are assigned 5 points if consumption is equal or greater than 1.5 ounces per 1000 kcal.
Milk is given 10 points if intake is equal or greater than 1.3-cup equivalents per 1000 kcal. Meat and beans are allocated 10 points if consumption was equal or higher than 2.5 ounces per 1000 kcal. Oils are assigned 10 points if intake was equal or higher than 12 grams per 1000 kcal. A score of zero is assigned if no items from any particular category are consumed. The overall scale ranges from 0 to 100 points (Guenther et al., 2014). Tool reliability and validity was previously discussed in the review of literature.

Analysis

Descriptive statistics were calculated for socio-demographic data and diabetes characteristics utilizing IBM SPSS statistics version 21. To determine the HEI scores, food frequency data from the ASA24 were uploaded into SAS for analysis using a SAS Macros provided by the NIH. Pearson correlations were run between DES-28 and A1C levels, HEI, BMI, age, and DM duration among participants. An alpha level of .05 was used to establish significance for all statistical procedures.
CHAPTER IV

RESULTS

Demographics

The study sample consisted of 35 African American adults with T2DM. Socio-demographics are summarized in Table 1. The majority of participants were 60 years of age or older (n = 21), female (n = 24), unemployed (n = 26), married (n = 22), and had an education not exceeding high school (n = 26). There was an even split between private and government insurance (51.5% and 48.5% respectively).

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;39</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>30-39</td>
<td>1</td>
<td>2.9</td>
</tr>
<tr>
<td>40-49</td>
<td>4</td>
<td>11.4</td>
</tr>
<tr>
<td>50-59</td>
<td>9</td>
<td>25.7</td>
</tr>
<tr>
<td>60-69</td>
<td>14</td>
<td>40.0</td>
</tr>
<tr>
<td>70-79</td>
<td>6</td>
<td>17.1</td>
</tr>
<tr>
<td>&gt;80</td>
<td>1</td>
<td>2.9</td>
</tr>
<tr>
<td>Missing</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>11</td>
<td>31.4</td>
</tr>
<tr>
<td>Female</td>
<td>24</td>
<td>68.6</td>
</tr>
<tr>
<td>Missing</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; High school</td>
<td>7</td>
<td>20.0</td>
</tr>
<tr>
<td>High school graduate</td>
<td>19</td>
<td>54.3</td>
</tr>
<tr>
<td>Some college</td>
<td>5</td>
<td>14.3</td>
</tr>
<tr>
<td>College graduate</td>
<td>4</td>
<td>11.4</td>
</tr>
<tr>
<td>Missing</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td><strong>Employment</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed</td>
<td>9</td>
<td>25.7</td>
</tr>
<tr>
<td>Unemployed</td>
<td>26</td>
<td>74.3</td>
</tr>
<tr>
<td>Missing</td>
<td>0</td>
<td>0.0</td>
</tr>
</tbody>
</table>
As summarized in Table 2, 80% of participants had a family history of diabetes. Largely, participants had a maternal history of diabetes (68.5%), of those 22.9% had a family history in both parents. The study had an even sampling of patients with a history of receiving previous diabetes education and those who had no previous education. Of those with a history of previous diabetes education, only 31.4% had participated in making diabetes self-management goals as a part of the diabetes education process.

Diabetes duration from the time of diagnosis was distributed over a period of 49 years, with a majority of participants falling between the range of 0 and 20 years (n = 22). The largest proportion of the participants (n = 15) were on combination drug therapy (oral hypoglycemic agents and insulin), followed by oral medication alone (n = 11), insulin therapy alone (n = 8), and lifestyle modification alone (n = 1).

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family History of Diabetes Mellitus</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>28</td>
<td>80.0</td>
</tr>
<tr>
<td>No</td>
<td>7</td>
<td>20.0</td>
</tr>
<tr>
<td>Missing</td>
<td>0</td>
<td>0.0</td>
</tr>
</tbody>
</table>
Table 2. Diabetes Characteristics of the Full Sample (continued) (n = 35)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Side of Family</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother</td>
<td>16</td>
<td>45.7</td>
</tr>
<tr>
<td>Father</td>
<td>4</td>
<td>11.4</td>
</tr>
<tr>
<td>Both</td>
<td>8</td>
<td>22.9</td>
</tr>
<tr>
<td>N/A</td>
<td>7</td>
<td>20.0</td>
</tr>
<tr>
<td>Missing</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Previous Diabetes Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>17</td>
<td>51.4</td>
</tr>
<tr>
<td>No</td>
<td>18</td>
<td>48.6</td>
</tr>
<tr>
<td>Missing</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Previous Diabetes Education with Goal Setting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>11</td>
<td>31.4</td>
</tr>
<tr>
<td>No</td>
<td>24</td>
<td>68.6</td>
</tr>
<tr>
<td>Missing</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Diabetes Duration (years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 - 9</td>
<td>12</td>
<td>34.3</td>
</tr>
<tr>
<td>10 - 19</td>
<td>10</td>
<td>28.6</td>
</tr>
<tr>
<td>20 - 29</td>
<td>8</td>
<td>22.8</td>
</tr>
<tr>
<td>30 - 39</td>
<td>4</td>
<td>11.4</td>
</tr>
<tr>
<td>40 - 49</td>
<td>1</td>
<td>2.9</td>
</tr>
<tr>
<td>Missing</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Medication Type</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oral</td>
<td>11</td>
<td>31.4</td>
</tr>
<tr>
<td>Insulin</td>
<td>8</td>
<td>22.9</td>
</tr>
<tr>
<td>Combination</td>
<td>15</td>
<td>42.9</td>
</tr>
<tr>
<td>None</td>
<td>1</td>
<td>2.9</td>
</tr>
<tr>
<td>Missing</td>
<td>0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Descriptive Statistics of Variables

Descriptive statistics for the DES-28, HEI, BMI, and A1C levels can be seen in Table 3. All participants completed the DES-28 scale, 24-hour dietary recall (reflected in HEI Score), and had an A1C level and BMI data available in the electronic medical record. As a group, the mean scores on the DES-28 fell at the middle of the range.
(M = 3.87, SD = .52). Participants (n = 35) scored similarly on the DES subscales; Setting and Achieving Goals subscale of the DES-28, M = 3.94, SD = .61 and scored lowest on the Managing the Psychosocial Aspects of Diabetes subscale, M = 3.79, SD = .62.

Mean HEI scores also fell at the middle of range, M = 50.18, SD = 11.75 which indicated poor diet quality (score < 51), and was lower that the mean score for the US population (M = 55.4, SD = 0.7). A1C levels of participants ranged from 4.9 to 14% with the average greater than the recommended level of 7.5% (M = 8.63, SD = 2.32). Mean BMI of participants (M = 36.72, SD = 8.95) was high and is classified as obesity class II (BMI 35 kg/m² and 39.9 kg/m²). A BMI greater than 30 kg/m² is considered obese. Class I obesity range is from between 30 kg/m² to 34.9 kg/m² and class III is greater than 40 kg/m².

### Table 3. Descriptive Statistics for DES, HEI, BMI, A1C (n = 35)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>n</th>
<th>Means ± SD (range)</th>
<th>Median</th>
<th>Range</th>
<th>Max Possible Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total DES Score (28 items)</td>
<td>35</td>
<td>3.87 ± .52</td>
<td>3.92</td>
<td>2.07</td>
<td>5</td>
</tr>
<tr>
<td>DES Subscales</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Managing the Psychosocial Aspects of Diabetes (9 items)</td>
<td>35</td>
<td>3.79 ± .62</td>
<td>3.77</td>
<td>2.66</td>
<td>5</td>
</tr>
<tr>
<td>Assessing Dissatisfaction and Readiness to Change (9 items)</td>
<td>35</td>
<td>3.87 ± .53</td>
<td>4.00</td>
<td>1.88</td>
<td>5</td>
</tr>
<tr>
<td>Setting and Achieving Diabetes Goals (10 items)</td>
<td>35</td>
<td>3.94 ± .61</td>
<td>4.00</td>
<td>2.80</td>
<td>5</td>
</tr>
<tr>
<td>Healthy Eating Index Score</td>
<td>35</td>
<td>50.18 ± 11.75</td>
<td>48.36</td>
<td>47.39</td>
<td>100</td>
</tr>
<tr>
<td>Hemoglobin A1C</td>
<td>35</td>
<td>8.63 ± 2.32</td>
<td>8.20</td>
<td>9.10</td>
<td>N/A</td>
</tr>
<tr>
<td>Body Mass Index</td>
<td>35</td>
<td>36.72 ± 8.95</td>
<td>35.82</td>
<td>47.89</td>
<td>N/A</td>
</tr>
</tbody>
</table>
In addition to the HEI score, components of the HEI were explored. In Table 4, mean caloric intake, adequacy and moderation measures are provided. Average caloric intake was equivalent to 15.41 calories per kilogram of body weight of the participants. Participants achieved <50% of the total possible score in the following categories of the adequacy components: Whole Fruit, Greens and Beans, Whole Grains, Dairy and Seafood/Plant Proteins. When scoring moderation, participants also scored <50% of the total possible score for Sodium, meaning, they had higher than recommended intake of sodium containing foods.

**Table. 4 HEI Component Scores (n = 35)**

<table>
<thead>
<tr>
<th>Category</th>
<th>n</th>
<th>Mean ± SD</th>
<th>Mean Kcal/kg</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kilocalories</td>
<td>35</td>
<td>1558.93 ± 684.96</td>
<td>15.41</td>
<td>N/A</td>
</tr>
<tr>
<td>Measuring Adequacy Component</td>
<td>n</td>
<td>Mean ± SD</td>
<td>Max Possible Score</td>
<td>Standard for Max Score</td>
</tr>
<tr>
<td>Whole Fruit</td>
<td>35</td>
<td>2.15 ± 2.35</td>
<td>5</td>
<td>≥ 0.8 cup / 1,000 kcal</td>
</tr>
<tr>
<td>Total Fruits</td>
<td>35</td>
<td>2.79 ± 2.17</td>
<td>5</td>
<td>≥ 0.4 cup / 1,000 kcal</td>
</tr>
<tr>
<td>Total Vegetables</td>
<td>35</td>
<td>3.12 ± 1.62</td>
<td>5</td>
<td>≥ 1.1 cup / 1,000 kcal</td>
</tr>
<tr>
<td>Greens and Beans</td>
<td>35</td>
<td>1.32 ± 2.09</td>
<td>5</td>
<td>≥ 0.2 cup / 1,000 kcal</td>
</tr>
<tr>
<td>Whole Grains</td>
<td>35</td>
<td>2.14 ± 3.26</td>
<td>10</td>
<td>≥ 1.5 ounces / 1,000 kcal</td>
</tr>
<tr>
<td>Dairy</td>
<td>35</td>
<td>3.26 ± 3.24</td>
<td>10</td>
<td>≥ 1.3 cup / 1,000 kcal</td>
</tr>
<tr>
<td>Total Protein Foods</td>
<td>35</td>
<td>4.89 ± .37</td>
<td>5</td>
<td>≥ 2.3 ounces / 1,000 kcal</td>
</tr>
<tr>
<td>Seafood/Plant Proteins</td>
<td>35</td>
<td>1.67 ± 2.13</td>
<td>5</td>
<td>≥ .8 ounces / 1,000 kcal</td>
</tr>
<tr>
<td>Fatty Acids</td>
<td>35</td>
<td>5.61 ± 3.60</td>
<td>10</td>
<td>≥ 2.5</td>
</tr>
</tbody>
</table>
### Table 4 HEI Component Scores (continued) (n = 35)

<table>
<thead>
<tr>
<th>Measuring Moderation Component</th>
<th>n</th>
<th>Mean ± SD</th>
<th>Max Possible Score</th>
<th>Standard for Max Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refined Grains</td>
<td>35</td>
<td>5.25 ± 3.69</td>
<td>10</td>
<td>≥ 4.3 ounces / 1,000 kcal</td>
</tr>
<tr>
<td>Sodium</td>
<td>35</td>
<td>2.4 ± 2.82</td>
<td>10</td>
<td>≥ 2 grams / 1,000 kcal</td>
</tr>
<tr>
<td>Empty Calories</td>
<td>35</td>
<td>15.53 ± 4.87</td>
<td>20</td>
<td>≥ 50% of energy</td>
</tr>
</tbody>
</table>

### Bivariate Correlations

Bivariate correlations between DES-28 and HEI, A1C, BMI, age, and diabetes duration can be seen in Table 5. The DES-28 and DES-28 subscale III had a positive, significant correlation with HEI with $r^2$ values of .143 and .175 respectively. No significant correlations were found between DES-28 and A1C, BMI, age, and diabetes duration. However, upon segmenting the sample by, “no previous education,” there was a significant, positive correlation between HEI and no previous diabetes education.

### Table 5. Bivariate Correlations Between DES-28 and HEI, A1C, BMI, Age, & Diabetes Duration

<table>
<thead>
<tr>
<th>Factor</th>
<th>DES-28</th>
<th>DES-28 Subscale I.</th>
<th>DES-28 Subscale II.</th>
<th>DES Subscale III.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthy Eating Index (HEI)</td>
<td>.379*</td>
<td>0.145</td>
<td>0.319</td>
<td>0.419*</td>
</tr>
<tr>
<td>Hemoglobin A1C (A1C)</td>
<td>-0.171</td>
<td>-0.075</td>
<td>-0.074</td>
<td>-0.273</td>
</tr>
<tr>
<td>Body Mass Index (BMI)</td>
<td>0.198</td>
<td>0.181</td>
<td>0.258</td>
<td>0.160</td>
</tr>
<tr>
<td>Age</td>
<td>0.111</td>
<td>0.02</td>
<td>-0.001</td>
<td>0.228</td>
</tr>
<tr>
<td>Diabetes Duration</td>
<td>-0.165</td>
<td>-0.125</td>
<td>0.008</td>
<td>-0.282</td>
</tr>
</tbody>
</table>

Note: Correlations marked with an asterisk (*) were significant at $p < 0.05$
CHAPTER V

DISCUSSION

The purpose of this study was to determine if at baseline, diabetes empowerment was related to diet quality and glycemic control and in a Southern African American population. Diabetes self-empowerment as measured by the DES-28 was found to have a positive, significant association with diet quality as measured by the HEI. Patient self-empowerment was not found to correlate with glycemic control as measured by A1C levels prior to DSME. The lack of correlation between patient empowerment and glycemic control may be related to the fact that the scale was administered prior to DSME. It should also be noted that the DES-28 might require refinement for use in US Southern African Americans. Previous literature has indicated that different African American groups may vary in their perception of empowerment (Kleier & Dittman, 2014). In addition, a limitation of this pilot study is the sample size and potential unidentified collection bias. It is important to remember that this is baseline data, not data obtained after an empowerment intervention.

The main inconsistency in the findings of this study when compared to the current literature regarding empowerment and diabetes is that self-empowerment did not correlate with glycemic control. Baseline empowerment in African Americans with diabetes was associated with glycemic control in one study however; the study was comprised predominantly US Caribbean African Americans as compared to this study with Southern African Americans (Kleier & Dittman, 2014). Also, all data in the Kleier & Dittman (2014) study was based on self-reported diagnosis of DM, which limits the reliability of the results. Six other international cross-sectional studies have also shown a
strong positive association between diabetes self-empowerment and glycemic control (Anderson et al., 1995; Anderson et al., 2005; D'Souza et al., 2015; Rossi et al., 2015; Tol, Shojaeezadeh, et al., 2012; Yang et al., 2015).

No research to our knowledge has evaluated the HEI in African Americans with T2DM. Of note, many of the scores for the food categories that measured adequacy and moderation of the participant’s diets were less than 50% of the maximum score. Interestingly, the components with lower HEI scores were those that affect glycemic control, such as whole fruits, whole grains, and high fiber plant foods. These categories should be a focus of future culturally competent DSME in Southern African Americans. Also of note, is that while diet quality correlated with self-empowerment, diet quality was still considered poor, and slightly below the mean HEI score for the overall US population. Improvement of diet quality through empowerment counseling may be an impactful way to improve glycemic control in this population. Empowerment may have correlated with HEI in part because a higher percentage of pre-intervention sample participants had close relatives with diabetes and therefore would have been exposed to concepts related to improved diet quality. Empowerment may not have correlated with A1C level because subjects had not received the necessary education regarding diabetes self-monitoring behaviors through DSME. The goal setting subscale of the DES-28 scale also showed a positive, significant association with the HEI, and this is consistent with the study conducted by Baptiste-Roberts (2007) that found participants with a family history of diabetes were more likely to have better diets and more health protective behaviors. Meaning, this population may be successful in setting basic dietary goals independently of provider intervention, however, goal setting and dietary intervention
specific to glycemic control may be beyond the capacity of the patient who has not received culturally competent, empowerment centered DSME.

Interestingly, an increased BMI with low self-report of kilocalories per kilogram intake was found. This may be related to underreporting of intake in this small sample, or may reflect a sedentary lifestyle, when considering their BMI status. This finding supports inclusion of physical activity education as a focus of future weight reduction efforts. Consequently, a large majority of the patients were on insulin or combination oral/insulin therapy, which does lead to greater storage of glucose, and can potentiate weight gain in people with diabetes. So, despite relatively low caloric intake, high BMI levels persist.

**Limitations**

Results should be interpreted with caution due to the convenience sampling method used, small sample size, and low $r^2$ values of statistically significant correlations. Response bias may have also occurred, as the DES-28 was self-administered, so those with lower literacy may have struggled with the double negative language used in the questionnaire. Additionally, diet quality was measured in part by obtaining a 24-hour recall from the patient, which is susceptible to under-reporting of intake and inaccuracy of reporting as compared to tools such as food frequency questionnaires which measure the frequency of consumption of particular food items.

**Future Implications**

To date this is the only study the researcher is aware of that has examined the relationship between empowerment, diet quality and glycemic control in Southern African Americans with T2DM. Further research is needed to establish these
relationships using a larger participant sample. A larger sample would provide the researcher with the ability to validate the DES-28 in Southern African Americans with T2DM.

Future research should also examine the change in self-empowerment, glycemic control, and diet quality after a DSME intervention in this population. Concurrently, Southern African Americans perceptions of the level of shared decision-making about their care and its relationship to feelings of empowerment should be explored. There is some literature reporting African Americans view Caucasian providers as unengaged in their care and therefore, less trustworthy. Taking this into consideration, Southern health care providers in rural areas could use future findings to modify their counseling techniques to empower rather than disempower patients.
CHAPTER VI

CONCLUSIONS

This study demonstrates that diabetes self-empowerment measured by the DES-28 is positively associated with diet quality as measured by the HEI, but not with glycemic control as measured by A1C level in Southern African Americans with T2DM. Additionally it demonstrated the applicability of the HEI-2010 as a means to evaluate diet quality in patients with T2DM. The HEI scores revealed that diet quality in Southern African Americans with T2DM is low, and that areas of lowest diet quality are those most commonly associated with poor glycemic control. This revealed the need for culturally tailored DSME. For the nutrition professional or diabetes educator to be effective with patients in this population subset they should focus on patient consumption of whole grains, whole fruits, and high fiber plant foods more intensely, as those three groups were among the HEI components with the lowest scores. Future research should explore the effect of utilizing the strategy of empowerment as an intervention on glycemic control and diet quality.
CHAPTER VII

REFERENCES


Freedman, L. S., Guenther, P. M., Krebs-Smith, S. M., & Kott, P. S. (2008). A population's mean Healthy Eating Index-2005 scores are best estimated by the


http://care.diabetesjournals.org/content/25/7/1159.full.pdf


http://care.diabetesjournals.org/content/26/11/3048.full.pdf


http://care.diabetesjournals.org/content/26/10/2817.full.pdf
APPENDIX A.

IRB Approval
IRB PROTOCOL #: IRB16047
TITLE OF PROJECT: Using the DES-SF Tool to Determine the Relationship between Diabetes Self-Empowerment, Diet Quality and Glycemic Control in a Southern African American Population
RESEARCHER OF RECORD: Makala Smith
CO-RESEARCHERS: . Simone Camel
FACULTY ADVISOR: 
EXEMPTION DATE: 10/15/15
EXEMPTION CATEGORY: Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior unless (a) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; or (b) any disclosure of the human subjects’ responses outside the research could reasonably place the subject at risk of criminal or civil liability or be damaging to the subjects’ financial standing, employability or reputation. [45CFR46(b)(2)]

Research involving children (subjects who have not attained the age of 18 years) is not exempt unless the research involves only the observation of public behavior and the researchers do not participate or impact the activities being observed. [45CFR46.401(b)]

The Request for Review of Research Involving Human Subjects identified above has been reviewed by the Winthrop University Institutional Review Board (IRB) and has been determined to be exempt from IRB review. You may begin your research on or after the Exemption date show above.

A Request for Modification of Previously Approved or Exempt Protocol must be completed by the researcher and submitted to the IRB for review for any proposed changes or modifications to the protocol. IRB approval must be received prior to amended changes or modifications being implemented by the researcher. These changes may include a change in a survey instrument, the addition, or deletion of a
research site, a change in personnel, a change in methodology or a change in the Researcher of Record.

Use the form *Adverse Event Report* to report any negative consequences that occur as a result of participation in a research project. An “adverse event” or “adverse experience” is an undesirable and unintended, though not necessarily unanticipated, injury or physical or emotional consequence to a human subject. “Unanticipated Problems” may or may not include specific events experienced by individual subjects, but are developments within the research activity that suggest a potential for increased risks to subjects or others.

Aaron Hartel, Ph.D., Chair
Winthrop University Institutional Review Board
803-323-4942
[hartela@winthrop.edu](mailto:hartela@winthrop.edu)

Deborah Broome
Sponsored Programs and Research
803-323-2398
[broomed@winthrop.edu](mailto:broomed@winthrop.edu)
You are invited to take part in a research study. Before you decide to be a part of this study, you need to understand the risks and benefits. This consent form provides information about the research study. I will be available to answer your questions and provide further explanations. If you take part in this research study, you will be asked to sign this consent form. Your decision to take part in this study is voluntary. You are free to Choose whether or not you will take part in the study. If you should decide to participate, you may withdraw from the study at any time.

Purpose of the research study:
The purpose of this research is to determine if patient empowerment is related to diet quality and glycemic control in southern African American patients at a clinic in the Sumter, SC area.

Procedures or methods to be used in the study:
This study seeks to measure if diabetes empowerment is related to diet quality and glycemic control in participants over a 12 week period. You were selected for the this study through the clinic scheduling system. After signing the informed consent, you will be given a packet containing one questionnaire. The front page of the questionnaire explains how to go about completing it. The questionnaire measures diabetes empowerment. You will be given ample time to finish the questionnaire (estimated time to complete the questionnaire is 15-20 minutes). After completion of the diabetes empowerment scale-short form (DES-28), you will be called back by a medical assistant to be weighed, and have height and blood pressure measured. The medical assistant is trained in this role, and these events occur standardly at each appointment to Sumter Medical Specialists, PA. After your height, weight, and blood pressure is obtained, the medical assistant will bring you to be seen by the primary researcher (registered dietitian) in a private patient room. The researcher will go over the questionnaire with you to check for unanswered assessment questions on the DES-28. The researcher will also answer any questions related to the meaning of questions or words on the questionnaire. Aproximately 30-45
minutes will be spent going over the questionnaire, and conducting an initial assessment. The latter is already a part of standard practice. The purpose of this study is not related to counseling techniques, but rather seeks to measure how baseline empowerment levels relate to baseline diet quality and A1C levels prior to counseling. Regular counseling techniques and methods will not be altered in any way during the study. After the initial counseling session, the primary researcher will abstract other data from your medical chart for demographic characteristics (age, sex, race, marital status, level of education), insurance information (primary only), medical characteristics (diabetes diagnosis code (ICD-10), diabetes duration, medications used to treated type II diabetes), and laboratory test results (glycosylated hemoglobin) and 24 hour dietary recall from initial assessment. The laboratory results will be abstracted for the two months prior to study enrollement and will occur prior to the initial visit with the participant. Lab draws will occur as standard practice, not as requested by the researcher for the purposes of the study. It is also standard practice that the registered dietitian will meet with you for follow up appointments, including diabetes education classes (2) and follow up visits as needed. Standard care will not be altered for the purposes of the study in any way.

**Possible Risks/Benefits Associated with Participating in Study:**
I understand that the biggest risk involved in the study is the possibility of personal information provided by me to the research staff being overheard or read by others. Furthermore I understand that there is a chance someone other than myself and the researcher may observe my height and or bone mineral density determinations. The research staff has informed me that they plan to be sure that all of the information I give them will not have my name attached, but only a number, which the director of the study knows. No name will be used on any information, only the code number. Only the director of the study will have the key, which matches the name of the subject with the code number. In addition family members and other project participants will not be present when questions are being answered or when height and bone mineral density are measured.

**Possible Costs/Compensation Associated with Participating in Study:**
I understand that there will be no cost to participants and that participants in the project will not receive money for their participation. I understand that there will be no charges for the time taken to complete the two questionnaires required of the participants. However, my regularly scheduled office visit with the registered dietitian will be billed as an initial visit with standard billing codes.

**Number of questions in the survey/questionnaire and anticipated time to complete the survey/questionnaire:**
You will have to individually one questionnaire, assessing diabetes empowerment level. The questionnaire given is the Diabetes Empowerment Scale, which is a twenty-eight item questionnaire. The questionnaire will take approximately 15-20 minutes to complete, each participant will be given as much time as needed to complete the questionnaires.
Right to withdraw from the study:
I understand that my participation in this research study is voluntary. I understand that I may withdraw from the study at any time for any reason. If I decide not to start the study or if I withdraw from the study, I will receive no penalty.

Privacy of records or other data collected in the study:
I understand that my records are confidential and will only be identified by a randomly assigned code number for which only authorized research personnel have the key, which matches my name with the number. In addition, my records will not be released to anyone except as needed for statistical evaluations and publication in scientific literature. No publication shall reveal my name or contain any identifying information.

Questions – contact information:
If you have any questions about this study, you may contact me using my Winthrop email account: katuscakm2@winthrop.edu

or through my faculty advisor:
Address: 701 Oakwood Ave, Rock Hill, SC 29730
Work Phone: 803-323-4552 Email: camels@winthrop.edu

You may also contact:
Deborah Broome, Compliance Officer 803-323-2398
broomed@winthrop.edu
Sponsored Programs and Research
Winthrop University
Rock Hill, SC 29733

Signatures:
By signing this consent agreement, you agree that you have read this informed consent agreement, you understand what is involved, and you agree to take part in this study. You will receive a copy of this consent form.

______________________________________________________________  ________________
Signature of Participant Date

______________________________________________________________
Signature of Researcher Date
Carolina Diabetes & Kidney Center
Notice of Privacy Practices

THIS NOTICE DESCRIBES HOW MEDICAL INFORMATION ABOUT YOU MAY BE USED AND DISCLOSED AND HOW YOU CAN GET ACCESS TO THIS INFORMATION. PLEASE REVIEW IT CAREFULLY.

A. OUR COMMITMENT TO YOUR PRIVACY

Our practice is dedicated to maintaining the privacy of your protected health information (PHI). In conducting our business, we will create records regarding you and the treatment and services we provide to you. We are required by law (the Health Insurance Portability and Accountability Act of 1996 or HIPAA) to maintain the confidentiality of health information that identifies you. We also are required by law to provide you with this notice of our legal duties and the privacy practices that we maintain in our practice concerning your PHI. By federal and state law, we must follow the terms of the notice of privacy practices that we have in effect at the time.

We realize that these laws are complicated, but we must provide you with the following important information:

- How we may use and disclose your PHI
- Your privacy rights concerning your PHI
- Our obligation concerning the use and disclosure of your PHI

The terms of this notice apply to all records containing your PHI that are created or retained by our practice. We reserve the right to revise or amend this Notice of Privacy Practices. Any revision or amendment to this notice will be effective for all of your records that our practice has created or maintained in the past, and for any of your records that we may create or maintain in the future. Our practice will post a copy of our current Notice in our offices in a visible location at all times, and you may request a copy of our most current Notice at any time.

B. IF YOU HAVE ANY QUESTIONS ABOUT THIS NOTICE, PLEASE CONTACT:

Privacy Officer 635 W. Wesmark Blvd. Sumter, SC 29150 Phone: (803) 469-7500

C. Uses and Disclosures of Health Information

For Treatment: We may use medical information about you to provide you with medical treatment or services. We may disclose medical information about you to doctors, nurses, technicians, medical students, or other health care providers who are involved in taking care of you now or in the future.

We may also use health information about you to call you or send you a letter to remind you about an appointment, to follow up with diagnostic test results, or to provide you with information about other treatment and care that could benefit your health.

For payment: We may use and disclose medical information about you so that the treatment and services you receive at the hospital may be billed and payment may be collected from you, an insurance company or a third party.

For healthcare operations: Our practice may use and disclose your PHI to operate our business. As examples of the ways in which we may use and disclose your information for our operations, our practice may use your PHI to evaluate the quality of care you received from us, or to conduct cost-management and business planning activities for our practice. Every effort will be made to assure anonymity.

D. Other Disclosures

Business Associates: We will share your PHI with third party associates that perform various activities for the clinic. Whenever any arrangement between our clinic and a business associate involves the use of disclosure of your PHI, we will have a written contract that contains terms that will protect the privacy of your PHI.

Communication with others involved with your care: Our health professionals may, in the event you are incapacitated or in an emergency circumstance, using their judgment, disclose to a family member, or other relative, close personal friend or any other person you identify, health information directly relevant to that person's involvement in your care or payment related to your care.

Thursday, September 11, 2014
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Research: Under certain circumstances, we may use and disclose health information about you from your medical record for research purposes. All research projects, however, are subject to a special approval process designed to protect the privacy of your health information.

Required by law: We may use or disclose your PHI to the extent that the use or disclosure is required by law. The use or disclosure will be made in compliance with the law and will be limited to the relevant requirements of the law. You will be notified, as required by law, of any such disclosures.

Public Health Risks: Our practice may disclose your PHI to public health authorities that are authorized by law to collect information for the purpose of:

- Maintaining vital records, such as births and deaths
- Reporting child abuse or neglect
- Preventing or controlling disease, injury or disability
- Notifying a person regarding potential exposure to a communicable disease
- Notifying a person regarding a potential risk for spreading or contracting a disease or condition
- Reporting reactions to drugs or problems with products or devices
- Notifying individuals if a product or device they may be using has been recalled or withdrawn, needs repairs or replacement
- Notifying appropriate government agencies regarding the potential abuse or neglect of an adult patient (including domestic violence); however, we will only disclose this information if the patient agrees or we are required or authorized by law to disclose this information
- Notifying your employer under limited circumstances related primarily to workplace injury or illness or medical surveillance

Health Oversight Activities: Our practice may disclose your PHI to a health oversight agency for activities authorized by law. Oversight activities can include, for example, investigations, inspections, audits, surveys, licensure and disciplinary actions; civil, administrative, and criminal procedures or actions; or other activities necessary for the government to monitor government programs, compliance with civil rights laws and the health care system in general.

Legal Proceedings: We may disclose your PHI in the course of any judicial or administrative proceeding, in response to an order of a court or administrative tribunal, in certain conditions in response to a subpoena, discovery request or other lawful purpose.

Law Enforcement: We may release PHI if asked to do so by a law enforcement official:

- Regarding a crime victim in certain situations, if we are unable to obtain the person's agreement.
- Concerning a death we believe has resulted from criminal conduct.
- Regarding criminal conduct at our offices.
- In response to a warrant, summons, court order, subpoena or similar legal process.
- To identify, locate or suspect, material witness, fugitive or missing person.
- In an emergency, to report a crime (including the location or victim(s) of the crime, or the description, identity or location of the perpetrator).

Deceased Patients: Our practice may release PHI to a medical examiner or coroner to identify a deceased individual or to identify the cause of death. If necessary, we also may release information in order for funeral directors to perform their jobs.

Organ and Tissue Donation: Our practice may release your PHI to organizations that handle organ, eye or tissue procurement or transplantation, including organ donation banks, as necessary to facilitate organ or tissue donation and transplantation if you are an organ donor.

Research: Our practice may use and disclose your PHI for research purposes in certain limited circumstances. We will obtain your written authorization to use your PHI for research purposes except when: (a) our use or disclosure was approved by an Institutional Review Board or a Privacy Board; (b) we obtain the written agreement of a researcher that (i) the information being sought is necessary for the research study; (ii) the use or disclosure of your PHI is being used only for the research; and (iii) the researcher will not remove any of your PHI from our practice or (c) the PHI sought by the researcher only relates to decedents and the researcher agrees in writing that the use or disclosure is necessary for the research and, if we request it, to provide us with proof of death prior to access to the PHI of the decedents.

Serious Threats to Health or Safety: Our practice may use and disclose your PHI when necessary to reduce or prevent a serious threat to your health and safety or the health and safety of another individual or the public. Under these circumstances, we will only make disclosures to a person or organization able to help prevent or lessen the threat.

Military: Our practice may disclose your PHI if you are a member of the U.S. Armed Forces, a veteran, or a member of foreign military forces for activities deemed necessary by appropriate military command authorities, including the Department of Veteran's Affairs for the purpose of your eligibility for or entitlement to certain benefits provided by law.

Thursday, September 11, 2014
National Security: Our practice may disclose your PHI to federal officials for national security activities authorized by law. We also may disclose your PHI to federal officials in order to conduct investigations.

Inmates: Our practice may disclose your PHI to correctional institutions or law enforcement officials if you are an inmate or under the custody of a law enforcement official. Disclosure for these purposes would be necessary: (a) for the institution to provide health care services to you (b) for the health, safety and security of the institution, and its officers and employees and/or (c) to protect your health and safety or the health and safety of other individuals.

Workers' Compensation: Our practice may release your PHI for workers' compensation and similar programs to the extent necessary to comply with applicable laws.

Required Uses and Disclosures: Under the law, we must make disclosures to you and, when required by the Secretary of the Department of Health and Human Services, to investigate or determine our compliance with the requirement of Section 164.500 et. seq.

We will not use information in your records for marketing purposes. Other uses and disclosures from your medical record will be made only with your written authorization or approval.

E. YOUR RIGHTS REGARDING YOUR PHI

You have the following rights regarding the PHI that we maintain about you:

1. Confidential Communications. You have the right to request that our practice communicate with you about your health and related issues in a particular manner or at a particular time and place. For instance, you may ask that we contact you at home, rather than at work. If we agree to your request in writing, we will accommodate reasonable requests. You do not need to give a reason for your request.

2. Requesting Restrictions. You have the right to request a restriction on our use or disclosure of your PHI for treatment, payment, or health care operations. Additionally, you have the right to request that we restrict our disclosure of your PHI to only certain individuals involved in your care or the payment for your care, such as family members and friends. We are not required to agree to your request; however, if we do agree, we are bound by our agreement except when otherwise required by law. In emergencies, or when the information is necessary to treat you. In order to request a restriction on use or disclosure of your PHI, you must make your request in writing using the contact information below. Your request must describe in a clear and concise fashion:

(a) the information you wish restricted;
(b) whether you are requesting to limit our practice's use, disclosure, or both; and
(c) to whom you want the limits to apply.

3. Inspection and Copies. You have the right to inspect and obtain a copy of the PHI that may be used to make decisions about you, including patient medical records and billing records. However, you may not obtain psychotherapy notes or information compiled in reasonable anticipation of a civil, criminal, or administrative action or proceeding. You must submit your request in writing using the contact information below. Your request must describe in a clear and concise fashion:

(a) the time period (e.g., within the last three years) to which your request applies; and
(b) the form in which you want your PHI (e.g., electronic copy).

4. Amendment: You may ask us to amend your health information if you believe it is incorrect or incomplete, and you may request an amendment for as long as the information is kept by our practice. To request an amendment, your request and reason for the request must be made in writing using the contact information below. You must provide us with a reason that supports your request for amendment. Our practice will deny your request if you fail to submit your request (and the reason supporting your request) in writing. Also, we may deny your request if we ask you to amend information that is in our opinion: (a) accurate and complete; (b) not part of the PHI kept by or for the practice; (c) part of the PHI which would be permitted to inspect and copy; or (d) not created by our practice, unless the individual or entity that created the information is not available to amend the information.

5. Accounting of Disclosures. All of our patients have the right to request an "accounting of disclosures." An "accounting of disclosures" is a list of certain non-routine disclosures our practice has made of your PHI for non-treatment or operations purposes. Use of your PHI as part of the routine patient care in our practice is not required to be documented. For example, the doctor sharing information with the nurse; or the billing department using your information to file your insurance claim. In order to obtain an accounting of disclosures, you must submit your request in writing using the contact information below. All requests for an "accounting of disclosures" must state a time period, which may not be longer than six (6) years from the date the "accounting of disclosures" is requested and may not include dates before April 14, 2003. The first list you request within a 12-month period is free of charge, but our practice may charge you for additional lists within the same 12-month period. Our practice will notify you of the costs involved with additional requests, and you may withdraw your request before you incur any costs.
6. **Right to a Paper Copy of This Notice.** You are entitled to receive a paper copy of our notice of privacy practices. You may ask us to give you a copy of this notice at any time by contacting us utilizing the contact information below.

7. **Right to File a Complaint.** If you believe your privacy rights have been violated, you may file a complaint with our practice or with the Secretary of the Department of Health and Human Services. You will not be retaliated against for filing a complaint. To file a complaint with our practice, use the contact information below.

8. **Right to Provide an Authorization for Other Uses and Disclosures.** Our practice will obtain your written authorization for uses and disclosures that are not identified by this notice or permitted by applicable law. Any authorization you provide to us regarding the use and disclosure of your PHI may be revoked at any time in writing. After you revoke your authorization, we will no longer use or disclose your PHI for the reasons described in the authorization. Please note: We are required to retain records of your care.

**Contact Information:**

<table>
<thead>
<tr>
<th>Privacy Officer</th>
<th>635 W. Wesmark Blvd. Sumter, SC 29150</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phone</td>
<td>(803) 469-7500</td>
</tr>
<tr>
<td>Fax</td>
<td>(803) 469-7533</td>
</tr>
</tbody>
</table>
APPENDIX C.

Script for Desk Personnel
Script for front desk personnel pertaining to informed consent and study description:

**Study Title:** Using the DES-SF tool to determine the relationship between diabetes self-empowerment, diet quality and glycemic control in a southern African American population

Hello, my name is ________ from Sumter Medical Specialists, PA. We are asking you to volunteer to take part in a questionnaire as part of a research study pertaining to empowerment and diet quality and blood glucose control in clinic patients. The questionnaire will consist of questions related to your feelings surrounding your diabetes. This survey will take approximately 15-20 minutes of your time. Your participation in this survey is completely voluntary. This means you do not have to participate if you do not want to. If you agree to participate, you have the right to only answer the questions you choose to answer. The potential risks of this research are minimal and confidentiality of private health information that you share with us will be maintained to the highest level. You have the right to stop participation at any point during the interview if you so choose. We expect to enroll 50 participants in this study. If you have questions or concerns regarding this research, you can contact the primary investigator, your registered dietitian, by the email listed at the bottom of your informed consent form, or the Winthrop University IRB, the committee that works to protect your rights and welfare. Also as a part of this study, I am asking you to give authorization to release some of your private health information (PHI). We will be collecting your age, marital status, education level, duration of diabetes, history of diabetes education, insurance type (primary only), height, weight, blood pressure, 24 hour dietary recall and most recent A1C level (taken within the past two months). This information may be shared with other members of the research team and the Winthrop University IRB. They will take special care to maintain confidentiality and privacy about you and your protected health information. It is your choice to let the researchers use and share your health information. You can, at any time, change your mind.
APPENDIX D.

Debriefing Form
Debriefing Form

Thank you for participating in our study!

The purpose of this study was to determine if lower levels of diabetes empowerment were associated with poor diet quality and glycemic control. Each participant’s diabetes empowerment was measured through the diabetes empowerment scale given at check in and diet quality through the 24-hour recall conducted during the standard patient appointment. Glycemic control was assessed through abstracting the most recent glycosylated hemoglobin (A1C) level from the medical record. Today concludes your participation in this study, though you will return to the researcher (registered dietitian) for subsequent visits as a part of your standard care. Your participation in this study is invaluable, and essential to the researchers more fully understanding the impact of empowerment on two aspects of diabetes self-management.

If you are interested in learning the results of this study, please contact the researchers after June 1, 2016.

Researchers:
Makala Katuscak Smith
Katuscakm2@winthrop.edu

If you have any concerns regarding this study, please contact the faculty advisor or the Director of Sponsored Programs and Research.

Faculty Advisor: Simone Camel Officer (803) 323-4552 camels@winthrop.edu

Sponsored Programs & Research: Deborah Broome, Compliance (803) 323-2398 broomed@winthrop.edu

If anything about this survey caused you to feel uncomfortable, health and counseling services are available to you on the 2nd floor of Crawford. You can reach Counseling Services at (803) 323-2233 or get information at http://www.winthrop.edu/hcs/counselingservices-home.htm. All counseling services are free and confidential.
APPENDIX E.

Diabetes Empowerment Scale-28
### Attitudes Toward Diabetes – DES

In general, I believe that I:

1. ...know what part(s) of taking care of my diabetes that I am **satisfied** with.
   - Strongly Agree
   - Agree
   - Neutral
   - Disagree
   - Strongly Disagree

2. ...know what part(s) of taking care of my diabetes that I am **dissatisfied** with.
   - Strongly Agree
   - Agree
   - Neutral
   - Disagree
   - Strongly Disagree

3. ...know what part(s) of taking care of my diabetes that I am ready to change.
   - Strongly Agree
   - Agree
   - Neutral
   - Disagree
   - Strongly Disagree

4. ...know what part(s) of taking care of my diabetes that I am not ready to change.
   - Strongly Agree
   - Agree
   - Neutral
   - Disagree
   - Strongly Disagree

5. ...can choose realistic diabetes goals.
   - Strongly Agree
   - Agree
   - Neutral
   - Disagree
   - Strongly Disagree

6. ...know which of my diabetes goals are most important to me.
   - Strongly Agree
   - Agree
   - Neutral
   - Disagree
   - Strongly Disagree

7. ...know the things about **myself** that either help or prevent me from reaching my diabetes goals.
   - Strongly Agree
   - Agree
   - Neutral
   - Disagree
   - Strongly Disagree

8. ...can come up with good ideas to help me reach my goals.
   - Strongly Agree
   - Agree
   - Neutral
   - Disagree
   - Strongly Disagree

9. ...am able to turn my diabetes goals into a workable plan.
   - Strongly Agree
   - Agree
   - Neutral
   - Disagree
   - Strongly Disagree
In general, I believe that I:

10. ...can reach my diabetes goals once I make up my mind. ( ) ( ) ( ) ( ) ( ) ( )

11. ...know which **barriers** make reaching my diabetes goals more difficult. ( ) ( ) ( ) ( ) ( ) ( )

12. ...can **think** of different ways to overcome barriers to my diabetes goals ( ) ( ) ( ) ( ) ( ) ( )

13. ...can try out different ways of overcoming barriers to my diabetes goals. ( ) ( ) ( ) ( ) ( ) ( )

14. ...am able to decide which way of overcoming barriers to my diabetes goals works best for me. ( ) ( ) ( ) ( ) ( ) ( )

15. ...can tell how I'm feeling about **having** diabetes. ( ) ( ) ( ) ( ) ( ) ( )

16. ...can tell how I'm feeling about **caring for** my diabetes ( ) ( ) ( ) ( ) ( ) ( )

17. ...know the ways that having diabetes causes stress in my life. ( ) ( ) ( ) ( ) ( ) ( )

18. ...know the **positive** ways I cope with diabetes-related stress. ( ) ( ) ( ) ( ) ( ) ( )

19. ...know the **negative** ways I cope with diabetes-related stress. ( ) ( ) ( ) ( ) ( ) ( )
<table>
<thead>
<tr>
<th></th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>20.</td>
<td>...can cope well with diabetes-related stress.</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>21.</td>
<td>...know where I can get support for having and caring for my diabetes.</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>22.</td>
<td>...can ask for support for having and caring for my diabetes when I need it.</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>23.</td>
<td>...can support myself in dealing with my diabetes.</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>24.</td>
<td>...know what helps me stay motivated to care for my diabetes.</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>25.</td>
<td>...can motivate myself to care for my diabetes.</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>26.</td>
<td>...know enough about diabetes to make self-care choices that are right for me.</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>27.</td>
<td>...know enough about myself as a person to make diabetes care choices that are right for me.</td>
<td>( )</td>
<td>( )</td>
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<td>( )</td>
</tr>
<tr>
<td>28.</td>
<td>...am able to figure out if it is worth my while to change how I take care of my diabetes.</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
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</tr>
</tbody>
</table>

Thank you very much for completing this questionnaire.