2020

Physician–Patient Communication: Association with Health Literacy in African Americans Living with Type 2 Diabetes Mellitus

Brittany Egeh
Walden University

Walden University

College of Health Sciences

This is to certify that the doctoral dissertation by

Brittany Egeh

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

Review Committee
Dr. Katie Callahan, Committee Chairperson, Health Services Faculty
Dr. Anita Manns, Committee Member, Health Services Faculty
Dr. Mary Lou Gutierrez, University Reviewer, Health Services Faculty

Chief Academic Officer and Provost
Sue Subocz, Ph.D.

Walden University
2020

Abstract

Physician–Patient Communication: Association with Health Literacy in African Americans Living with Type 2 Diabetes Mellitus

by

Brittany Egeh

MD, American International School of Medicine, 2016

MHA, Walden University, 2014

BS, Albany State University, 2010

Dissertation Submitted in Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Health Services

Walden University

February 2020

Abstract

Health literacy is needed throughout care to understand basic health, prevent diseases, understand diagnoses, and treatment and management of complicated diseases, such as Type 2 diabetes mellitus (T2DM). Inadequate physician–patient communication is related to medication errors and overall understanding of basic health information in chronic condition such as T2DM. The purpose of this study was to examine the association between physician–patient communication and health literacy, glycemic control, diabetic knowledge, and demographics. The target population consisted of African Americans, ages 18-75, diagnosed with T2DM. Primary data were collected from a family medicine clinic using 4 questionnaires: s-TOFHLA (short form of functional health literacy), Diabetic Knowledge Test, interpersonal processes of care, and a demographic survey. The theoretical framework was based on the social cognitive theory. Hemoglobin A1c levels were recorded from electronic medical records. Data were analyzed using cross-tabulations and ordinal logistic regression. The findings suggested that adequate physician–patient communication is associated with adequate and inadequate health literacy levels, glycemic control, diabetic knowledge, and age. Evidence suggests that adequate physician–patient communication should be considered in the management of T2DM in African Americans. Improving physician–patient communication supports adequate health literacy and adequate diabetic knowledge among patients with T2DM, both of which improve health outcomes.

Physician–Patient Communication: Association with Health Literacy in African Americans Living with Type 2 Diabetes Mellitus

by

Brittany Egeh

MD, American International School of Medicine, 2016

MHA, Walden University, 2014

BS, Albany State University, 2010

Dissertation Submitted in Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Health Services

Walden University

February 2020

Dedication

This work is dedicated to God who sustained me through this process and provided me with the guidance and fortitude to complete this study.

I also dedicate this research to my late Grandmother who instilled in me the value of education, and the strength to always persevere no matter how difficult the journey may appear.

Acknowledgements

This dissertation would not have been possible without the many people who have assisted me and supervised me throughout this process. My doctoral chair, Dr. Katie Callahan-Myrick gave me instrumental direction, support, patience, and constant kindness throughout her supervision, she believed in my work, and has facilitated in my growth as a scholar-practitioner.

I am also thankful to the second member of my dissertation committee, Dr. Anita Manns for always providing a meticulous approach to revising of documents, being available to assist me in time of need, and increasing my confidence as a scholar-practitioner. I am also thankful to my University Research Reviewer (URR), Dr. Mary Lou Gutierrez, who also contributed scholarly with her in depth knowledge. I would also like to extend my appreciation to Dr. Madeline Aagard who gave me excellent guidance and feedback during residency sessions. A special thank you to Dr. Powell, and the staff, for providing me with a facility to yield this research.

I am forever appreciative to my family who also believed in me, and constantly encouraged and supported me throughout this process of continuing education. Last but not least, I am evermore grateful to my fiancé whose constant love, support, and companionship has been invaluable throughout this journey.

Table of Contents

List of Tables

List of Figures

Chapter 1: Introduction to the Study

Introduction

The World Health Organization (WHO, 1998) defines health literacy as the intellectual capability and social skills that determine the motivation and ability of an individual to access, understand and use the information obtained to promote and maintain good health. The American Medical Association defines health literacy as a constellation of skills, which includes an ability to perform basic reading, and numerical skills that are required in the healthcare environment (Safeer & Keenan, 2005). Health literacy plays a key role in the effectiveness of communication between providers and patients (Pagels et al., 2015). Health literacy is of increasing importance in public health and healthcare today. Nearly half of American adults have difficulty understanding basic health information (Kindig, Panzer, & Nielsen-Bohlman, 2004). Lower health literacy has been found to be associated with increased emergency department visits and potentially avoidable hospitalizations (Jessup et al., 2017). In 2014, about 245,000 emergency room visits for people of all ages had hyperglycemia crisis as their first listed diagnosis (American Diabetes Association, 2017).

Poor physician–patient communication plays a significant role in the health literacy of individuals who are already considered disadvantaged with low literacy (Kripalani et al., 2010). Physicians often deliver a large amount of information in a short period of time that is often not straightforward for the patient (Kripalani et al., 2010). Patients are sometimes reluctant to ask the physician questions because of low self-efficacy (Katz, Jacobson, Veledar, & Kripalani, 2007). Non-White, working class, and

less educated patients are less likely to actively partake in medical encounters, further affecting patients' ability to understand medical conditions and treatment (Katz et al., 2007).

Background of Study

Sentell, Zhang, Davis, Baker, & Braun (2014) stated that health literacy could be a predictor of an individual's health outcome. Type 2 diabetes mellitus (T2DM) is also a major public health issue in the United States. According to the Centers for Disease Control and Prevention (CDC), the prevalence of diagnosed diabetes is an estimated 23.1 million people or 7.2% of the U.S. population (National Diabetes Statistics Report, 2017). Prevalence varied significantly by education level, which is an indicator of socioeconomic status. Specifically, 12.6% of adults with less than a high school education had a diagnosis of diabetes compared with 9.5% of those with a high school education and 7.2% of those with more than a high school education (National Diabetes Statistics Report, 2017).

Fulton County is one of 159 counties in Georgia and includes the cities of Alpharetta, Atlanta, College Park, East Point Fairburn, Hapeville, Johns Creek, Milton, Mountain Park, Palmetto, Roswell, and Union City. As of 2015, the population of Fulton County was just over 1 million residents (United States Census Bureau, 2015). Of them, 1 million residents (42.9%) were African American. Based on census data reported in 2010 on Health Disparities in minority health report card 26.5% of the African Americans in this county live below the poverty line and 6.8% of the population reported having less than a 9th grade education(Georgia Department of Public Health, 2015). Poor

health was more likely to be reported in those residents who had less than a high school education (Georgia Department of Community Health, 2008). According to Sentell et al. (2014), education impacts individual health above and beyond other socioeconomic factors.

Health literacy has an influence on the decisions that individuals make about their health. Diabetes is the tenth most common cause of death in Georgia (Georgia Department of Public Health, 2015). It affects Georgians of all levels of education. The prevalence of diabetes among these adults who did not graduate from high school was 13.2 % higher than the diabetes prevalence among college graduates, which was 6.6% (Georgia Department of Public Health, 2015). In 2012, an estimated 61,000 citizens in Fulton County were living with diabetes (Georgia Department of Public Health, 2015). Schillinger et al. (2004) demonstrated that poor health literacy was associated with low educational attainment, poor health, older patients, and minorities.

Management of diabetes is determined by glycemic control. Glycemic control is measured by a Hemoglobin A1c(HgbA1c) a diagnostic tool that determines an individual's average glucose levels over a 120-day period. For a patient with Type 2 Diabetes Mellitus glycemic control would be a HgbA1c ranging between 6.4-7.0(Aron et al.,2009). Glycemic control is affected by poor patient adherence to treatment, which includes daily glucose monitoring, self-injections of insulin, dietary modifications, and medication compliance (Schillinger et al., 2004). Health literacy develops through communication between physician and patient and is an essential part of glycemic control. Lack of understanding of how to control one's glycemic level can hinder the

control of diabetes, which could lead to additional adverse health outcomes over time. Patients with low health literacy were found to have poor communication with their healthcare providers. This was due to health information being explained in ways that patients could not understand (Schillinger et al., 2004).

Problem Statement

T2DM is a very complex disease to manage. It requires constant attention to diet, exercise, monitoring of glucose, and medication to achieve glycemic control (Cramer, 2004). Upon diagnoses of diabetes, depending on the stage in which a patient is diagnosed, a regimen has to be developed for the patient to start their medications, and add necessary lifestyle modifications. It is widely known that patients have difficulty understanding health information(CDC, 2016). Physicians play a significant role in health literacy. When a patient is under their medical care, physicians must ensure that the patient is equipped with the tools and education needed to improve their health condition. Research has outlined many factors that cause health illiteracy among patients, such as literacy skills, health knowledge, demographics, culture, and experience (CDC, 2017). Systemic and professional factors include communication and dissemination of information, access to services/resources, and knowledge experiences with the healthcare system(CDC, 2017). Each of the listed factors that contribute to health illiteracy involve some form of interpersonal process of care. Interpersonal processes of care (IPC) encompass the social-psychological aspects of clinical interaction, which includes patient–provider communication (Schillinger,Bindman, Wang, Stewart, & Piette, 2004).

The quality of interpersonal care is correlated to a patient's self-care behavior and also to the health outcome of conditions such as T2DM (Schillinger et al., 2004).

In the United States, the incidence of diabetes disproportionately affects African Americans (Calvin et al., 2011). African Americans are two times more likely to develop T2DM when compared to their White counterparts. According to the American Diabetes Association, diabetes is the seventh leading cause of death in the United States; however, it is the third leading cause of death among African Americans (ADA, 2012).

The objective of this study was to highlight the use of health literacy in communities and to promote dialogue among physicians and patients about patients' health conditions. The goal was to understand how dialogue among patients and physicians affects health outcomes.

Purpose of Study

The purpose of this study was to assess the association between physician–patient communication and health literacy levels among African Americans living with T2DM using quantitative methods. The intent of the study was to understand how physician and patient communication is associated with health literacy, diabetic knowledge, and hemoglobin A1c and its effect on self-efficacy in diabetic management. The goal of this study was to provide recommendations about the exchange of information between the physician and the patient and its association with the management of self-care of diabetic patients in order to understand patients' (a) degree of self-efficacy and (b) management of glycemic control.

Research Question(s) and Hypotheses

The following research questions were addressed by this study:

Research Question 1. Is there an association between physician–patient communication and health literacy among African Americans living with Type 2 diabetes mellitus, adjusting for confounders age and gender?

H_{01}: There is no association between physician–patient communication and health literacy among African Americans living with Type 2 diabetes mellitus, adjusting for potential confounders age and gender.

H_{A1}: There is an association between physician–patient communication and health literacy among African Americans living with Type 2 diabetes mellitus, adjusting for potential confounders age and gender.

Research Question 2. Is there an association between physician–patient communication and glycemic control among African Americans living with Type 2 diabetes mellitus, adjusting for potential confounders age and gender?

H_{02}: There is no association between physician–patient communication and glycemic control among African Americans living with Type 2 diabetes mellitus, adjusting for potential confounders age and gender.

H_{A2}: There is an association between physician–patient communication and glycemic control among African Americans living with Type 2 diabetes mellitus, adjusting for potential confounders age and gender.

Research Question 3. Is there an association between physician–patient communication and diabetic knowledge among African Americans living with Type 2 diabetes mellitus, adjusting for potential confounders age and gender?

H_{03}: There is no association between physician–patient communication diabetic knowledge among African Americans living with Type 2 diabetes mellitus, adjusting for potential confounders age and gender.

H_{A3}: *There* is *an* association between physician–patient communication and diabetic knowledge among African Americans living with Type 2 diabetes mellitus, adjusting for potential confounders age and gender.

Research Question 4. Is there an association between physician–patient communication and demographics (age and gender) among African Americans living with Type 2 diabetes mellitus ?

H_{04}: There is a no association between physician–patient communication and demographics (age and gender) among African Americans living with Type 2 diabetes mellitus.

H_{A4}: There is an association between physician–patient communication and demographics (age and gender) among African Americans living with Type 2 diabetes mellitus.

Theoretical Foundation

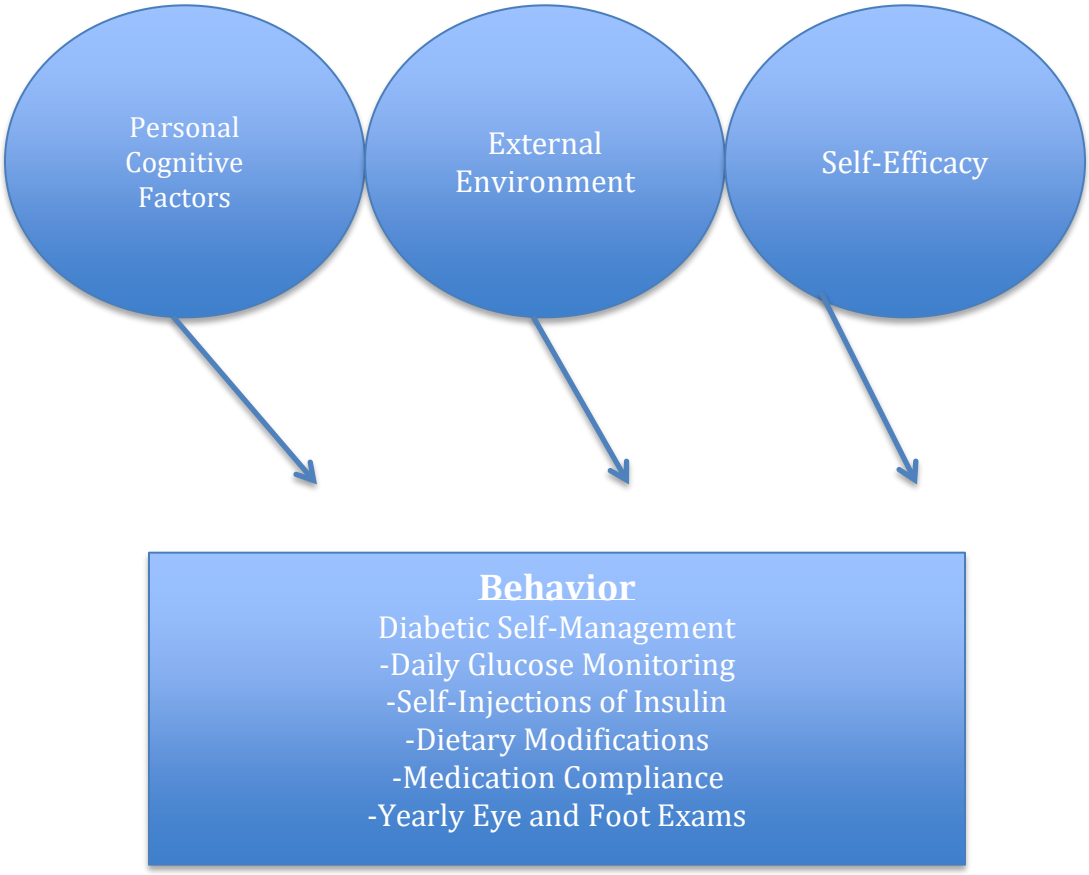

Figure 1. Factors that directly affect an individual's health literacy and behavior, based on the SCT in correlation with T2DM.

Lower health literacy is associated with a lower quality of life. Low health literacy is a significant issue in Fulton County, Georgia, that affects African Americans with chronic conditions such as T2DM. Physicians have the ability to bridge the gap in health literacy through exchange of information during patient encounters. The theoretical basis for this study was the SCT. The SCT is founded on a causal model of triadic reciprocal causation in which personal/cognitive, behavioral patterns, and

environmental events all operate as interacting determinants that influence one another bidirectionally (Glanz, 2002). A person's health literacy is influenced not only by individual or personal characteristics, but the cumulative impact of social and environmental factors. Social and environmental factors, such as educational attainment, poverty, neighborhood development and social norms all interact to explain an individual's behavioral pattern. SCT helps to explain why patients living in disproportionately advantaged areas, with lower education levels, have poorer health outcomes in the management of T2DM. SCT is also based on self-efficacy and discusses how individuals acquire self-efficacy by watching or observing behavior.

SCT is based on three concepts: behavior, personal/cognitive factors, and the environment. *Personal/cognitive factors* focus on the subjective human values and expectations, and thus illustrate that an individual's actions are not only objective but are based on an individual's perception of reality. South Fulton County, Georgia, has become an area comprised of many individuals of lower socioeconomic status. Personal factors, such as lack of education and low income, affect an individual's perception of what is important . Carrying out the daily regimen of T2DM management may not be possible given their hierarchy of needs and their perception of the disease.

The *external environment* can influence the perception an individual's personal factors. The environment in which a person with a chronic disease lives may or may not be conducive to the management of that disease. The environment can include a person's home, family, the neighborhood, social factors, or the people around him or her. The external environment has an effect on patients living with T2DM in their ability for self-

care management (Albright et al., 2001). Factors such as low socioeconomic status affect health literacy. Having a predisposition to low socioeconomic status may cause an individual to believe she or he has other problems that are more serious than management of T2DM, which, in turn affects her or his behavior based on their what is considered important. (Albright et al., 2001). This perception, combined with decreased health literacy about the severity of the T2DM, is an important component of outcome expectations that affects self-care management.

Behaviors are based on environmental and personal factors. The environment, individuals, and behavior are constantly influencing each other. Behavior can be a result of the environmental factors, just as the individuals behavior can exert influence on the environment. (Glanz et al., 2002). Individuals who are fortunate enough to establish a relationship with a primary care physician have demonstrated that a model of learning can be established through a physician–patient relationship. SCT explains how people acquire and maintain behavioral patterns in order to create interventions.

Observational learning includes four processes: attention, retention, production, and motivation (Bandura, 1986). Retention and production are focused on in this study. Retention of an observed behavior is dependent upon an individual's intellectual capacity, such as reading ability, or ability to gain new skills by observing. Production, on the other hand, is focused on the performance of modeled behavior, which is dependent on the patient's physical ability, communication ability, and self-efficacy (Glanz et al., 2008). Patients with diabetes are expected to perform daily tasks for self-management to avoid diabetic complications (Sarkar et al., 2006). The physician, upon

diagnosis, first explains and demonstrates these daily self-management tasks to the patients. Self-management then becomes the mainstay of the patient's daily regimen for diabetic management (Sarkar et al., 2006). The SCT concept of observational learning establishes that an individual can observe another's behavior and reproduce that same action (Bandura, 1986). Observational learning is relevant for exchange of information between the patient and physician. With observational learning, negative expectations about diabetic complications due to lack of management and increase in behavioral capability could promote a behavior that would encourage diabetes self-management despite negative environmental influences from a patient's home, family, or the neighborhood in which they live.

The self-efficacy element of the SCT is sensitive to observational leaning (Glanz, 2002).Observational learning occurs by watching the actions of another person and the observer gains a sense of reinforcement. Physicians act as role models to their patients by demonstrating and explaining how to carry out difficult tasks required in management of T2DM. Although the physician may not have that particular condition, their expertise in the subject matter is useful in observational learning. Through education of patients in the office setting, the physician has the ability to foster the behavior in an environment that will produce observational learning in the management of T2DM.

The concept of self-efficacy of the SCT refers to a person's confidence in his or her ability to perform a behavior, which is relevant for improving diabetic self-management, and increased with observational learning in the healthcare setting (Sarkar et al., 2006). Limited health literacy is independently associated with the development of

poor self-related health, poor glycemic control, and more diabetic complications, which may be associated with an individual's self-efficacy (Sarkar et al., 2006).

Nature of the Study

A quantitative, nonexperimental research design was used in this study to explore the relationship between (a) physician–patient communication and (b) health literacy, diabetic knowledge, glycemic control (HbA1c), and demographics among individuals diagnosed with T2DM. Because physicians have the potential to increase the health literacy of their patients living with chronic conditions, statistical data were collected using questionnaires to examine the association between physician–patient communication and health literacy, while adjusting for potential cofounders. Participants were asked to complete four, separate, self-administered questionnaires. The collected data were used to build on existing knowledge of health literacy in minority communities, and to propose relationships among physicians and patients in association with T2DM.

Quantitative research designs are used to determine differences among groups, through isolation of the independent variable of interest physician–patient communication and the dependent variables of health literacy, diabetic knowledge, hemoglobin A1c, and demographics. The study design was chosen because it is useful for looking at relationships and expressing those relationships through statistics. The primary goal of this study was to understand whether there was an association between physician-patient relationship with health literacy, hbA1c, lifestyle modification, medication adherence in African American patients living with T2DM.

Definitions

African American: an American who has African and especially Black African ancestors.

Environment: Factors physically external to the individual, that provide opportunity for social support (Glanz et al 2002).

Health literacy: the intellectual capability and social skills that determine the motivation and ability of an individual to access, understand and use the information obtained to promote and maintain good health (Nutbeam, 1998).

Intrapersonal processes of care are components of quality that are defined as social/physiological aspects of the patient and physician's interaction (Stewart et al., 1999).

Observational learning: Behavioral acquisition that occurs by watching the actions and outcomes of others is including credible role models of the targeting behavior (Glanz et al, 2002).

Socioeconomic factors: The American Psychological Association (2016) defines socioeconomic factors as the social standing or class of an individual or group. Socioeconomic factors are commonly measured as a combination of education, income and occupation. Socioeconomic factors are often examined to compare class groups, and ethnic groups uncovering the distinct inequalities among these groups that are related to access to resources, issues related to privilege, power and also control (American Psychological Association, 2016).

Type 2 diabetes mellitus: is a chronic condition that results from defects in insulin secretion, almost always with a major contribution from insulin resistance (Alberti & Zimmer, 1998).

Health outcome: An outcome or result of a medical condition that directly affects the length or quality of a person's life (McGraw-Hill Concise Dictionary of Modern Medicine, 2002).

Self-efficacy: Self-efficacy can be defined as individual's belief in his or her capacity to execute behaviors necessary to produce attainments. Self-efficacy illustrates the confidence in one's ability to take control over one's own motivation, behavior, and social environment (American Psychological Association, 2016).

Scope and Delimitations

Delimitations

Lack of external validity was a delimitation in this study due to the possible smaller sample size and random sampling from local internal medicine and family medicine clinics. This study did not necessarily account for those individuals who do not have insurance and who are unable to see the doctor for their current health condition. Participants were aware of the research study, which could have contributed to false responses to the questions.

Limitations

The surveys and questionnaires were all closed-ended questions. This could have prevented an in-depth understanding of an individual's true perceptions of their

relationship with their physician. Closed-ended questions could also prevent the researcher from delineating a true understanding of a patient's self-efficacy.

Informational bias, specifically, recall bias, could have occurred. Participants may not have remembered exposures or situations accurately, which could have brought about informational bias occurring when answering the questionnaires.

Significance of Study

The purpose of this quantitative study was to evaluate the relationship between physician–patient communication and health literacy among African Americans living with T2DM in South Fulton County, Georgia, while considering the following main variables:

- *Exchange of information*. Physician–patient communication is a form of health literacy in which patients gain information needed to properly manage their condition thus promoting the exchange of information between the doctor and the patient (Ong, DeHaes, Hoos & Lammes, 1995).
- *Health outcomes*. Health outcomes are based on prior knowledge of the management of T2DM, which is based on current physician–patient communication, assessing and comparing current hospitalizations, ER visits, and diabetic complications.
- *Understanding self-efficacy management*. Assessing the patient's ability to succeed in self-care management in T2DM.

This project is unique because it addressed the need for increased health literacy among patients with T2DM through the exchange of information between physician and

patient. Insights from this study could aid in making recommendations for how to assess physicians by the role they play in health literacy through communication and how health literacy affects health outcomes in African Americans living with chronic conditions (Durham & Berkman, 2011). This research study is expected to fill a gap in literature, and to promote positive social change to increase communication among physicians and patients concerning the management of chronic disease and thus, in turn, increase health literacy. Because health information can sometimes be confusing for the general population, this study sought to increase physician's awareness and to provide information and services that people can understand. In addition, this study should help with awareness on state and local levels, thereby increasing the communities knowledge of prevention, diagnoses, and the management of chronic diseases.

Summary

Poor functional health literacy affects many individuals with lower socioeconomic status, specifically African Americans. There is a lack of literature available about physician–patient communication and health literacy. This chapter introduced the need to gain insights on how the communication between physicians and patients has an effect on diabetic self-management. Many studies have examined health literacy in communities with health disparities, but few studies have examined how physician–patient communication relates to health literacy. Current patients with T2DM in Fulton County, Georgia, were asked to complete surveys that provided statistical data and allowed assessment of the potential relationship between physician–patient communication and health literacy among African Americans. The relationship was

analyzed based on self-efficacy, personal cognitive factors, and external environment among African Americans living with T2DM.

In Chapter 2, the literature review will be used to examine the research on the relationship between low health literacy and self-care management among African Americans living with T2DM.

Chapter 2: Literature Review

Introduction

The purpose of this study is to examine the association between physician–patient communication and health literacy in diabetic patients managing their conditions.

A physician–patient relationship or communication is essential to the management of chronic diseases. T2DM is a very complex disease to manage; it requires constant attentiveness to diet, exercise, monitoring of glucose, and medication to achieve glycemic control (Cramer, 2004). Health literacy is essential in managing chronic conditions for appropriate exchange of information between the patient and their healthcare provider. Proper exchange of information, understanding of a patient's social and environmental factors, and self-efficacy are useful in achieving improved health outcomes of patients T2DM.This literature review is organized in four sections: (a) theory, (b) health literacy, (c) diabetes mellitus, and (d) summary.

Health literacy is a common issue in the U.S. healthcare system for many patients. While patients may have the appropriate literacy, many are deficient in the knowledge of specific conditions and how to appropriately self-manage those conditions (Kindig et al., 2004). Healthcare providers, specifically physicians, have a major responsibility in the exchange of information during a patient encounter (Pagels et al., 2015; Schillingeret al., 2004). It is part of the physician's responsibility to ensure that a patient understands what they are explaining to his/her patient in lay terms (Schillinger et al., 2004).

In addition, if a patient is diagnosed with a disease, it is part of the physician's responsibility to ensure that the patient is allied with an appropriate team of people to

manage their condition effectively (Schillinger et al., 2004). Communication between the healthcare providers and patients is fundamental in order for a patient to understand health information, however, in many cases, patients leave the office of their physician or healthcare provider not understanding the information they were given (Kripalani et al., 2010).

In this chapter, I focused on health literacy, African Americans, and the effects of physician–patient communication on self-care management and health outcomes of African Americans with T2DM. SCT and self-efficacy are used to describe the theoretical basis for understanding how personal characteristics, and social and environmental factors, influence a person's health literacy. Finally, IPC about patient-physician relationships are reviewed for T2DM patients.

Literature Search Strategy

The following databases were searched for articles published in peer-reviewed journals between 2010 and 2016: Google Scholar, CINAHL, EbscoHost, ERIC, Medline, ProQuest, PubMed, SAGE; Science Direct, and other multidisciplinary databases. The following keywords and phrases were used: *health literacy, physician patient relationship, functional health literacy, diabetes mellitus, type 2 diabetes mellitus, glycemic control, diet, exercise, family support in diabetes management, health insurance, self-management, self- efficacy, social cognitive theory, assessment, instructional strategies, health literacy and physicians, health literacy and minorities, health literacy in elderly, health literacy and cultural competence, health literacy and diabetes.*

Theoretical Foundation: Social Cognitive Theory and Self-Efficacy

SCT started as the social learning theory in the 1960s by Albert Bandura and later developed into the SCT in 1986 (Bandura, 1986). Albert Bandura asserted that learning occurs based on a social context reciprocal interaction of the person, environment, and behavior emphasizing a social influence on an external and internal social reinforcement (Bandura, 1986). Reciprocal determinism is the central concept of the SCT referring to the mutual interaction of a person (past experiences or learned experiences), which influences reinforcements and expectations (Bandura, 1986). Reciprocal determinism also examines how the environment or external social context factors into behavioral action.

Physicians play an important role in the prevention, diagnosis, and management of chronic diseases in patients. Health professionals discuss information with patients at one level, then patients' process that information at another level. At the patient level there are several factors that affects how a patient processes the information. SCT illustrates the varying levels of processes that may affect how a patient receives that health information (Schillinger et al., 2003).

In the midst of the physician and patient interaction, the physician is responsible for understanding the level of literacy a patient has, the social context of a patient and appropriate ways to manage disease in the midst of these factors. Patients with lower health literacy often have many influencing factors that affect their decision-making skills. Patients with low levels of health literacy find it difficult comprehending medical information provided. These patients often have problems reading labels on a pill bottles,

interpreting blood glucose values, and the schedules of dosing (Schillinger et al., 2003). Lower functional health literacy is common in patients in the public hospital setting and among populations that are insured by Medicare and is independently associated with poor understanding of disease, worse health status, and higher use of services (Schillinger et al., 2003) thus illustrating the phenomenon of reciprocal determinism.

Albright, Parchman and Burge (2001) explored four factors that are linked to self-care behaviors in patients with T2DM. These factors included (a) patient demographics, (b) doctor patient relationship, (c) stress and (d) social context. The study sought to understand and influence individual behaviors that enhance self-care and influence the success of treatment for patients with diabetes. The results of the study suggested that diabetes care had an association with a patient's social and environmental interaction, including the age, sex, patient satisfaction, personal stress and family content (Albright et al., 2001). According to Albright et al. (2001) the level of family understanding may have an effect on self- care behavior in management of T2DM suggesting that habitual patterns of interaction between family members constitutes an aspect of the environmental component of SCT.

SCT and self-efficacy refers to the level of self-confidence an individual has in his or her ability to effectively perform a behavior (Bandura, 1986). Bandura portrays self-efficacy as a task and situation-(domain) specific cognition (specific self-efficacy) representing a dynamic motivational belief system that may vary depending on unique properties of each task and work situation (Bandura, 1986).

Self-efficacy determines whether a patient's behavior will be initiated and sustained. Self-efficacy is crucial in self-management of diabetes. Patients with diabetes are expected to perform daily self-management activities to help avoid diabetic complications. Self-efficacy is relevant determinant of self-management behaviors among populations with limited health literacy (Sakar et al., 2006). Sarkar also reported an association between self-efficacy and self-management that was persistent across ethnic groups and health literacy levels. The finding suggested that carefully designed self-management interventions that targeted self-efficacy might be effective in populations that have low health literacy (Nath, 2007).

There are many strategies that contribute to self-efficacy and improve the outcomes in education for adults with T2DM. Providers have the ability to work to involve their patients in care and guiding them in active learning about diabetes. It has also been suggested that people with diabetes should be encouraged to explore their feelings about their illness (Nath, 2007). When providers teach their patients skills through practical and interactive exercises patients are able to adjust their behaviors and helping them to control their own health outcomes (Nath, 2007).

T2DM disproportionally affects low income and racial ethnic minorities, and there is an urgent need to improve the quality of care. Self-management is a main tool in diabetes care, and it is believed that self-efficacy is a critical pathway to improve self-management (Sakar et al., 2006). Self-efficacy is significantly associated with diet, exercise, self-monitoring of blood glucose and foot care suggesting that self-efficacy management relationships across self-management domains constitutes a useful

intervention target in vulnerable populations. The patient with limited health literacy may have lower self-efficacy due to lack of knowledge of proper self-care management.

Literature Review

Physician–patient communication has an essential role in health literacy for patients who are diagnosed with T2DM (Schillinger et al., 2003). Research indicates that patients can comprehend as little as half of what physicians convey in a basic outpatient encounter due to low health literacy (Schillinger et al., 2003). However, it has been suggested that primary care physicians caring for patients with T2DM and low health literacy rarely assess for comprehension of new concepts (Schillinger et al., 2003). The aim of this literature review was to examine the current literature of how physician–patient communication correlates to health literacy in African Americans with T2DM.

Health Literacy

Health literacy is frequently confused with the term literacy; it is often assumed that health literacy is only a concern for those who cannot read however health literacy is a level beyond literacy (Osborne, 2012). Health literacy focuses on communicating health information plainly and understanding it accurately. Health literacy is needed throughout the continuum of care from understanding wellness and health, disease prevention, detection, diagnosis, decision making to treatment and self-care management (Osborne, 2012). Health Literacy refers to a set of skills that people need to function in a healthcare environment (Berkman et al., 2011). The skills needed are the ability to read, understand text and to locate and interpret information in documents also known as print literacy; uses quantitative information such as interpretation of food labels, measuring blood

glucose levels and adhering to medication regimens also known as numeracy literacy; and the ability to listen effectively oral literacy (Berkman et al., 2011). The primary goal of health literacy is to encourage health understanding.

Health literacy can be defined as the basis of social and individual factors, which are mediated by an individual's education, culture, and language (Kindig et al., 2004). In addition, health literacy is affected through communication and assessment skills based on those individuals administering health information (Kindig et al., 2004). Many studies have been conducted over the past three decades assessing the various health related materials, such as informed consent forms, medication package inserts, and it has been found that there is a mismatch that exists between the reading levels of the materials and the reading skills of the intended audience (Rudd et al., 2000).

Modern health systems make complex demands for the health consumer, many people find it difficult to obtain, understand, or use health information (Kindig et al., 2004). Limited health literacy largely affects older adults, people with limited education, and those with limited English proficiency (e.g., Beers at al., 2003; Gazmararian et al., 1999; Williams et al., 1995). Clinicians should be aware that health self-management tasks involving comprehension of new information may be increasingly difficult for older patients because of cognitive and literacy burdens (Kobasyashi et al., 2015). Deficits in health literacy is also linked to many other factors such as disability, language, culture, emotion, and environment (Osborne, 2012). Physician–patient communication can build health literacy, knowledge, self-management and self-efficacy of those with low health literacy.

Williams, Davis, Parker and Weiss (2002) explored the role of health literacy in patient-physician communications in order to suggest recommendations to enhance communication and health outcomes. A patient's health literacy is a critical factor that affects the patient and physician communication along with health outcomes (Williams et al., 2002). Researchers have shown that health literacy is a stronger predictor of health status than is socioeconomic status, age or ethnic background (Nath, 2007). Poor health literacy poses ramifications for the American health system. Patients with low health literacy often present with inaccurate or incomplete histories, missed doctor appointments, medications taken incorrectly, incorrect dosing and the lack of understanding of informed consent further affecting health outcomes of those with T2DM (Williams et al., 2002).

Health Literacy and Health Outcomes

Approximately 80 million U.S. adults are thought to have limited health literacy, placing them at risk for poorer health outcomes (Berkman et al., 2011). Limited health literacy rates are higher among elderly, minorities, and poor persons, and those with less than a high school education (Berkman et al., 2011).

According to the National Adult Literacy Survey (NALS), about one fourth of Americans do not have the ability to read, write, or speak in English, compute and solve problems at levels of proficiency necessary to function on the job or in society (Williams et al., 2002). Individuals with inadequate literacy skills come from diverse backgrounds and include all races and levels of socioeconomic status (Williams et al., 2002). These functional illiterate adults are more likely to have health problems and live in poverty

(Williams et al., 2002). Lack of adequate literacy is twice as common for older Americans and inner-city minorities, the primary users of Medicare and Medicaid (Williams et al., 2002). Many high school graduates are illiterate, as age increases, so do the deficits in literacy, due to declining cognitive function, increase time since formal education, and decreased sensory abilities (Safeer & Keenan, 2005). The Rapid Estimate of Adult Literacy in Medicine (REALM) is the quickest way to assess a patient's recognition of heath terms and their ability to interpret health related reading material (Safeer & Keenan, 2005). The REALM is a 66-item health word-recognition test providing a grade estimate of individuals who read below the ninth-grade level. The responses are recorded as either correct or incorrect. The number of correct responses corresponds to a reading level (Powell et al., 2007).

Based on an Agency for Healthcare Research and Quality report (2004), there is an association between inadequate literacy measured by reading skills, and several adverse health outcomes, which included increased incidence of chronic illness, low usage of preventative health services, and suboptimal intermediate disease markers (Nath, 2007). Berkman, Sherida, Donahue, Halpern, and Crotty (2002), conducted a systematic evidence review for the Agency for Healthcare Research and Quality published in 2004 based on literature search, data abstraction, quality assessment, and data synthesis determined that low health literacy is associated with poor health outcomes and poorer usages of services.

In the area of use of healthcare services and access to care, nine studies were carried out to examine the risk of emergency care use and hospitalizations with the

evidence showing increased use of both services among individuals with low health literacy, including older adults, clinic and inner-city patients, patients with asthma and patients with congestive heart failure (Berkman et al., 2011). In the area of health-related care skills, taking medications appropriately six studies provided evidence that low health literacy is related to poorer skills in taking medications (Berkman et al., 2011). In one good quality study, patients with coronary heart disease and low health literacy were less likely to accurately identify their medications.

Lastly in interpreting labels and health messages, studies provided moderate evidence that low health literacy is associated with poorer interpretation of labels that included prescription medications, nutrition and health messages (Berkman et al., 2011). In addition, adult patients with low health literacy in primary care clinics were less able to describe how they would take five medications and had a greater probability of misunderstanding instructions on one or more labels (Berkman et al., 2011). This study reveals that there is a direct correlation between health literacy and health outcomes in management of chronic diseases such as T2DM.

Numerous studies have confirmed an association between inadequate health literacy and adverse outcomes in patients with diabetes (Nath, 2007). Health education is a prerequisite for effective self-management of diabetes, but knowledge does not necessarily predict outcomes (Nath, 2007). However better understanding of diabetes may improve outcomes in certain populations that have a gap in knowledge deficits, because even a small increase in knowledge may contribute to improving self-care (Nath, 2007).

Health Literacy and Physician–Patient Relationship

The physician–patient relationship is an alliance between the patient and the doctor. This alliance offers an opportunity to greatly improve the patient's quality of life and health status (Ludwig & Burke, 2014). Communication is a vital part of the physician and patient's relationship. The patient and physician must be able to effectively understand one another during a medical encounter. A deficit forms in this relationship when one individual in this relationship lacks understanding in the midst of their communication. Health literacy can affect this relationship, when a patient has low heath literacy misunderstandings can arise in the communication between a physician and a patient, possibly leading to inadequate care.

An Institute of Medicine report concluded that most health professionals and policymakers lack understanding about the barriers posed by inadequate health literacy (Nath, 2007). Successful diabetes care requires two-way communication between the healthcare providers and patient's involvement of patient's treatment decisions and active participation in self-care and goal setting (Nath, 2007). It is the physician's responsibility to form a relationship with their patients to foster two-way communication and ensure that the patient is comfortable with expressing his/her needs in a medical encounter.

Educating a patient during a medical encounter is one of three main functions that should take place in fostering two-way communication (Schillinger et al., 2003). Studies have shown that patients recall and comprehend as little as 50% of what they are told by their physicians (Schillinger et al., 2003). Ensuring that a patient is able to recall their diabetic regimen and comprehension is essential for patients with chronic conditions such

as T2DM. Patients living with T2DM are expected to cope with complex treatment regimens, management of multiple visits with varying clinicians, monitor changes in their health status and begin positive health behaviors (Schillinger et al., 2003).

Understanding of the physician's vocabulary is an essential part of the two-way communication between the physician and the patient during a medical encounter. The language or terminology that healthcare providers use when communicating with patients can be a barrier for patients with inadequate health literacy (Williams et al., 2002). Several studies document that physicians use of medical terms, combined with limited health vocabulary, results in poor and confusing communication, and oftentimes patients complain that physicians do not explain their illness or treatment options in terminology that can be understood by the patient (Williams et al., 2002).

Understanding instructions from clinicians is another essential part of the two-way communication between the physician and the patient during a medical encounter. Lack of comprehension of health vocabulary, limited health knowledge, and impaired ability to integrate new information and concepts play wavering roles in patients with low health literacy and their ability to communicate with the healthcare provider (Williams et al., 2002). Patients commonly do not understand the context, detail, and or significance of their diagnoses, and even hospital discharge instructions (Williams et al., 2002).

According to Williams, Davis, Parker, and Weiss senior citizens living in public assistance housing complexes with the poorest literacy skills were reported to have greater difficulty understanding information given to them by their healthcare providers (Williams et al., 2002). Simple instructions such as taking medicine orally, or on an

empty stomach, or three times daily are intimidating to many low-literate patients (Williams et al., 2002). Most patients with low health literacy have difficulty following written instructions such as “Take one tablet two times a day.” These patients are more likely to follow instructions correctly when they are written in a format less open to interpretation: for example, “Take one tablet every 6 hours.” Pictures and line drawings are useful in this patient population (Nath, 2007).

Low literacy patients become overwhelmed with information about their illness and ask fewer questions than those with higher health literacy. Patients with inadequate literacy often feel a sense of shame or low self-worth and are often too embarrassed to ask a physician to explain or repeat relevant information or instructions (Safeer et al., 2005). In addition, providers give too much detailed information or information that is not relevant to these patients (Williams et al., 2002).

Physician–patient relationships play a significant role in health literacy of patient populations that have low health literacy. Physicians have the responsibility of identifying these patients through assessment tools, ensuring that they speak to patients in a way in which is comprehendible during a medical encounter, and finding out ways in which they can better meet the needs of the patients.

Physicians’ Role in Addressing Health Literacy

One of the goals for Healthy People 2010 is to improve health literacy, and recently the Institute of Medicine added health literacy to its list for quality improvement (Safeer et al., 2005). One of the goals for Healthy People 2020 focuses on the role of health information technology in implementation of health literacy and health

communication in order to meet the needs for health measures and interventions (Healthy People, 2017). Medical encounters with the physician and patient should include the physician providing patients with information that is simple and clear to understand their medical condition and its treatment (Safeer et al., 2005).

In a recent study of patients with diabetes, two-thirds did not know their last A1c value and, of those patients who claimed they did, only 25% were able to report the value accurately. Patients that rated their providers as being more thorough are more likely to know their A1c values, and patients whose physicians assessed recall and comprehension are more likely to have lower A1cs (Wallace, 2010). Very few healthcare providers do this during visits; many physicians only assess the patients understanding 20% of the time. This suggest that at the most basic level literacy, physicians are able to influence health outcomes of patients with diabetes and other chronic illness, which poses barriers to knowledge attainment (Wallace, 2010). Focusing on improved communication during a medical encounter may result in improved health outcomes for patients.

In addition, physicians often rely on written information that is too complex for the patient to understand. Written materials should be short, clear and simple and should consist of many pictures (Safeer & Keenan, 2005). Presenting information to a patient focused on pathophysiology and complicated medical terms can decrease the patients understanding of the material.

The American Family Physician provided six steps to enhance understating among low health literacy patients including: (a) Slowing down and taking time to assess the patients literacy skills, (b) Using basic language instead of medical jargon, (c) Draw

pictures to enhance understanding and recall, (d) Use the teach back method or show me approach to confirm understanding, (e) Always be respectful and caring, and sensitive, thereby empowering the patient an opportunity to participate in their own healthcare (Safeer & Keenan, 2005). With the use of these simple steps, physicians can build understanding and effective communication.

Type 2 Diabetes Mellitus

Background of Diabetes

Diabetes mellitus is a chronic disease requiring continuous medical care, patient self-management, patient education and support to prevent short-term complications and reduce the risk of long-term complications (ADA, 2013). Diabetes is a disease in which blood glucose or sugars are above normal overwhelming the insulin receptors preventing its uptake. Most of the food that is consumed is turned into glucose, which is used as a source of energy (CDC, 2015). The pancreas, which is an organ in the body responsible for glucose uptake by means of a hormone, called insulin. Insulin is useful in helping to get glucose into the cells of our bodies (CDC, 2015). Diabetes is an illness that occurs when the body cannot make enough insulin or cannot utilize the insulin, further causing an excessive amount of glucose in the body (CDC, 2015).

T2DM is one classification of the four clinical classes, which results from a progressive insulin secretory defect on the background of insulin resistance (ADA, 2015). Diabetes can cause many serious health complications including heart disease, blindness, kidney failure, and amputations of the lower extremities (CDC, 2015). There are many risk factors of T2DM, which include weight, inactivity, family history, race (Blacks,

Hispanics, American Indians, and Asians), age, gestational diabetes polycystic ovary syndrome, high blood pressure, and abnormal cholesterol and triglyceride levels (Mayo Clinic, 2017). Each of these risk factors is highly important in prevention of development of this illness. Health literacy not only aids in self-management of diabetes, however the prevention as well. Diabetes is a disease that requires extensive knowledge for management; therefore, adequate health literacy is vital for improving the health outcomes of individuals living with diabetes.

Diabetes Statistics in the United States

In 2015, an estimated 30.3 million Americans of all ages or 9.4% of the population had diabetes. This total included 30.2 million adults aged 18 years or older of which 7.2 million were not aware or did not report having diabetes (CDC, 2017). Americans age 65 and older remain the highest group of individuals affected by diabetes. In 2015, more than half of these new cases were among adults aged 45-64 years and the numbers were equal for men and women. Non-Hispanic Blacks (9.0 per 1,000 persons) and people of Hispanic origin (8.4 per 1,000) had a higher age adjusted incidence compared to the non-Hispanic Whites (5.7 per 1,000 persons) during 2013-2015 (CDC, 2017). Age-adjusted incidence was about two times higher for people with less than a high school education (10.4 per 1,000 persons) compared to those with more than a high school education (5.3 per 1,000 persons) during 2013-2015 (CDC, 2017). Diabetes remains the 7th leading cause of death in the United States in 2015 based on death certificates in which diabetes was listed as the underlying cause of death (CDC, 2017).

The total direct and indirect estimated cost of diagnosed diabetes in the United States in 2012 was $245 billon (CDC, 2017).

Diabetes in Georgia

Georgia's health rate for diabetes is 8% higher than the national average (ADA, 2017). In 2013 diabetes was the 7th leading cause of death in Georgia (CDC, 2016) In 2014, there was 14.2% people in Georgia living with diabetes. Of the estimated persons 241,000 had diabetes but didn't know they had it, which increased their health risk (ADA, 2017). In addition, about 36.1% people in Georgia of the adult population had pre-diabetes, which is an elevated blood glucose level that is not yet diabetes. As of 2013 the total cost of diabetes in Georgia is approximately $5.1 billion (ADA, 2017).

Diabetes and Low Health Literacy

Despite an increase in the number of pharmacologic agents that are effective at lowering hemoglobin A1c for patients with T2DM almost 48% of patients diagnosed with diabetes are unable to achieve an A1c measurement ≤ 7.0% (White, 2016) The association between health literacy and diabetes control is intricate, with a number of studies reporting an indirect association between health literacy and A1c which were mediated by factors such as diabetes knowledge and self-efficacy (White, 2016). Clinical indicators measure many chronic diseases such as T2DM, which may be difficult for patients who have low health literacy to understand and further to translate into behaviors for control of these indicators (White, 2016). Many patients with diabetes do not recall or understand the meaning of control indicators such as HbA1c (White, 2016). Low health literacy is common among patients with diabetes and has been found to be associated

with poorer knowledge of the disease and its complications (White, 2016). Diabetes treatment regimens are complex and require making major lifestyle changes that are difficult even for educated patients (Powell et al., 2007). T2DM management requires extensive knowledge for self-care management, sometimes tailoring for a brand-new lifestyle.

Without proper education, many patients do not comply with their regimen or lifestyle changes. Patients with low health literacy may experience problems reading the labels on medications, interpreting the values for blood glucose readings, understanding dosage schedules, comprehending appointment slips, educational brochures and also knowing risk (Schillinger et al., 2003). Patients with low health literacy also have difficulties naming and medications, describing their indications, and often times have beliefs that interfere with their adherence to a self-care management regimen (Schillinger et al., 2003). Rothman, DeWalt, and Malone (2004), found that comprehensive diabetes disease management programs benefited patients with low literacy when comparing to a control group that did not participate in disease management program. Patients that participated in the diabetes management program had improvements in their glucose control compared to those who were not.

Powell, Hill and Clancy (2007), conducted a study in which they sought the relationship of Rapid Estimate of Adult Health Literacy in Medicine (REALM), Diabetic Knowledge Test (DKT), and Diabetes Health Belief Model (DHBM) Scale and glycemic control. The DKT is a 14-item general multiple-choice test and 9-item insulin use subscale, which is used to assess a patient's knowledge on diabetes.

The Diabetes Health Belief Model Scale (DHBM) is an 11-question scale that operationalizes the Health Belief Model for individuals with diabetes (Powell et al., 2007). Based on the study conducted there was a statistically significant lower DKT score and higher hemoglobin A1c in patients with lower health literacy based on the REALM literacy level and the DKT score (Powell et al., 2007). Also, those patients with lower literacy level had hemoglobin A1c levels 1.21% to 1.36% higher than those with REALM literacy greater than or equal to the ninth grade. There was no significant association between the DHBM scale score and literacy (Powell et al., 2007). The study concluded that low health literacy seems to be associated with worse glycemic control and poorer disease knowledge in patients with diabetes (Powell et al., 2007).

Assessing Diabetic Literacy

Because diabetes self-management requires patients to accurately conduct numerical calculations, health literacy assessments must focus on numerical data. The Wide Range Achievement Test (WRAT) measures arithmetic computation in addition to reading and spelling and is available in two levels. (Level 1 for children 5-11 years and level 2 for individual's ages 12-64 years) however this test is takes about 30 minutes to complete (Wallace, 2010).

A new assessment test that requires about 10-15 minutes to take is the Diabetic Numeracy Test (DNT). The DNT is tailored towards literacy and math skills as well as diabetic knowledge (Wallace, 2010). Lower numeracy skills are associated with difficulty performing many self-management tasks in a person living with diabetes. Tasks such as correctly interpreting glucose meter readings, calculating carbohydrate intake, and insulin

dosages potentially leads to worse glycemic control (Wallace, 2010). Identifying and assessing diabetic literacy is useful in improving knowledge in patients with low health literacy. A better understanding of diabetes may improve outcomes in some populations that have large knowledge deficits, because under these circumstances even a small increase in knowledge may contribute to improved self-care (Nath, 2007).

Diabetes Self-Management

Diabetes self-management is a lifelong process and is directed towards care. The process of self-management requires a mix of cognitive (reasoning), acting, and social, communicating skills (Moser et al., 2008). Development of skills in patients with low health literacy is essential to diabetic self-management, however understating alone does not make self-management successful. Low health literacy is associated with other factors that have a negative influence on patient's ability to place knowledge into effect (Wallace, 2010).

Self-care management behaviors such as medication management, glucose testing and managing regular appointments, diet and exercise requires major behavior changes, goal setting can be helpful in integrating behavior change in the context of daily life (Wallace, 2010). Populations of patients with low health literacy, have lower self-efficacy or confidence, which effects the ability of the patient carrying out a skill, these patients also have lower participation in their decision- making, limited social support, suffer from depression, lack of employment, or under employment and many lack insurances with lower socioeconomic status (Wallace, 2010).

Patient goal setting and follow up have been useful in promoting self-efficacy in self-management in based on the physician patient relationship. Addressing psychosocial factors in addition to health literacy are all associated with self-care management and may be contributory in improving health outcomes for patients with lower health literacy (Wallace, 2010).

Summary

Low health literacy is a public health issue affecting how millions of Americans navigate through today's healthcare settings (Rothman, et al., 2004). Patients with low literacy can have difficulty reading prescriptions, following medical instructions, and often times lack knowledge of their disease and the basic skills of how to manage it. Low health literacy is common among patients with diabetes and other chronic illnesses. Patients with lower health literacy are usually elderly, minority, report lower income, and have lower education attainment (Rothman et al., 2004). Low health literacy has been linked to poor health outcomes based on the recent studies. Health literacy has recently been added to the IOM list for quality improvement based on its need for research and the growing issue in the United States (Safeer & Keenan, 2005).

There are several health implications associated with low health literacy and a major correlation to physician–patient relationships. Physician–patient relationships play a significant role in improving health literacy. Improving communication through medical encounters and developing patient skills are vital to improving the quality of care that a patient receives (Wallace, 2010). T2DM is a chronic illness that requires extensive knowledge for the physician and also the patient to manage. Due to the complexities of

the disease many patients often have found it difficult to maintain their blood glucose levels. Limited literacy defined in is simplest term is lack of the ability to read, however when it comes to effectively managing a disease such as T2DM literacy poses a barrier for greater than 50% of the patients that seek care (Wallace, 2010). The prevalence of limited health literacy has many implications in terms of health outcomes, health disparities, safety of patients and also healthcare costs (Wallace, 2010). However, in reference to diabetes limited health literacy affects the patients' self-management.

Self-care management is a mainstay of diabetes. Adequate health literacy is needed to fulfill the duties needed in self-care management of individuals with T2DM. These changes in a diabetic's life can be extensive, and due to low health literacy and often times the self-care management duties are left unfulfilled, increasing health complications. Because physicians play an active role in patients understanding of self-care management, the American Family Physicians published an article addressing the need for physicians to provide patients with simple information that they can understand and promoting self-efficacy among patients through teach back methods.

In conducting this literature review, health literacy, diabetes, physician–patient relationships were examined. In examining health literacy, the focus of assessment was the REALM and DKT, these tests were chosen from previous research. The overview of SCT identifies how environment, and social factors affect a person's behavior changes and self-efficacy. SCT poses a method of understanding self-care management in patients with T2DM. The objective of this study is to examine physician–patient's relationships

and its correlation to health literacy in individuals with T2DM. The target population was African Americans in South Fulton, Georgia.

Chapter 3 describes methods for data collection.

Chapter 3: Methodology

Introduction

The purpose of this study was to explore the association between health literacy and physician–patient communication among African Americans living with T2DM in Fulton County, Georgia. A summary of the study's design also includes a justification for why the research design was selected. The setting and sample size were discussed in addition to the data analysis and ethical considerations.

Research Design and Rationale

Description of Research Design and Approach

The study used a quantitative, nonexperimental research design with a survey. The goal was to examine the association between health literacy and physician–patient communication, while adjusting for potential cofounders. Participants were asked to complete four separate self-administered questionnaires/surveys: (a) a short-form test of functional health literacy (s-TOFHLA) to measure their health literacy, (b) a separate survey for IPC to examine the quality of care between the physician and patient, (c) the diabetes knowledge test (DKT) to measure their knowledge of diabetes, and (d) an in-person, patient questionnaire, including demographic characteristics (age, gender, race/ethnicity, education, insurance, social support) and current diabetes medications (use of diet/exercise, insulin, oral hypoglycemic agents). The three surveys and the demographic questionnaire provide answers to the research questions and help test the hypothesis of this study.

Table 1

Variable Descriptions, Measurements and Coding

Variable category	Variable	Level of measurement	Description	Code
Independent variables				
	Physician–patient communication	Scale	1 = Adequate 14-18 2 = Moderate 9-13 3 = Inadequate 1-8	IPC, IPC2, IPC3, IPC4, IPC5, IPC6, IPC7, IPC8, IPC9,1PC10, IPC11, IPC12, IPC13, IPC14, IPC15, IPC16, IPC17, IPC18, IPC19, IPC20, IPC21, IPC22, IPC23, IPC24, IP25, IPC26, IPC27, IPC28, IPC29
Dependent variables				
	Health Literacy	Scale	1 = Adequate 2 = Marginal 3 = Inadequate	HLA1, HLA2, HLA, HLA4, HLA5, HLA6, HLA7, HLA8, HLA9, HLA10, HLA11, HLA12, HLA13, HLA14, HLA15, HLA16, HLA17, HLA18, HLA19, HLA20, HLA21, HLA22, HLA23, HLA24,

			HLA25, HLA26, HLA27, HLA28, HLA29, HLA30 HLA31, HLA32, HLA33, HLA34, HLA35, HLA36
Diabetes Knowledge	Scale	1 = High Knowledge 13-16 2 = Medium Knowledge 9-12 3 = Low Knowledge 1-8	DKT1, DKT2 DKT3, DKT4, DKT5, DKT6, DKT7, DKT8, DKT9, DKT10, DKT11, DKT12, DKT13, DKT14 DKT15, DKT16, DKT17, DKT18, DKT19, DKT20, DKT21, DKT22, DKT23
Hemoglobin A1c	Nominal	A1c% 0 = Below 6.5% 1 = 7% 2 = 8% 3 = 9% 4 = 10% 5 = 11% 6 = 12% 7 = 13% 8 = 14%	

Demographics	Categorical	Age Gender 1 = Male 2 = Female Education Level 1 = Some middle school 2 = Some high school 3 = High School/ Diploma/GED 4 = Some College 5 = College Graduate 6 = Graduate Level or Above Income Level 1 = 20,000 or less 2 = 20,000-40,000 3 = 40,000-60,000 4 = 60,000- or more

Methodology

Population

The target population was made up of male and female African American patients, aged 18-75, who had a diagnosis of T2DM for greater than 6 months and are actively seeking care and treatment by a primary care physician. The target population size surveyed is approximated at 450–500 individuals who have visited the clinic and have the diagnoses of T2DM for greater than 6 months. The diagnoses of T2DM are an HbA1c of 6.5 or higher on two separate occasions, or fasting blood glucose greater than 126 mg/dl (CDC, 2017).

Sampling and Sampling Procedures

The setting for this study was a family medicine clinic in South Fulton County, Georgia. This center consists of family medicine physicians. The center was selected because the location is a predominantly lower-income African American community serving a patient population of primarily African Americans. The sampling method used was a random sample of patients with diagnoses of T2DM who were identified by a query from the electronic medical records with an International statistical code of disease (ICD) code of E11.9, which is the diagnosis code for T2DM. Randomization will allow each individual of the diabetic population that identifies as African American, between the ages of 18 and 75, an equal probability of being selected, producing data that is representative of the target population (Creswell, 2009). The participants were identified by a query using the computerized database within the clinic.

The sample size was calculated using the power analysis program, G Power 3.1 (Faul et al., 2009). A minimum sample size of 70 participants was recommended to achieve a medium-size effect. To compute the sample size, the input parameters included: power analysis for test family z-test. The statistical test used was logistic regressions, with analyses input set at a priori: to compute the required sample size. The calculated sample size needed to achieve a power or strength of study of 80% (0.80) with the level of significance (alpha) of 0.05 with the linear multiple regression model to meet the medium effect size of 0.15 is a minimum sample size of 70 participants. The level of significance (alpha) of 0.05 and strength of study or power 80% are general inputs commonly used to calculate an appropriate sample size (Rudestam & Newton, 2015).

Procedures for Recruitment, Participation and Data Collection

The family medicine clinic provides services to about 50 patients per day. To collect data, the researcher recruited participants based on a diagnosis of T2DM (ICD-10 code of 11. 9) during their scheduled appointments. The physician informed patients before the medical encounter about the research study to decide if the patient was interested. If the patient was interested in participating in the study, the patient was instructed to listen to the informed consent form and verbally consent following the encounter with the physician. Once the informed consent form was completed, the researcher sat down with each participant to explain each survey; and provided the participant with the allotted time. Each questionnaire was collected and stored in a secure locked file cabinet in the physician's office.

Eligibility Standards and Characteristics of Selected Sample

Patients were deemed eligible if they were between the ages of 18-75, had been diagnosed with T2DM for over six months, and spoke as well as understood Basic English. Participants must have a primary care physician at the associated clinic for at least six months and have had a diagnosis of diabetes for greater than six months. Excluded patients include those who have a documented diagnosis of end-stage renal disease, dementia, psychotic disorder, or blindness because these conditions can interfere with accurate measurements of Functional Health Literacy (FHL). To ensure that the patients were eligible, a list of the patients generated from the database was provided to their physicians to indicate patients meeting the criteria for eligibility. Billing and coding generated the list of eligible patients based on appointments. The billing and coding

department has access to the query database and provided the researcher with the needed information. General characteristics of the selected sample size were measured by the in-person patient questionnaire.

Instrumentation and Materials

The first questionnaire that was administered was the patient demographics survey, followed by the s-TOFHLA. Respondents then answered the DKT and lastly, the interpersonal processes of care. The in-person patient questionnaire developed by the researcher is similar to a previous study conducted by Schillinger. The in-person patient questionnaire inquired about general information on the participant, including the participant's age, highest education level attained, diabetes duration, and current diabetic medications. (Schillinger et al., 2004).

The s-TOFHLA was created in 1999 by the research team Baker, Williams, Parker, Gazmararian and Nurss. (Collins et al., 2011). The TOFHLA, created in 1985, is a functional literacy tool designed to evaluate adult literacy in the healthcare setting. This instrument measures health literacy on the assumption that more than classroom knowledge is needed to progress adequately through the healthcare system. The s-TOFHLA is a more abbreviated version of the TOFHLA that decreases administration time from 22 minutes to 7 minutes and eliminates the need for visual acuity screening because of the 14-point font scale. The s-TOFHLA tests a patient's ability to read passages using original materials applicable to the healthcare setting. The s-TOFHLA has four numeracy items and two reading comprehension passages, the first from an upper Gastrointestinal radiograph and the other from a rights and responsibility section of a

Medicaid application, which are at a reading level of 4th and 10th grade (Collins et al., 2011). A modified Cloze procedure is used where every fifth to seventh word in the passage is omitted, and there are four multiple-choice options provided (Schillinger et al., 2004). The scoring of the s-TOFHLA is scored on a 0-36 scale, categorizing patients with a 0-16 score of inadequate FHL, 17-22 marginal FHL, and 23-36 adequate FHL (Schillinger et al., 2004). Those patients with inadequate FHL often misread simple materials such as their medications, slips for appointments, and nutrition labels. Patients that tested for marginal FHL often have difficulty with brochures, educational materials and consent documentation on rights and responsibilities (Schillinger et al., 2004) The s-TOFHLA has demonstrated good internal consistency (reliability) with a Cronbach's alpha of 0.68 for numeracy items and 0.97 for items in reading comprehension section (Collins et al., 2011).

The quality of physician–patient communication was measured using the communication sub-scales of the IPC in Diverse populations Questionnaire (IPC), which is a publicly available, modifiable, and reliable instrument. The IPC questionnaire was developed by Stewart, Napoles-Spinger, and Perez-Stable (1999) to validate a hypothesized conceptual framework of domains of the IPC that are relevant to ethnically diverse patients of low socioeconomic status (Stewart et al., 1999, Schillinger et al., 2004). The questionnaire contains 40 items that cover topics such as the patient's experience with their physician based on communication and interpersonal style in the past six months (Stewart et al., 1999; Schillinger et al., 2004). Due to the investigators interest in physician–patient communication , the study will only include 20 of the 40

items which are grouped into seven sub scales of (a) general clarity, (b) elicitation of responsiveness to patients problems, concerns and expectations, (c) explanations of condition, progress and prognosis, (d) explanation of processes of care, (e) explanations of self-care, (f) empowerment and (g) decision making (Schillinger et al., 2004 ;Stewart et al., 1999). The IPC will require patients to respond using the frequency of specific behaviors using a five-point Likert scale which ranged from "always" to "never." The IPC items were combined and modified to create scaled scores for (a) inadequate (b) moderate and (c) adequate communication. All scales were assembled so that a higher score correlated with adequate physician communication.

The final test to be used is the DKT created by the Michigan Diabetes Research and Training Center (MDRTC) who began this project in the mid-1980s for diabetic educators and researchers throughout the country. The Diabetes Knowledge Test is a 14-item general multiple-choice test and 9-item insulin subscale used to assess a patient's diabetes knowledge (Fitzgerald et al., 1998). The 23-item test takes about 15 min to complete. The tests readability was measured by the Flesch-Kincaid grade level, and the reading level for the test items is at a 6th grade level (Fitzgerald et al., 1998). The DKT was categorized into three levels: low knowledge, medium knowledge, and high knowledge. Each scale was constructed so that a higher score meant higher knowledge.

Data Collection

The medical director of the center gave permission to the researcher to utilize the facility and collect data from patients who have been diagnosed with T2DM. The center also provided the researcher with a letter of cooperation and data use agreement.

Participants in the study were asked to complete four different questionnaires following their patient encounter with the physician. The patients gave an oral consent prior to the researcher reading the consent form and providing participants with a copy. Participants were then given each questionnaire to complete beginning with the demographic survey, the s-TOFHLA, IPC, and lastly the DKT. These results will be shared with the facility in order to offer recommendations for diabetes health outcomes in their patient.

Data Analysis

After collecting data from responders using surveys, each survey was individually scored and input into excel. Once data was completely input into excel it was exported to SPSS 24.0 to analyze descriptive stats as frequencies, and confidence intervals for all variables. An ordinal logistic regression model was run to examine the relationships between each independent variable and outcome variables, cross-tabulations were also used to identify if there were any significant relationships, based upon a $p < 0.05$.

Research Questions and Hypotheses

The following research questions were addressed by this study:

Research Question 1. Is there an association between physician–patient communication and health literacy among African Americans living with Type 2 diabetes mellitus, adjusting for confounders age and gender?

H_{01}: There is no association between physician–patient communication and health literacy among African Americans living with Type 2 diabetes mellitus, adjusting for potential confounders age and gender.

H_{A1}: There is an association between physician–patient communication and health literacy among African Americans living with Type 2 diabetes mellitus, adjusting for potential confounders age and gender.

Research Question 2. Is there an association between physician–patient communication and glycemic control among African Americans living with Type 2 diabetes mellitus, adjusting for potential confounders age and gender?

H_{02}: There is no association between physician–patient communication and glycemic control among African Americans living with Type 2 diabetes mellitus, adjusting for potential confounders age and gender.

H_{A2}: There is an association between physician–patient communication and glycemic control among African Americans living with Type 2 diabetes mellitus, adjusting for potential confounders age and gender.

Research Question 3. Is there an association between physician–patient communication and diabetic knowledge among African Americans living with Type 2 diabetes mellitus, adjusting for potential confounders age and gender?

H_{03}: There is no association between physician–patient communication diabetic knowledge among African Americans living with Type 2 diabetes mellitus, adjusting for potential confounders age and gender.

H_{A3}: *There* is *an* association between physician–patient communication and diabetic knowledge among African Americans living with Type 2 diabetes mellitus, adjusting for potential confounders age and gender.

Research Question 4. Is there an association between physician–patient communication and demographics (age and gender) among African Americans living with Type 2 diabetes mellitus ?

H_{04}: There is a no association between physician–patient communication and demographics (age and gender) among African Americans living with Type 2 diabetes mellitus.

H_{A4}: There is an association between physician–patient communication and demographics (age and gender) among African Americans living with Type 2 diabetes mellitus.

Threats to Validity

Lack of external validity may be delimitation in this study do to sample size and random sampling from local family medicine clinic. This study did not necessarily account for those individuals who do not have insurance and who are unable to see the doctor for their current health condition. Participants were also aware of the research study, which may have attributed to false responses to the questions; additional threats to the validity of the study are each person's interpretation of the instructions, and lack of information due to failure to complete questionnaires.

Ethical Considerations

Approval for the study was obtained from the Institution Review Board of Walden University. Each participant in the study signed an informed consent form, which informed the participants about the study, how long the study would last, why participants were selected, associated benefits and risk of involvement, and the honoring

of their confidentiality throughout the study and after the study. The data collected from the participants did not include the patient's name, however coded numerically. Questionnaires were administered on a one-on-one basis in privacy with the researcher. During the course of the study questionnaires were kept in a locked cabinet in the physicians' office, with only the researcher having access to the key. The participants were also informed that all data contained will not influence the care given by their physician and only used by the researcher for research purposes and there will be no harm posed to this population. As a previous medical student at this clinic, and volunteer, I have been provided with full authorization to patient data based on HIPPA regulations. I was responsible for excluding patients based on exclusion criteria based on the generated list of eligible participants provided.

Appendix A contains the letter of cooperation from the organization that was the source of the participants. The organization that allowed for the study to be conducted is the South Atlanta Primary Care. There is a staff of two-family medicine physicians and one podiatrist who treat a variety of adult conditions with one major condition being that of T2DM.

Summary

In Chapter 3 the methodology was discussed. In this study a quantitative, nonexperimental research design and surveys were used to collect data to understand if there were correlations among health literacy and physician–patient communication in African American patients living with T2DM. SPSS will be used to analyze the data collected. The s-TOFHLA, IPC, DKT, and Demographic questionnaires were all means

for providing data for this study. Participants were selected from an electronic database and asked if they are willing to participate in a study on diabetes knowledge. All participants were provided with informed consent and administered surveys on specific days of the week for research study. The study population included those from a local Family Medicine clinic in South Fulton County all having a diagnosis of T2DM for greater than 6 months. Data Analysis included the usage of SPSS. All participants' information will be completely confidential, and IRB was contacted for approval of this study.

The results of the data collected will be presented in Chapter 4, which is the next chapter.

Chapter 4: Results

Introduction

The purpose of this quantitative study was to investigate any association between physician–patient communication and health literacy among African Americans living with T2DM. Four surveys were used to collect data: (a) the short test of Functional Health Literacy in Adults survey (s-TOFHLA), (b) Diabetic Knowledge Test , (c) Interpersonal Processes of Care survey, and (d) a demographics survey. Data were analyzed using SPSS version 24 software. An ordinal logistic regression model and cross-tabulations were applied to answer research questions.

The following research questions and hypotheses were explored in this study:

Research Question 1. Is there an association between physician–patient communication and health literacy among African Americans living with Type 2 diabetes mellitus, adjusting for confounders age and gender?

H_{01}: There is no association between physician–patient communication and health literacy among African Americans living with Type 2 diabetes mellitus, adjusting for potential confounders age and gender.

H_{A1}: There is an association between physician–patient communication and health literacy among African Americans living with Type 2 diabetes mellitus, adjusting for potential confounders age and gender.

Research Question 2. Is there an association between physician–patient communication and glycemic control among African Americans living with Type 2 diabetes mellitus, adjusting for potential confounders age and gender?

H_{02}: There is no association between physician–patient communication and glycemic control among African Americans living with Type 2 diabetes mellitus, adjusting for potential confounders age and gender.

H_{A2}: There is an association between physician–patient communication and glycemic control among African Americans living with Type 2 diabetes mellitus, adjusting for potential confounders age and gender.

Research Question 3. Is there an association between physician–patient communication and diabetic knowledge among African Americans living with Type 2 diabetes mellitus, adjusting for potential confounders age and gender?

H_{03}: There is no association between physician–patient communication diabetic knowledge among African Americans living with Type 2 diabetes mellitus, adjusting for potential confounders age and gender.

H_{A3}: *There* is *an* association between physician–patient communication and diabetic knowledge among African Americans living with Type 2 diabetes mellitus, adjusting for potential confounders age and gender.

Research Question 4. Is there an association between physician–patient communication and demographics (age and gender) among African Americans living with Type 2 diabetes mellitus ?

H_{04}: There is a no association between physician–patient communication and demographics (age and gender) among African Americans living with Type 2 diabetes mellitus.

H_{A4}: There is an association between physician–patient communication and demographics (age and gender) among African Americans living with Type 2 diabetes mellitus.

While controlling for age and gender, ordinal logistic regression was used to examine physician–patient communication and its relationship to health literacy, glycemic control, and diabetic knowledge in African Americans with T2DM. Cross-tabulations were used to further evaluate the relationship to health literacy for each research question as well as with respect to the participant's demographic characteristics (age, gender, sex, and education level) and physician–patient communication. This chapter is a discussion of the data analysis based on the data collected .

Data Collection

To conduct this study, primary data were collected from patients at a primary care facility in Atlanta, Georgia. I was granted permission by the center, with a signed letter of cooperation, to use patients as study participants for this dissertation. The Walden Institutional Review Board granted approval with Approval Number 11-12-18-0375471.

Medical flyers were posted in the medical clinic to advertise the research study to individuals who were interested. In addition, potential participants were also identified in the waiting room to see if they were possibly interested in participating in the study. The facility scheduled a minimum of 50 patients per day.

Patients, aged 18-75, African American race, and diagnosed with T2DM for greater than six months and who understood basic English, were considered for this study. The patients that met the above criteria were asked if they would be interested in

participating in this study. Patients that agreed to participate in the study were taken into a private room provided by the clinic to answer survey questions. Implied consent was used after reading consent forms to potential participants. In order to protect participants' privacy, no signatures were collected, and completion of the surveys indicated participants' consent. Each survey packet included the s-TOFHLA, DKT, IPC, and a demographic survey, and each packet had a random number assigned. The study had a minimum sample size of 70 participants to meet statistical significance that was calculated by a power analysis program G* power. A total of 100 participants were identified from the month of February 2019–June 2019 to complete surveys, and 87 participants agreed to participate. This yielded an 87% response rate, meeting the power needed to conduct this study. Statistical Package for Social Sciences (SPPS) was used to perform data analysis.

Discrepancies in Data Collection

Changes were made from Chapter 3 to Chapter 4 concerning the statistical analysis method. After collecting and reviewing data and level of measurements for each variable, ordinal logistic regression and cross-tabulations were better analysis tools based on methods in which data was collected. In addition, research confounders were specified to age and gender and were also the only two demographics used in Research Question 4.

Baseline Demographic Characteristics of the Participants

The first survey collected demographic characteristics for each participant. Data were collected to categorize each responder by age, gender, education level, and income level. The demographics survey also asked three additional questions concerning the

participant's diabetes treatment regimen, there perceived hgba1c level, and the amount of years in which they have lived with diabetes. Table 3 presents an overview of the descriptive demographic characteristics of the 87 participants who responded to the survey.

Based on the 87 responders, the majority of the participants completing the survey were women (59.8%). The ages ranged from the minimum age of 27 to the maximum age of 83. The majority of responders were between the ages of 61 and 85 (48.2%), and the next largest group was between ages 41 to 60 (41.3%). The average ages of the responders were within a median age of 57. The ethnicities of the responders were all African American (100%). Table 2 illustrates an overview of the descriptive demographic characteristics derived from survey responders.

Table 2

*Demographic Characteristics of Responders (*N = *87)*

Characteristics	N	%
Gender		
Male	35	40.2
Female	52	59.8
Ethnicity		
Black	87	100
Age group		
20-40	9	10.3
41-60	36	41.3
61-85	42	48.2

Table 3 illustrates an overview of descriptive socioeconomic characteristics from the 87 survey responders. Majority of the survey responders reported at least a high school diploma/GED (39.1%). Eleven responders (12.6%) reported some high school, 22 responders (25.3%), reported some college, 18(20.7) responders reported having achieved a college degree, and 2 responders (2.3%) had graduate level or above.

The annual income of the responders was documented using four levels: $20,000 or less, $20,001 - $40,000, $40,001-60,000 or more than $60,000. There were 20 responders (27.5%) in the $20,000 or less range, 52 responders in the (59.8%) in the $20,001 – $40,000 range, 10 responders (11.5%) in the $40,001- 60,000 range, and 1 responder reporting more than $60,000 of annual income.

Table 3

*Socioeconomic Characteristics of Responders (*N = *87)*

Characteristics	N	%
Educational Attainment		
Some High School	11	12.6
High School Diploma/GED	34	39.1
Some College	22	25.3
College Graduate	18	20.7
Graduate level or above	2	2.3
Annual Income		
$20,000 or less	24	27.6
20,001 – 40,000	52	59.8
40,001- 60,000	10	11.5
more than $60,000	1	1.1

Results

Primary data analysis focused on physician–patient communication measured by the interpersonal processes of care, health literacy measured by the STOFHLA, glycemic control measured by hemoglobin A1c, diabetic knowledge as measured by the diabetic knowledge test, and demographics specifically age, gender (Table 4).

The data collected was used to address four research questions to determine whether there is an existing association between physician–patient communication and health literacy in African Americans living with T2DM. There were four hypotheses analyzed to answer each research question. Each hypothesis was examined with statistical analysis to accept or reject the null hypothesis.

Table 4

Statistical Procedures and Research Questions

Research Question	Hypothesis	Variables	Statistical Procedure
Research Question 1: Is there an association between physician–patient communication and Health literacy among African Americans living with T2DM adjusting for potential cofounders?	Physician–patient communication, as measured by the IPC is not associated with Health literacy, as determined by s-TOFHLA in African Americans with T2DM.	IV: Physician–patient communication DV: Health Literacy	Cross-tabulations Ordinal Logistic Regression
Research Question 2: Is there an association between physician–patient communication and glycemic control among African Americans living with T2DM adjusting for potential cofounders?	Physician–patient communication, as measured by the IPC is not associated with glycemic control, as determined by HgbA1cin African Americans with T2DM.	IV: Physician- Patient Communication DV: Glycemic Control	Cross-tabulations Ordinal Logistic Regression
Research Question 3: Is there an association between physician–patient communication diabetic knowledge among African Americans living with T2DM adjusting for potential cofounders?	Physician–patient communication, as measured by the IPC is not associated with diabetic knowledge, as determined by the DKT in African Americans with T2DM.	IV: Physician- Patient Communication DV: Diabetic Knowledge	Cross-tabulations Ordinal Logistic Regression
Research Question 4: Is there an association between physician–patient communication and demographics among African Americans living with T2DM? adjusting for potential cofounders?	Physician–patient communication, as measured by the IPC is not associated with demographics, as determined by age, gender, income, and education level in African Americans with T2DM.	IV: Demographics (age, gender) DV: Physician-Patient Communication	Cross-tabulations Ordinal Logistic Regression

Descriptive Analysis

The summary of responses to the IPC survey is presented below (Table 5). The IPC survey was used to measure the physician–patient relationship focusing on communication, patient-centered decision making, and interpersonal style. Each respondent completed an 18 question IPC survey, which revealed if their physician–patient communication was adequate, moderate, or inadequate. The majority of responders reported moderate physician–patient communication 44 (50.6%). Adequate physician-communication was reported by 35 (40.2%), and inadequate physician communication was reported 6 (6.9%), while data was missing for two participants.

Table 5

Physician–Patient Communication/IPC Distribution

Physician-Patient Communication	*N*	%
Adequate	35	40.2
Moderate	44	50.6
Inadequate	6	6.9
Incomplete	2	2.3
Total	87	100.0

Figure 2 illustrates the responses of Physician–patient communication based on IPC survey responses.

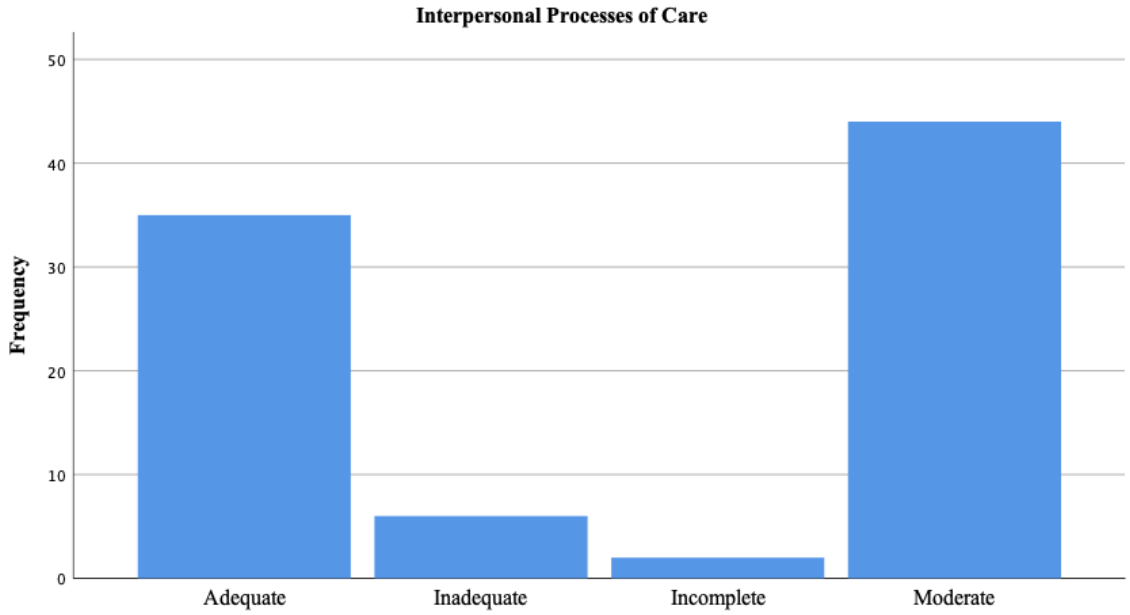

Figure 2. Physician–patient Communication/Interpersonal Process of Care Distribution.

The summary of responses to the functional health literacy survey is presented below in (Table 6). Responders completed a 36-item functional health literacy test. The majority of responders reported functional/adequate health literacy 71 (81.6%). Marginal health literacy was reported by 13 (14.9%) of responders, and inadequate functional health literacy was reported by 3 (3.4%) of responders.

Table 6

Health Literacy Distribution

Health Literacy Level	N	%
Adequate	71	81.6
Marginal	13	14.9
Inadequate	3	3.4
Total	87	100.0

Among the patients with adequate health literacy, 32 patients who reported adequate IPC, 6 patients reported inadequate IPC, and 32 patients reported moderate IPC, and there was 1 incomplete. Among patients with marginal health literacy, 3 patients reported adequate IPC and 10 patients reported moderate IPC. Among patients with inadequate health literacy, 2 patients reported moderate IPC, and there was 1 incomplete. In Figure 3, the distribution of participants who responded to the health literacy survey and physician–patient communication (IPC) survey is shown below.

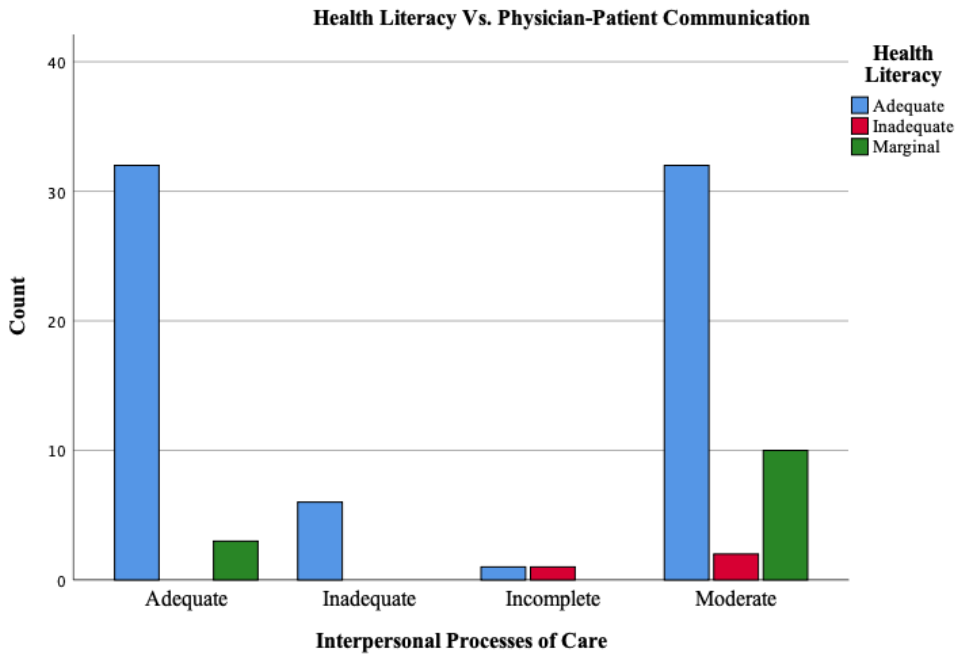

Figure 3. Health Literacy and IPC.

Among responders with a glycemic level ranging between 6.4-7.0, seven patients reported adequate IPC, and one patient reported inadequate IPC and, eight patients reported moderate IPC. Among responders with a glycemic level ranging between 7.1-

9.0, 16 patients reported adequate IPC, and two patients reported inadequate IPC, while 11 patients reported moderate IPC. Among responders with a glycemic level (greater than or equal to 9), seven patients reported adequate, and two patients reported inadequate IPC, while 17 patients reported moderate physician–patient communication. In Figure 4, the distribution of the participant's glycemic levels and physician–patient communication (IPC) is shown below.

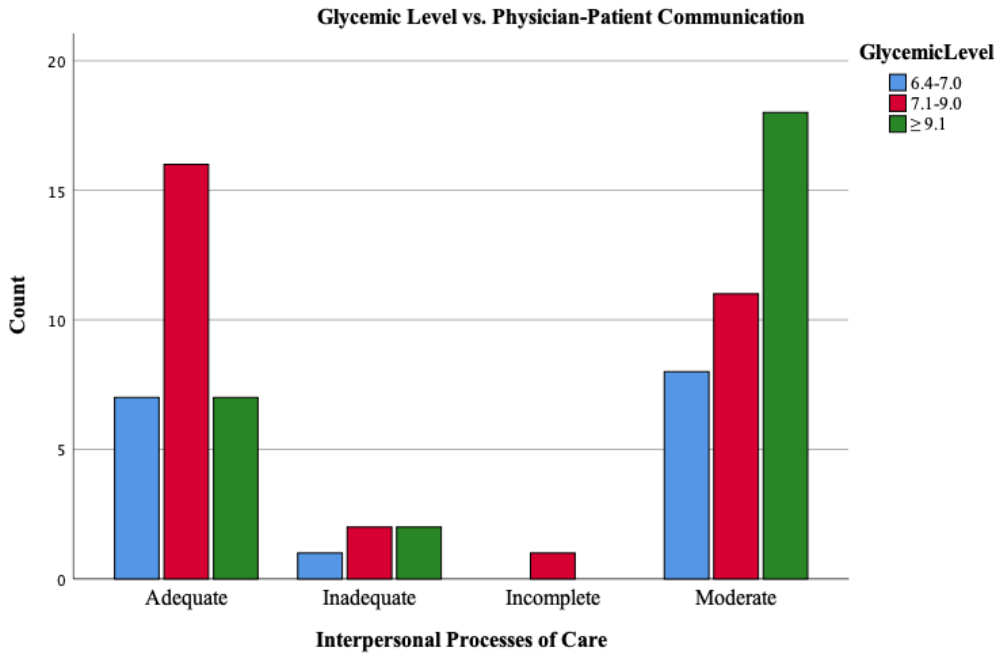

Figure 4. Glycemic level and Physician–patient Communication Distribution.

The hemoglobin A1c levels were recorded based on three distributions, 6.4-7.0, 7.1-9.0, and ≥ 9.1. The majority of responders had an HgbA1c ranging between 7.1-9.0, 30 (34.5%). The least number of responders was between 6.4-7.0, 16 (18.4%). There

were only 73-documented HgbA1c's, which meets the adequate sample size of 70. Table 7 illustrates the glycemic levels based on hemoglobin A1c levels.

Table 7

Glycemic Level Distribution

Glycemic Level	N	%
6.4-7.0	16	18.4
7.1-9.0	30	34.5
≥ 9.1	27	31.0
Total	73	83.9
Total	87	100.0

Table 8 presents a summary of responses to the diabetic knowledge survey, which is a 14- item general multiple-choice test and/or additional 9-item insulin test to assess responder's diabetes knowledge. The DKT revealed that 35 (40.2%) responders had high diabetic knowledge, there were 32 (36.8%) responders with medium diabetic knowledge and 17 (19.5%) responders with low diabetic knowledge. Three responders did not respond to this survey.

Table 8

DKT Distribution

Diabetic Knowledge	N	%
High knowledge	35	40.2
Medium knowledge	32	36.8
Low knowledge	17	19.5
Incomplete	3	3.4
Total	87	100.0

Among responders with (high diabetic knowledge), 18 patients reported adequate IPC, three patients reported inadequate IPC, and 14 patients reported moderate IPC. Among responders with (medium diabetic knowledge), 11 patients reported adequate IPC, two patients reported inadequate IPC, and 19 patients reported moderate IPC. Among responders with (low diabetic knowledge), five patients reported adequate IPC, one patient reported inadequate IPC, and 11 patients reported moderate IPC. There were three incomplete surveys. In Figure 5, the distribution of responders' DKT and physician patient-communication (IPC) is shown below.

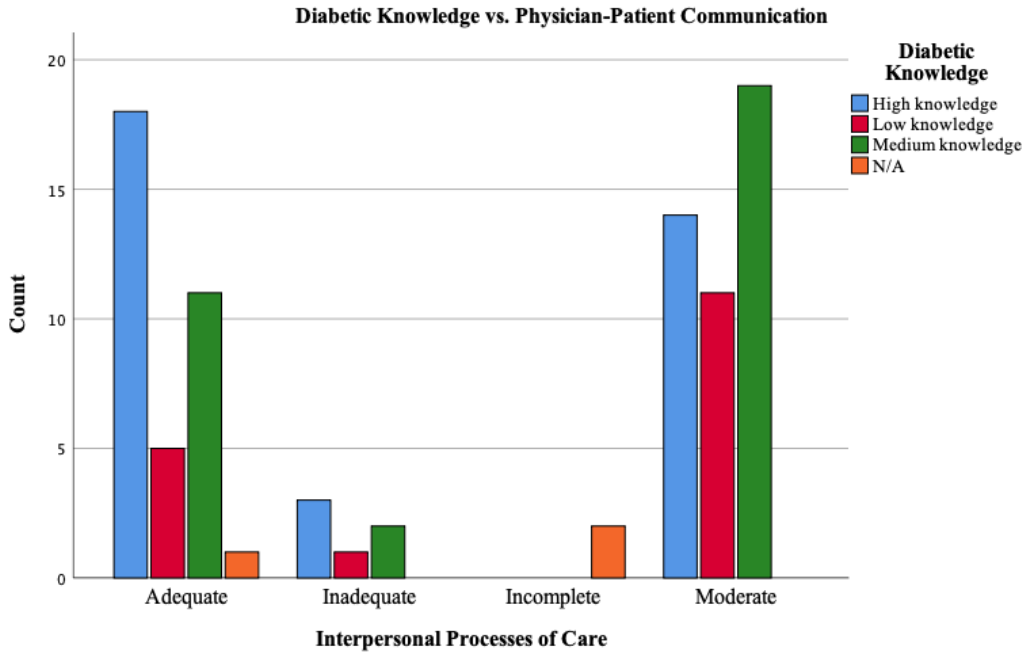

Figure 5. Diabetic Knowledge and Physician–patient Communication Distribution.

The ages ranged from the minimum age of 26 to the maximum age of 83. The majority of responders were ≥ 57 (56.3%), and the next largest group was between ages

26 to 56 (43.7%). The average age of the responders was within a median age of 57. Table 9 illustrates the age distribution.

Table 9

Age Distribution

Age	N	%
26-56	38	43.7
≥ 57	49	56.3
Total	87	100.0

Among responders' age 26-56, 19 patients reported adequate IPC, two patients reported inadequate IPC, and 14 patients reported moderate IPC, and two incompletes. Among responders age ≥ 57, 16 patients reported adequate IPC, four patients reported inadequate IPC, and 29 patients reported moderate IPC. In Figure 6 the distribution of age and physician–patient communication (IPC) is shown below.

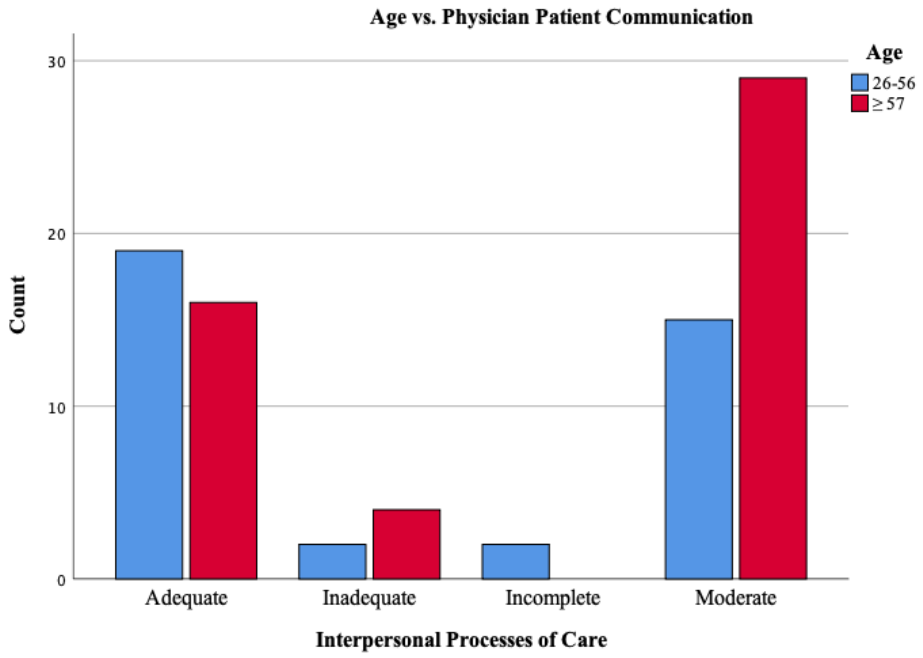

Figure 6. Age and Physician–patient Communication Distribution.

Table 10 illustrates that based on the 87 responders; the majority of the participants completing the survey were female 52 (59.8%). Male responders were a total of 35 (40.2%).

Table 10

Gender Distribution

Gender	N	%
Female	52	59.8
Male	35	40.2
Total	87	100.0

Among respondent's gender (female), 24 patients reported adequate IPC, 3 patients reported inadequate IPC, and 24 patients reported moderate IPC, and one survey

was incomplete. Among participants, gender male, 11 patients reported adequate IPC, three 3patients reported inadequate IPC, and 20 patients reported moderate IPC with 1 incomplete survey. In Figure 7, the distribution of gender and physician–patient communication (IPC) is shown below.

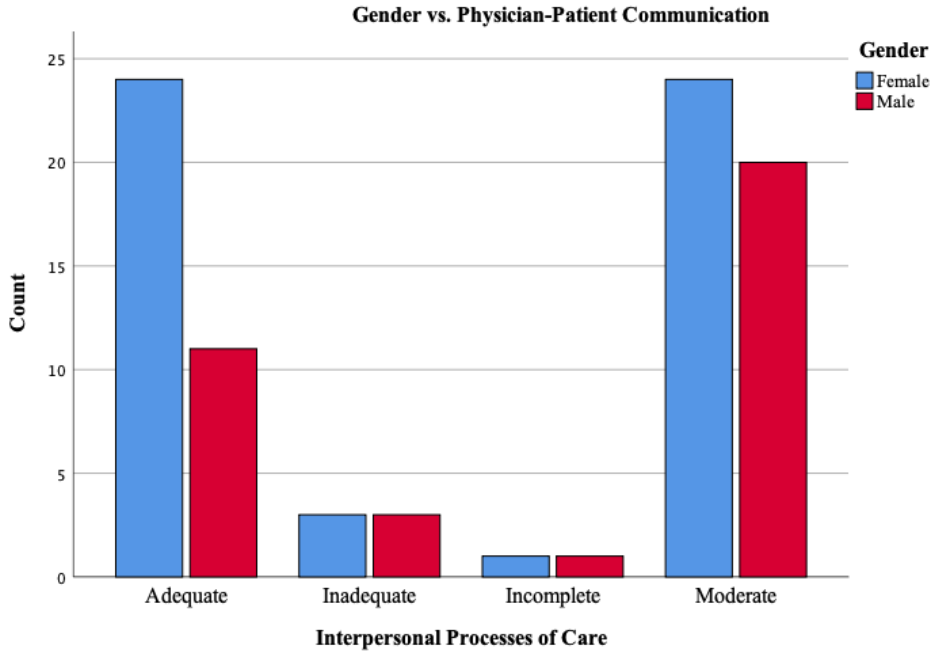

Figure 7. Gender and Physician–patient Communication Distribution.

Inferential Analysis

The following research questions were addressed by this study:

> *Research Question 1*. Is there an association between physician–patient communication and health literacy among African Americans living with Type 2 diabetes mellitus, adjusting for confounders age and gender?

H_{01}: There is no association between physician–patient communication and health literacy among African Americans living with Type 2 diabetes mellitus, adjusting for potential confounders age and gender.

H_{A1}: There is an association between physician–patient communication and health literacy among African Americans living with Type 2 diabetes mellitus, adjusting for potential confounders.

living with Type 2 diabetes mellitus, adjusting for potential confounders age and gender.

This research question was analyzed using cross-tabulation and ordinal logistic regression analysis. The two variables examined were physician–patient communication and health literacy. Physician–patient communication was the independent variable/predictor variable and health literacy was the dependent variable or outcome variable.

Of the 87 responders who participated in this study, a total of 71 responders indicated they had (adequate health literacy). Among these 71 patients who had adequate health literacy, 32 patients reported adequate IPC, with another 32 patients reporting moderate health literacy and 6 patients reporting an inadequate IPC. There was one patient with an incomplete survey. Among the three patients who reported (inadequate health literacy) in the survey, only one patient did not complete the IPC survey, and two patients reported moderate IPC. Among 13 patients with (marginal health literacy), three reported adequate IPC, and 10 reported a moderate IPC.

When analyzing the association between physician–patient communication and health literacy, cross-tabulations showed that those patients who reported adequate and moderate physician–patient communication also reported adequate health literacy levels. Table 11 represents the physician–patient communication/intrapersonal processes of care and health literacy cross-tabulation output.

Table 11

Physician–patient Communication and Health Literacy

		Health Literacy			
Count		Adequate	Inadequate	Marginal	Total
IPC	Adequate	32	0	3	35
	Inadequate	6	0	0	6
	Incomplete	1	1	0	2
	Moderate	32	2	10	44
Total		71	3	13	87

Without accounting for age and gender, to address Research Question 1, Cox and Snell model suggested that health literacy could account for 8.3% of physician–patient communication. Nagelkerke suggested that 12.3% of physician–patient communication could be explained by health literacy, while McFadden model suggested that only 7.7% of physician–patient communication could be explained by health literacy.

Table 12

Physician-Patient Communication/(IPC) and Health Literacy Cross-tabulation Pseudo R-Square

Cox and Snell	.083
Nagelkerke	.123
McFadden	.077

Link function: Logit.

Without accounting for age and gender confounders in this model, Table 13 shows that in this current study, adequate and inadequate health literacy statuses β = 0.975, W(1) = 8.353, p = 0.004, 95% CI [0.314, 1.636] and $\beta = 1.242$, $W(1) = 12.240$, ***p < 0.001, 95% CI [0.546, 1.938] significantly, predicted only adequate physician-

patient communication/IPC; β = -1.371, W(1) = 3.992, p = 0.046, 95% CI [-2.717, -0.026] (Table 13).

Table 13
Physician–patient Communication and Health Literacy Parameter Estimates

							95% Confidence Interval	
		Estimate	Std. Error	Wald	df	Sig.	Lower Bound	Upper Bound
Threshold	Health Literacy = Adequate	.975	.337	8.353	1	.004	.314	1.636
	Health Literacy = Inadequate	1.242	.355	12.240	1	.000	.546	1.938
Location	IPC = Adequate	-1.371	.686	3.992	1	.046	-2.717	-.026
	IPC = Inadequate	-19.834	.000	.	1	.	-19.834	-19.834
	IPC = Incomplete	.368	1.499	.060	1	.806	-2.569	3.306
	IPC = Moderate	0[a]	.	.	0	.	.	.

Link function: Logit.

a. This parameter is set to zero because it is redundant.

Accounting for Age and Gender

After accounting for age and gender in the model to address Research Question 1, Cox and Snell model suggested that 13.1% of physician–patient communication could be explained by health literacy. Nagelkerke suggested that 19.3% of physician–patient communication could be explained by health literacy, while McFadden model suggested that only 12.4% of physician–patient communication could be explained by health literacy (Table 14).

Table 14

Physician–patient Communication and Health Literacy Pseudo R-Square

Cox and Snell	.131

Nagelkerke	.193
McFadden	.124

Link function: Logit.

After accounting for age and gender confounders in the model, Table 15 shows that in this current study, none of the health literacy status (adequate and inadequate) significantly predicted the physician–patient communication (adequate, inadequate, incomplete, or moderate) (Table 15).

Table 15

Physician–patient Communication and Health Literacy Parameter Estimates

							95% Confidence Interval	
		Estimate	Std. Error	Wald	df	Sig.	Lower Bound	Upper Bound
Threshold	Health Literacy = Adequate	1.692	1.200	1.989	1	.158	-.660	4.044
	Health Literacy = Inadequate	1.978	1.208	2.681	1	.102	-.389	4.345
Location	Age = 26-56 years old	.729	.668	1.191	1	.275	-.580	2.037
	IPC = Adequate	-1.074	.715	2.255	1	.133	-2.476	.328
	IPC = Inadequate	-19.799	.000	.	1	.	-19.799	-19.799
	IPC = Incomplete	1.061	1.587	.447	1	.504	-2.050	4.172
	IPC = Moderate	0[a]	.	.	0	.	.	.
	Gender = Female	-1.124	.606	3.443	1	.064	-2.312	.063
	Gender = Male	0[a]	.	.	0	.	.	.

Link function: Logit.

a. This parameter is set to zero because it is redundant.

The ordinal logistic regression results revealed that adequate physician–patient communication was a statistically significant predictor of adequate and inadequate health literacy without accounting for age and gender. Therefore, the null hypothesis was rejected. After accounting for age and gender, physician–patient communication did not

statistically predict health literacy, and the null hypothesis is accepted, taking into account age and gender.

Research Question 2. Is there an association between physician–patient communication and glycemic control among African Americans living with Type 2 diabetes mellitus, adjusting for potential confounders age and gender?

H_{02}: There is no association between physician–patient communication and glycemic control among African Americans living with Type 2 diabetes mellitus, adjusting for potential confounders age and gender.

H_{A2}: There is an association between physician–patient communication and glycemic control among African Americans living with Type 2 diabetes mellitus, adjusting for potential confounders age and gender.

This research question was analyzed using cross-tabulation and ordinal logistic regression analysis. The two variables examined were physician–patient communication and glycemic control. Physician–patient communication was the independent variable/predictor variable, and glycemic control was the dependent variable or outcome variable.

Of the 87, responders that responded to the survey, 73 responders reported information about their hemoglobin A1c. Among 73 responders whose glycemic values were recorded, a total of 16 patients reported a hemoglobin A1c level between 6.4-7.0 range, Thirty, patients reported A1c values between 7.1-9.0, while 27 patients reported A1c values greater than or equal to 9.1. Among 16 patients who reported glycemic values of 6.4-7.0, seven patients reported adequate IPC; one patient reported inadequate IPC,

while eight patients reported moderate IPC. Among 30 patients who reported glycemic values between 7.1-9.0, 16 patients reported adequate IPC, while only two patients reported inadequate IPC. In addition, one patient reported incomplete IPC, while 11 patients reported moderate IPC. Among the 27 patients who reported glycemic value 9.1 or greater, seven patients had adequate IPC, two patients indicated inadequate IPC, no patients reported incomplete IPC, but 18 patients reported moderate IPC.

When analyzing the association between physician–patient communication and glycemic control levels, cross-tabulations showed that those patients who reported majority adequate and moderate physician–patient communication also reported glycemic levels ranging between 7.1 and 9.0. However, when examining patients with glycemic levels greater than 9.1, more participant's had moderate physician–patient communication compared to adequate physician–patient communication. Table 16 represents the physician–patient communication/IPC and glycemic level/hemoglobin A1c cross-tabulation output.

Table 16

Physician–patient Communication and Glycemic Level Cross-tabulation

Count

		Glycemic Level			
		6.4-7.0	7.1-9.0	≥ 9.1	Total
IPC	Adequate	7	16	7	30
	Inadequate	1	2	2	5
	Incomplete	0	1	0	1
	Moderate	8	11	18	37
Total		16	30	27	73

Table 17 represents the model summary table without accounting for age and gender in Research Question 2. The Cox and Snell model illustrated that 3.5% of glycemic levels could be explained by physician–patient communication based on the IPC. Nagelkerke suggested that 3.9% of glycemic levels could be explained by physician–patient communication, while McFadden model suggested that only 1.7% of glycemic levels can be explained by physician–patient communication.

Table 17

Physician–patient Communication/(IPC) by Glycemic Level, Pseudo R-Square

Cox and Snell	.035
Nagelkerke	.039
McFadden	.017

Without accounting for age and gender in this model, Table 18 shows that responders with glycemic levels between 6.4- 7.0 were significantly predicted by IPC; β = 1.654, *W(1)* = 18.932, ***p = 0.001, 95% CI [-2.399, -.909] while responders with glycemic level between 7.1-9.0 were not significantly predicted, β = 0.242, *W(1)* = 0.394, p = 0.539, 95% *CI* [-.426, .827]. Also, none of the IPC (adequate, inadequate, incomplete or moderate) was statistically significant.

Table 18

Physician–patient Communication and Glycemic Level Parameter Estimates

							95% Confidence Interval	
		Estimate	Std. Error	Wald	df	Sig.	Lower Bound	Upper Bound
Threshold	6.4-7.0 Glycemic	-1.654	.380	18.932	1	.000	-2.399	-.909
	7.1-9.0 Glycemic	.201	.319	.394	1	.530	-.426	.827
Location	IPC = Adequate	-.727	.464	2.452	1	.117	-1.636	.183
	IPC = Inadequate	-.226	.890	.064	1	.800	-1.971	1.519
	IPC = incomplete	-.727	1.881	.149	1	.699	-4.413	2.959
	IPC = Moderate	0[a]	.	.	0	.	.	.

Link function: Logit. Glycemic ≥9.1 Glycemic is the reference

a. This parameter is set to zero because it is redundant.

Accounting for age and Gender

After accounting for the age and gender in the model for Research Question 2, Cox and Snell model suggested that 6.0% of glycemic levels could be explained by physician- patient communication/IPC. Nagelkerke suggested that 6.8% of glycemic levels could be explained by physician–patient communication/IPC, while McFadden model suggested that only 2.9% could be explained by glycemic levels physician–patient communication/IPC (Table 19).

Table 19

Physician–patient Communication by Glycemic Level, Pseudo R-Square

Cox and Snell	.060
Nagelkerke	.068
McFadden	.029

After accounting for age and gender in the model, Table 20 shows that responders with glycemic levels between 6.4-7.0 were significantly predicted by IPC; β = -2.053, $W(1) = 5.323$, p = 0.021, 95% CI [-3.797, -0.309*]*. However, none of the glycemic levels 7.1-9.0 were significantly predicted by any category of the IPC (adequate, inadequate, incomplete, or moderate).

Table 20

Physician–patient Communication and Glycemic Level Parameter Estimates

							95% Confidence Interval	
		Estimate	Std. Error	Wald	df	Sig.	Lower Bound	Upper Bound
Threshold	6.4-7.0 Glycemic	-2.053	.890	5.323	1	.021	-3.797	-.309
	7.1-9.0 Glycemic	-.160	.853	.035	1	.851	-1.831	1.511
Location	26-56 years old	-.029	.459	.004	1	.950	-.929	.871
	IPC = Adequate	-.592	.480	1.524	1	.217	-1.532	.348
	IPC = Inadequate	-.369	.897	.169	1	.681	-2.126	1.388
	IPC = Incomplete	-1.078	1.925	.313	1	.576	-4.850	2.695
	IPC = Moderate	0[a]	.	.	0	.	.	.
	Gender = Female	-.656	.473	1.927	1	.165	-1.582	.270
	Gender = Male	0[a]	.	.	0	.	.	.

Link function: Logit. ≥ 57 years old, Moderate IPC, and male are references

a. This parameter is set to zero because it is redundant.

The ordinal logistic regression results showed that physician–patient communication was a statistically significant predictor of glycemic control in glycemic levels ranging between 6.4-7.0, without accounting for age and gender, rejecting the null hypothesis. After accounting for age and gender, physician–patient communication was a statistically significant predictor of glycemic control in glycemic levels ranging between 6.4-7.0, rejecting the null hypothesis.

Research Question 3. Is there an association between physician–patient communication and diabetic knowledge among African Americans living with Type 2 diabetes mellitus, adjusting for potential confounders age and gender?

H_{03}: There is no association between physician–patient communication diabetic knowledge among African Americans living with Type 2 diabetes mellitus, adjusting for potential confounders age and gender.

H_{A3}: *There* is *an* association between physician–patient communication and diabetic knowledge among African Americans living with Type 2 diabetes mellitus, adjusting for potential confounders age and gender.

This research question was analyzed using cross-tabulation and ordinal logistic regression analysis. The two variables examined were physician–patient communication and glycemic control. Physician–patient communication was the independent variable/predictor variable, and diabetic knowledge was the dependent variable or outcome variable.

Of the 87 responders who responded to the survey, 35 patients reported high levels of diabetic knowledge, a total of 32 patients reported medium diabetic knowledge, and 17 patients reported low diabetic knowledge. Among the 35 patients who reported

high levels of diabetic knowledge, 18 patients reported adequate IPC, while 14 patients reported moderate IPC, and three patients reported inadequate IPC. Among the 32 patients who reported medium diabetic knowledge, 11 patients reported adequate IPC, 19 patients reported moderate IPC, and two patients reported inadequate IPC. Among the 17 patients who reported low diabetic knowledge, five patients reported adequate IPC, while 11 patients reported moderate IPC, and two patients reported inadequate IPC.

When analyzing the association between physician–patient communication and diabetic knowledge, cross-tabulations showed that more patients who reported high diabetic knowledge also reported adequate and moderate physician–patient communication. While those reporting medium diabetic knowledge more reported moderate physician–patient communication. Table 21 represents the physician–patient communication/IPC and DKT cross-tabulation output.

Table 21

Physician–patient Communication and Diabetic Knowledge Test

Physician–patient Communication	DKT (Count) High knowledge	Low knowledge	Medium knowledge	N/A	Total
Adequate	18	5	11	1	35
Inadequate	3	1	2	0	6
Incomplete	0	0	0	2	2
Moderate	14	11	19	0	44
Total	35	17	32	3	87

Without accounting for age and gender, in Research Question 3, the Cox and Snell model suggested that 17.9% of diabetic knowledge could be explained by physician- patient communication/IPC. Nagelkerke suggested that 19.8% of diabetic

knowledge can be explained physician–patient communication/IPC, while McFadden model suggested that only 8.4% of diabetic knowledge can be explained by physician–patient communication. (Table 22)

Table 22

Physician–patient Communication and Diabetic Knowledge Pseudo R-Square	
Cox and Snell	.179
Nagelkerke	.198
McFadden	.084

Without accounting for age and gender in this model, Table 23 shows that patients with high diabetic knowledge, and medium diabetic knowledge β = -0.622, W(1) = 4.308, p = 0.038, 95% CI [-1.210, -0.035] and β = 4.200, W(1) = 16.940, ***p < 0.001, 95% CI [2.200, 6.201] were significantly predicted by IPC, while low diabetic knowledge was not significantly predicted by IPC*;* β = 0.207, W(1) = 0.502, p = 0.479, 95% CI [-0.366, -0.781]. Also, none of the IPC (adequate, inadequate, incomplete or moderate was statistically significant.

Table 23

Physician–patient Communication and Diabetic Knowledge Parameter Estimates

							95% Confidence Interval	
		Estimate	Std. Error	Wald	df	Sig.	Lower Bound	Upper Bound
Threshold	DKT = High knowledge	-.622	.300	4.308	1	.038	-1.210	-.035
	DKT = Low knowledge	.207	.293	.502	1	.479	-.366	.781
	DKT = Medium knowledge	4.200	1.021	16.940	1	.000	2.200	6.201
Location	IPC = Adequate	-.564	.425	1.758	1	.185	-1.397	.270
	IPC = Inadequate	-.578	.819	.499	1	.480	-2.183	1.026
	IPC = Incomplete	24.280	.000	.	1	.	24.280	24.280
	IPC = Moderate	0[a]	.	.	0	.	.	.

Link function: Logit.

a. This parameter is set to zero because it is redundant.

Accounting for age and Gender

After accounting for the age and gender, this model in Research Question 3, Cox and Snell model showed that 21.2% of diabetic knowledge could be explained by physician-patient communication/IPC. Nagelkerke suggested that 23.5% of diabetic knowledge could be explained by physician–patient communication/IPC, while McFadden model suggested that only 10.2% of diabetic knowledge could be explained by physician–patient communication/IPC (Table 24).

Table 24

Physician–patient Communication and Diabetic Knowledge Pseudo R-Square

Cox and Snell	.212
Nagelkerke	.235
McFadden	.102

With accounting for age and gender, Table 25 shows that patients with medium diabetic knowledge statuses; $\beta = 6.122$, $W(1) = 14.886$, *** $p = 0.001$, 95% CI [-3.012, 9.232] was significantly predicted by IPC. While patients with high diabetic knowledge and low diabetic knowledge was not significantly predicted by IPC; $\beta = 1.248$, $W(1) = 1.076$, $p = 0.300$, 95% CI [-1.111,3.607] and $\beta = 2.108$, $W(1) = 2.999$, $p = 0.083$, 95% CI [-0.278,4.493]. Also, none of the IPC (adequate, inadequate, incomplete or moderate was statistically significant.

Table 25

Physician–patient Communication/(IPC) and Diabetic Knowledge Parameter Estimates

		Estimate	Std. Error	Wald	df	Sig.	95% Confidence Interval	
							Lower Bound	Upper Bound
Threshold	DKT = High knowledge	1.248	1.204	1.076	1	.300	-1.111	3.607
	DKT = Low knowledge	2.108	1.217	2.999	1	.083	-.278	4.493
	DKT = Medium knowledge	6.122	1.587	14.886	1	.000	3.012	9.232
Location	26-56 years old	-1.019	.713	2.041	1	.153	-2.417	.379
	≥ 57 years old	.059	.031	3.503	1	.061	-.003	.121
	IPC = Adequate	-.458	.439	1.089	1	.297	-1.317	.402
	IPC = Inadequate	-.421	.826	.260	1	.610	-2.040	1.197
	IPC = Incomplete	24.809	.000	.	1	.	24.809	24.809
	IPC = Moderate	0[a]	.	.	0	.	.	.

Link function: Logit.

a. This parameter is set to zero because it is redundant.

The ordinal logistic regression results showed that physician–patient communication was a statistically significant predictor of diabetic knowledge in high and medium diabetic knowledge without accounting for age and gender, rejecting the null hypothesis. After accounting for age and gender, physician–patient communication was a statistically significant predictor of medium diabetic knowledge, rejecting the null hypothesis.

Research Question 4. Is there an association between physician–patient communication and demographics (age and gender) among African Americans living with Type 2 diabetes mellitus ?

H_{04}: There is a no association between physician–patient communication and demographics (age and gender) among African Americans living with Type 2 diabetes mellitus.

H_{A4}: There is an association between physician–patient communication and demographics (age and gender) among African Americans living with Type 2 diabetes mellitus.

Of the 87 responders to the survey, 38 responders were between the ages of 26-56, and 49 responders were age greater than 57. Among the 38 patients between the ages of 26-56, 19 patients reported adequate IPC, 15 patients reported moderate IPC, and two patients reported inadequate IPC, while two surveys were incomplete. Among the 49 participants age (≥ 57), 16 patients reported adequate physician–patient communication, 29 patients reported moderate IPC, and four patients reported inadequate IPC. Table 26 represents the physician–patient communication/intrapersonal processes of care and age cross-tabulation output.

Table 26

Physician–patient Communication and Age Cross-tabulation

		Age		
Count		26-56	≥ 57	Total
IPC	Adequate	19	16	35
	Inadequate	2	4	6
	Incomplete	2	0	2
	Moderate	15	29	44
Total		38	49	87

Of the 87 responders that participated in this study, 60% responders were female, and 4% responders were male. Among the 52 female patients 24 patients reported adequate physician–patient communication, 24 patients reported moderate IPC, and three patients reported inadequate IPC, while one was incomplete. Among the 35 male patients, 11 patients reported adequate IPC, 20 patients reported moderate IPC, and three

patients reported inadequate, while one was incomplete. Table 27 represents the physician–patient communication/IPC and gender cross-tabulation output.

Table 27

Physician–patient Communication and Gender Cross-tabulation

		Gender		
Count		Female	Male	Total
IPC	Adequate	24	11	35
	Inadequate	3	3	6
	Incomplete	1	1	2
	Moderate	24	20	44
Total		52	35	87

In the model to question 4, Cox and Snell model showed that 6.2% of physician-patient communication/IPC could be explained by demographics (age and gender). Nagelkerke suggested that 7.2% of physician–patient communication/IPC can be explained by age and gender, while McFadden model suggested that only 3.3% of physician–patient communication/IPC can be explained by age and gender (Table 28).

Table 28

Physician–patient Communication and Age and Gender,

Pseudo R-Square

Cox and Snell	.062
Nagelkerke	.072
McFadden	.033

Table 29 shows that IPC adequate and inadequate statuses; β = *-1.202*, W(1) = 7.705, p = 0.006, 95% CI [-2.050, -0.353] and β = -0.906, W(1) = 4.559, p = 0.033, 95% CI [-1.738, -.0734] significantly predicted only age 26-56 years old β = -0.872, W(1) = 4.010, p = 0.045, 95% CI [-1.726, -0.01*9]*. Gender was not statistically significant.

Table 29

Physician–patient Communication and Age and Gender, Parameter Estimate

							95% Confidence Interval	
		Estimate	Std. Error	Wald	df	Sig.	Lower Bound	Upper Bound
Threshold	IPC = Adequate	-1.202	.433	7.705	1	.006	-2.050	-.353
	IPC = Inadequate	-.906	.424	4.559	1	.033	-1.738	-.074
	IPC = incomplete	-.810	.422	3.678	1	.055	-1.637	.018
Location	26-56 years old	-.872	.436	4.010	1	.045	-1.726	-.019
	≥57 years old	0[a]	.	.	0	.	.	.
	Gender = Female	-.681	.444	2.351	1	.125	-1.552	.190
	Gender = Male	0[a]	.	.	0	.	.	.

Link function: Logit.

a. This parameter is set to zero because it is redundant.

The ordinal logistic regression results revealed that demographics (age 26-56) were a statistically significant predictor of adequate and inadequate physician–patient communication, rejecting the null hypothesis.

Summary

In Chapter 4, each research question was analyzed, and the results were discussed. Data analyses were conducted on an overall sample of 87 participants from a primary care clinic who answered questions to surveys. Data presented in this chapter tested the null hypothesis of four research questions associating physician–patient communication to health literacy, glycemic control, diabetic knowledge, and demographics age and gender. To address each research question in this study, cross-tabulations and ordinal logistic regression analysis were conducted. The results from ordinal logistic regression analyses are summarized below.

With respect to RQ1, the ordinal logistic regression results showed that adequate physician- patient communication $p = 0.004$ was a statistically significant predictor of adequate $p=0.46$, and inadequate $p < 0.001$ health literacy without accounting for age and gender. Therefore, the null hypothesis was rejected. This suggests that focusing on improved communication between the physician and the patient may improve health literacy without accounting for age and gender.

After accounting for age and gender, physician–patient communication did not statistically predict health literacy. Therefore, the null hypothesis is accepted. In certain risk assessments, factors such as age and gender often affect health status, and therefore

should be controlled. Age and gender have opposite effects on physician–patient communication and health literacy with age having a stronger effect than gender.

With respect to RQ2, the ordinal logistic regression results showed that physician–patient communication was a statistically significant predictor of glycemic control in glycemic levels ranging between 6.4-7.0, ***p< = 0.001 without accounting for age and gender. Therefore, the null hypothesis was rejected. Glycemic control is a hemoglobin A1c level of less than or equal to 7 controlling for other comorbidities. Patients that had glycemic levels ranging between 6.4-7.0 are more likely to report good physician–patient communication, supporting that adequate physician–patient communication can help to improve glycemic levels.

After accounting for age and gender, physician–patient communication was a statistically significant predictor of glycemic control in glycemic levels ranging between 6.4-7.0, p = 0.021. Therefore, the null hypothesis was rejected. After accounting for age and gender, the relationship between the two variables maintained its significance, supporting that patients that had glycemic levels ranging between 6.4-7.0 are more likely to report good physician–patient communication, supporting that adequate physician–patient communication can help to improve glycemic levels.

With respect to RQ3, the ordinal logistic regression results showed that physician–patient communication was a statistically significant predictor of diabetic knowledge in high diabetic knowledge, p = 0.038 and medium diabetic knowledge, ***p< = 0.001 without accounting for age and gender. Therefore, the null hypothesis was

rejected. This statistical significance suggests that physician–patient communication has an impact on the level of diabetic knowledge high medium, supporting that if physicians communicate with their patients about diabetes; their knowledge is likely to increase. On the other hand, low diabetic knowledge did not reveal a statistical significance with physician–patient communication, because most patients with lower diabetic knowledge often feel as if they do not understand their condition and lack self-efficacy to manage their conditions properly due to a lack of knowledge.

After accounting for age and gender, physician–patient communication was a statistically significant predictor of diabetic knowledge in medium diabetic knowledge, ***$p<0.001$. Therefore, the null hypothesis was rejected. After accounting for age and gender the relationship between the two variables maintained its significance only for medium diabetic knowledge.

With respect to RQ4, the ordinal logistic regression results showed that demographics age 26-56, $p = 0.045$ were a statistically significant predictor of adequate, $p = 0.006$ inadequate, $p = 0.006$ physician–patient communication. Therefore, the null hypothesis was rejected. There was no statistical significance for gender. Demographics in studies are often labeled as confounders. Factors such as age, gender, educational level, and income status often affect health status, which is why they are usually controlled. Age 26-56 was a significant predictor of adequate and inadequate health literacy. According to the CDC (2017), adults over 60 have difficulties with printed

health documents, understanding provider instructions, and also with numbers and calculations.

Chapter 5 will discuss the interpretations of the findings in Chapter 4, limitations to the study, social change, and possible recommendations for future areas of study.

Chapter 5: Summary, Conclusion, and Recommendation

Introduction

The purpose of this quantitative study was to determine any relationship between physician–patient communication and health literacy, glycemic control, diabetic knowledge, and demographics (age, gender) in African Americans living with T2DM. This study used patient surveys to collect primary data. Previous surveys have consistently reported that patients desire better communication with their physicians (Ha et al., 2010). Because physician–patient communication is essential to patients' overall care and understanding for effective management of a T2DM, it is imperative to understand—if interpersonal relationships exist between the patient and doctor—whether there is facilitation of information exchange, and if this could improve health outcomes. Primary data were collected to see if physician–patient communication significantly impacted a patient's health literacy and self-care management of T2DM.

This chapter presents interpretations of the hypotheses-testing findings. The analyzed data functioned as the basis for the implications for positive social change, the study limitations, and the recommendations for further study.

Interpretation and Summary of Findings

This section discusses the interpretation of findings to answer the four research questions.

Research Question 1. Physician–patient Communication & Health Literacy

RQ1 evaluated the association between physician–patient communication and health literacy in African Americans living with T2DM. The results revealed that the measure, adequate physician–patient communication $p = 0.046$, was a statistically significant predictor of adequate $p<0.004$ and inadequate $p = 0.001$ health literacy, thus rejecting the null hypothesis. In a recent study comparing African American women to Latino women with T2DM and low health literacy, African American woman were found to have higher T2DM health risks than Latino women, with the most prevalent risk factors being preventable by the patient provider action (Ivanov, Wallace, Hernandez, & Hyde, 2015).

Physicians in another study misjudged the health literacy of 40% of their patients, overestimating 25% and underestimating 15%, which lead to an increase in medical jargon usage, speaking at a higher-grade level, and using more words per speaking turn than the patient (Kelly & Haidet, 2007).Physician dominance, often classified as medical jargon, leads to ineffective communication in patients with inadequate health literacy, leading to adverse health outcomes. Within the clinical setting, health literacy is viewed as a risk factor to the patients' health. Patients with inadequate health literacy level skills are more likely to face health problems, with the provider being responsible for addressing this clinical risk. (Sim, Yuan, &Yun, 2016). William et al. (2002), also supported a statistical significance between physician–patient communication and health literacy, which found that a physician–patient communication plays a critical role in the

patients' health literacy level, affecting health outcomes. On the other hand, some authors are not convinced that health literacy should be measured or is related to diabetes prevention or care outcomes (Al Sayah., et al, 2015) which are contrary to the results that I found.

Research Question 2. Physician–patient Communication & Glycemic Control

RQ2 evaluated the association between physician–patient communication and glycemic control in African Americans living with T2DM. The results revealed that physician–patient communication was a statistically significant predictor of glycemic control in glycemic levels ranging between 6.4-7.0, ***p< = 0.001, rejecting the null hypothesis. Aron et al. (2009), supports this finding, advising that glycemic control in adults with high hemoglobin A1c is hemoglobin A1c less than 7%, further supporting that patients with adequate physician–patient communication are more likely to have lower glycemic levels. Kutab et al. (2013), conducted a study that revealed that African Americans have a two to four times higher rate of renal disease, blindness, and amputation compared to non-Hispanic Whites. Each of these complications is a result of inadequate glycemic control. Studies have revealed that adequate control of blood glucose has been shown to reduce and prevent T2DM complications, but environmental, socioeconomic, and provider-patient related barriers can make this difficult to achieve. According to Wallace (2010), in a recent study, two-thirds of patients did not know their last A1c value, of those who did; only 25% were able to report them accurately. Patients who rated their physicians of being more thorough are more likely to know their A1c

values, and patients who physicians assessed recall and comprehension are more likely to have lower A1cs. This suggests that at the most basic level of literacy, physicians are able to influence the health outcomes of patients with diabetes and other chronic diseases (Wallace, 2010).

Research Question 3. Physician–patient Communication & Diabetic Knowledge

RQ3 evaluated the association between physician–patient communication and diabetic knowledge in African Americans living with T2DM. The results revealed that physician–patient communication was a statistically significant predictor of diabetic knowledge in high diabetic knowledge, $p = 0.038$ and medium diabetic knowledge, $***p < = 0.001$, rejecting the null hypothesis. Sayah et al. (2015), conducted a study on associations between health literacy and health outcomes in a predominantly low-income African American population with T2DM revealing that inadequate health literacy was significantly and modestly associated with diabetes knowledge, $r = -0.34$ but weakly associated with self-efficacy $r = 0.16$.

These findings are also supported by a study to investigate physicians' therapeutic practice and compliance of diabetic patients attending rural primary health units (Ibrahim et al., 2010) suggested that about two thirds 65% of patients get their diabetic knowledge from physicians, while the other 35% receive their instruction from nurses, family, and other diabetic patients. Clinical indicators and measure in T2DM are challenging to understand for patients who have low health literacy and to further translate into behaviors to control these indicators (White, 2016). Many patients with diabetes do not

recall or understand the meanings of terms such as A1c, glycemic control, glucose, or diabetic diet.

The role the physician plays in promoting this understanding and literacy in their patients is crucial to patients developing diabetic knowledge (White, 2016). Literature has revealed that low health literacy is associated with poorer interpretation of labels that included prescription medication, nutrition labels, and health messages (Berkman et al., 2011) In addition, adult patients with lower health literacy in primary care settings were less able to describe how to take their medications and had higher probability of misunderstanding instructions on one or more labels (Berkman et al., 2011). This lack of knowledge decreases medication compliance in patients and yields adverse health outcomes.

Research Question 4. Physician–patient communication & Demographics

RQ4 evaluated the association between physician–patient communication and demographics age and gender in African Americans living with T2DM. The results revealed that physician–patient communication was a statistically significant predictor demographics age 26-56, $p = 0.045$ were a statistically significant predictor of adequate, $p = 0.006$, inadequate, $p = 0.033$ physician–patient communication, rejecting the null hypothesis. There was no statistical significance for gender. The current finding on African Americans and diabetes is supported by Ivanov et al. (2015) study, which shows that older African American women were found to have more diabetes health risk and lower health literacy. Lack of adequate health literacy is twice as common for older

Americans, and inner-city minorities, people with limited education, limited English proficiency, and those who are the primary users for Medicare and Medicaid (Williams et al., 2002). Older patients often have a harder time understanding physician's orders due to factors such as literacy levels, inability to hear, or other comorbid conditions. As age increases so does deficits in literacy, due to declining cognitive function, increased time since formal education, and decreased sensory abilities (Safeer & Keenan, 2005) As adequate physician–patient communication increases, health literacy increases, promoting better understanding and management of chronic diseases such as T2DM.

Limitations of the Study

The method and results of this study presented a number of limitations. The data collected in this study was from a target population with a limited sample size, preventing a true representation of the overall population. All patients were selected from a primary care clinic, in an area with a specific socioeconomic status that comprised of primarily African American patients who predominantly had Medicare and Medicaid. In addition, the study design used was a cross sectional study, which yielded data from a limited period of time or until medium effect sample size was achieved. Larger sample sizes and multiple survey areas could have provided more stratified results and increased validity of the study. Lastly, the data collection tools revealed that although majority of the responders had adequate health literacy; there knowledge in diabetes was skewed; illustrating that adequate health literacy is not always associated with knowledge of a particular condition.

Recommendations

Researchers have identified the importance of health literacy in the management of chronic conditions. However, there are still few studies that connect the dots on how health literacy is achieved and how much physician–patient communication plays a role in the development of health literacy. Further studies are needed to assess physician–patient communication and how it benefits in educating patients with chronic conditions. Findings in this study are simplified to a target and generalized population limiting recommendations to primary or local level. Additional studies are needed to address issues on state and national levels.

Most complaints about doctors are usually related to communication issues rather than clinical competency (Ha et al., 2010). Focusing on improved communication during a medical encounter may result in improved health outcomes. Physicians with effective communication and interpersonal skills can assess problems earlier, prevent medical crises and expensive intervention, and provide better support for their patients (Ha et al., 2010).

The use of literacy tools to assesses health literacy levels and medical condition knowledge tools is a quick way to recognize the level of understanding that patients have on a specific condition and their literacy levels. Similar devices are already used in practice to assess for anxiety and depression levels, such as the General Anxiety Disorder (GAD-7) and (Patient Health Questionnaire) PHQ-9. Tools such as the Rapid Estimate of Adult Literacy in Medicine (REALM) or Short form test of functional health literacy (s-

TOFHLA) to measure health literacy are useful tools to add to practices to assist physicians in their communication with patients. Physicians have the responsibility of identifying patients with inadequate health literacy through assessment tools, ensuring that they speak to patients in a way that they can comprehend, and learning ways to meet the needs of their patients better to promote adequate health literacy.

Implications for Social Change

Effective physician–patient communication is a central clinical function in building a therapeutic physician–patient relationship, which is the heart and art of medicine (Longnecker & Ha, 2010). According to the IPC survey in this study, 40 % of responders reported adequate physician-patient communication, while 50% of responders reported moderate physician–patient communication, and 7% of responders reported inadequate physician–patient communication. This physician–patient communication measure is statistically and clinically significant for this generalized population. However, literature actually reports that there is a need for an increase in physician patient communication. Physician–patient centered communication is essential in high-quality healthcare, and many complaints are due to the breakdown of physician–patient communication (Ha et al., 2010). Physicians also play an indispensable role in educating the community in which they are attached, thereby promoting health literacy. A physician's communication and interpersonal skills encompass the ability to gather information to arrive at an accurate diagnosis, counsel, and give instructions on therapy (Ha et al., 2010). Physicians play a pivotal role for patients who are at a disadvantage

with chronic conditions such as diabetes. The physician has to ensure that patients with diabetes have adequate knowledge and resources to attain diabetic knowledge and achieve glycemic control ultimately. The physician cannot change personal cognitive factors and external environmental factors that can affect some patients with diabetes.

Implications for social change involve first improving physician's communication skills to promote health literacy within their communities. Studies have shown that communication skills tend to decline as medical students progress through their medical education, losing focus on holistic patient care (Ha et al., 2010). This loss of communication skills has also been thought to be due to the emotional and physical brutality of medical training during residency. Medical doctors must deal with the suppression of empathy, avoidance behavior in addressing emotionally negative issues, nondisclosure of information, and discouragement to collaborate with patients (Ha et al., 2010). Each of these factors should be addressed in medical schools and medical teaching programs across the country to improve physician–patient communication.

Increasing health literacy awareness is another important implication for social change. Limited health literacy rates are higher among disadvantaged populations such as the elderly, minorities, sick persons, and those with less than a high school education (Berkman et al., 2011). One goal for healthy people 2020 focuses on the role of health information technology in the implementation of health literacy and health communication to meet the needs of health measures and health interventions. (Healthy People, 2017). Many organizations on the local, state and national levels have become

aware of the importance of health literacy and health outcomes and are working on ways to improve provider's knowledge of this factor that has a major effect on health outcomes.

In addition, a number of studies have reported an indirect relationship between health literacy and A1c, which were mediated by factors of diabetic knowledge and self-management (White, 2016). The social change associated with physician–patient communication, health literacy, glycemic control, and diabetic knowledge is improving physician–patient communication in order to promote adequate health literacy and adequate diabetic knowledge among patients. Due to the intricate detail in the understanding and managing T2DM, ongoing dialogue between the physician and patient has the ability to improve health outcomes in patients with diabetes in hope help to reduce the morbidity and mortality rate of those with T2DM. There is a need for improvement of physician–patient communication and encouragement of patient's compliance through the conduct of educational and training programs directed towards improving patient's diabetic knowledge (Ibrahim et al., 2010). There is still little research directly addressing physician–patient communication and its association with diabetes management (Ibrahim et al., 2010).

Physicians are vital to the role of patient-centered care, health literacy, and management of chronic conditions, however with the increasing demand for physicians in the healthcare setting, it is becoming harder for doctors to allocate time for educating patients. Nevertheless, physicians must not forget the vital role in which they play as

caretakers of their community's health, and that they have the power to improve health literacy and improve health outcomes just by promoting more effective patient-physician relationships.

Studies listed in the literature review support the need for increasing physician–patient communication, improving health literacy, and assessing the knowledge of patient's experience of their conditions in order to better meet their needs.

Conclusion

The importance of further studies to address physician–patient communication is evident based on the statistical significance of physician–patient communication to health literacy, glycemic control, diabetic knowledge, and age. Physician–patient communication and health literacy promotes self-efficacy among patients managing T2DM and improves health outcomes. According to the Centers for Disease Control and Prevention diabetes is at an all-time high and remains the 7th leading cause of death in the United States (CDC, 2017). Researchers, physicians, and clinical practitioners have the power to reduce these statistics. Increased understanding of physician's roles in communicating with patients can serve as a foundation for improving health outcomes in chronic conditions. Physician–patient communication is essential to patient's overall care and understanding for effective management of chronic disease. The ultimate objective of physician–patient communication is to improve the patient's health and medical care (Ha et al., 2010).

Physicians have been known to overestimate their abilities to communicate. Patient surveys have consistently reported that patients desire better communication with their physicians (Ha et al., 2010) The three main goals of the current physician–patient communication are creating a good interpersonal relationship, facilitating the exchange of information and including the patient in decision-making (Ha et al.,2010).

Successful diabetes management requires teamwork between physicians and patients (Berkman et al., 2011). Effective physician–patient communication requires some form of health literacy, which consists of a basic understanding of health information. Due to the complexities of chronic diseases such as T2DM, many patients are left with misunderstandings in diabetic knowledge and basic knowledge of how to maintain or achieve glycemic control. Communication between the patient and physician is fundamental for a patient to understand health information, and unfortunately, in many cases, patients often leave their physicians not understanding the information exchanged (Kiripanlani et al.2010). Patients comprehend as little as half of what is conveyed in a primary outpatient encounter due to low health literacy (Schillinger et al., 2003).

Several factors impact health literacy, including a patient receipt of appropriate written health communication materials, the ability to accurately interpret written health-related information, and communication with providers (Healthy People, 2017).

The literature revealed barriers posed by inadequate health literacy and the lack of understanding by most health professionals and policymakers. (Nath, 2007). It is well documented that health literacy is a common issue in the U.S. healthcare system, with

about 80 million U.S. adults having literacy limitations, placing them at higher risks for poorer health outcomes (Berkman et al., 2011). However, there is a lack of information on the role of physician–patient communication in health literacy and its association with chronic disease. This analysis reveals that there are significant associations between physician–patient communication health literacy of individuals managing T2DM and adequate that physician–patient communication can improve health outcomes.

References

Al Sayah, F, Majumdar S.R., Williams B., Robertson S., Johnson J.A. Health literacy and health outcomes in diabetes: A systematic review. *Journal of General Internal Medicine*, 28(3),444–452. doi: 10.1007/s11606-012-2241-z.

American Diabetes Association. (2012). Diabetes basics statistics. Retrieved from http://www.diabetes.org/diabetes-basics/statistics/

American Diabetes Association. (2013). Standards of medical care in diabetes—2013. *Diabetes Care, 36*(Suppl 1), S11.

American Diabetes Association. (2017). Statistics about diabetes. Retrieved Jan 20, 2017 from http://www.diabetes.org/diabetes-basics/statistics/

American Psychological Association. (2016). Socioeconomic status. Retrieved from http://www.apa.org/topics/socioeconomic-status/

Alberti, K. G. M. M., & Zimmet, P. F. (1998). Definition, diagnosis and classification of diabetes mellitus and its complications. Part 1: Diagnosis and classification of diabetes mellitus. Provisional report of a WHO consultation. *Diabetic Medicine, 15*(7), 539-553.

Berkman, N. D., Sheridan, S. L., Donahue, K. E., Halpern, D. J., & Crotty, K. (2011). Low health literacy and health outcomes: An updated systematic review. *Annals of Internal Medicine, 155*(2), 97-107.

Bevan, J. L., & Pecchioni, L. L. (2008). Understanding the impact of family caregiver cancer literacy on patient health outcomes. *Patient Education and Counseling*, *71*(3), 356-364.

Boston University of Public Health. (2016). Behavioral change models. *The Social Cognitive Theory*. Retrieved from http://sphweb.bumc.bu.edu/otlt/MPH-Modules/SB/SB721-Models/SB721-Models5.html

Calvin, D., Quinn, L., Dancy, B., Park, C., Fleming, S. G., Smith, E., & Fogelfeld, L. (2011). African Americans' perception of risk for diabetes complications. *The Diabetes Educator*, *37*(5), 689-698.

Cramer, J. A. (2004). A systematic review of adherence with medications for diabetes. *Diabetes care*, *27*(5), 1218-1224.

Centers for Disease Control and Prevention. (2015). Basics about diabetes. Retrieved January 19, 2017 from https://www.cdc.gov/diabetes/basics/diabetes.html

Centers for Disease Control and Prevention. (2016). Factors that affect health. Retrieved from https://www.cdc.gov/healthliteracy/training/page655.html

Centers for Disease Control and Prevention. (2017). Statistics of the State of Georgia. Retrieved from https://www.cdc.gov/nchs/pressroom/states/GA_2015

Centers for Disease Control and Prevention. (2017). National diabetes statistics report. Retrieved from www.cdc.gov/diabetes/pdfs/data/statistics/national-diabetes-statistics-report.pdf

Collins, S. A., Currie, L. M., Bakken, S., Vawdrey, D. K., & Stone, P. W. (2012). Health literacy screening instruments for eHealth applications: A systematic review. *Journal of Biomedical Informatics*, *45*(3), 598-607.

Durham & Berkman. (2011). Research Triangle Institute. Evidence-based Practice Center North Carolina Central University *Health literacy interventions and outcomes an updated systematic review* (Vol. 199). Rockville, MD: Agency for Healthcare Research and Quality.

Encyclopedia of Survey Research Methods. (2008). Cross Sectional Survey Research Methods. Retrieved from http://methods.sagepub.com/reference/encyclopedia-of-survey-research-methods/n120.xml

Faul, F., Erdfelder, E., Buchner, A., & Lang, A.G. (2009). Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods, 41*, 1149-1160.

Fitzgerald, J. T., Funnell, M. M., Hess, G. E., Barr, P. A., Anderson, R. M., Hiss, R. G., & Davis, W. K. (1998). The reliability and validity of a brief diabetes knowledge test. *Diabetes Care*, *21*(5), 706-710.

Georgia Department of Community Health (2008). Georgia Health Equity Initiative. Retrieved from http://dph.georgia.gov/sites/dph.georgia.gov/files/related_files/site_page/Georgia20Health20Equity20Initiative.pdf

Georgia Department of Public Health. (2012). 2012 Georgia Diabetes Burden Report: An Overview. Retrieved from https://dph.georgia.gov/sites/dph.georgia.gov/files/Diabetes_Report_2012.pdf

Ha, J. F., & Longnecker, N. (2010). Doctor-patient communication: a review. *The Ochsner journal*, *10*(1), 38–43.

Harrington, K. F., Haven, K. M., Bailey, W. C., & Gerald, L. B. (2013). Provider Perceptions of parent health literacy and effect on asthma treatment recommendations and instructions. Pediatric Allergy, Immunology, and Pulmonology, 26(2), 69–75. http://doi.org/10.1089/ped.2013.0237

Healthy People (2017). Healthy People 2020 Framework. Retrieved from https://www.healthypeople.gov/sites/default/files/HP2020Framework.pdf

Hill, J. (2007). Viewing impact statement "diabetes education". Retrieved from http://apps.caes.uga.edu/impactstatements/index.

Ibrahim, N. K., Attia, S. G., Sallam, S. A., Fetohy, E. M., & El-Sewi, F. (2010). Physicians' therapeutic practice and compliance of diabetic patients attending rural primary health care units in Alexandria. *Journal of Family & Community Medicine*, *17*(3), 121–128. doi:10.4103/1319-1683.74325

Ivanov, L. L., Wallace, D. C., Hernández, C., & Hyde, Y. (2015). Diabetes risks and health literacy in southern African American and Latino women. *Journal of Community Health Nursing*, *32*(1), 12–23. doi:10.1080/07370016.2015.991664

Jessup, R. L., Osborne, R. H., Beauchamp, A., Bourne, A., & Buchbinder, R. (2017). Health literacy of recently hospitalized patients: A cross-sectional survey using the Health Literacy Questionnaire (HLQ). *BMC Health Services Research*, *17*, 52.

Katz, M. G., Jacobson, T. A., Veledar, E., & Kripalani, S. (2007). Patient literacy and question-asking behavior during the medical encounter: A mixed-methods analysis. *Journal of General Internal Medicine*, *22*(6), 782-786.

Kelly, P. A., & Haidet, P. (2007). Physician overestimation of patient literacy: a potential source of health care disparities. Patient Education and Counseling, 66(1), 119–122. http://doi.org/10.1016/j.pec.2006.10.007

Kindig, D. A., Panzer, A. M., & Nielsen-Bohlman, L. (Eds.). (2004). *Health Literacy: A* Prescription to End Confusion. Washington(DC): National Academies Press.

Kobayashi, L. C., Smith, S. G., O'Conor, R., Curtis, L. M., Park, D., von Wagner, C.,& Wolf, M. S. (2015). The role of cognitive function in the relationship between age and health literacy: A cross-sectional analysis of older adults in Chicago, USA. *BMJ Open*, *5*(4), e007222.

Kripalani, S., Jacobson, T. A., Mugalla, C. I., Cawthon, R. C., Niesner, K. J., & Vaccarino, V. (2010). Health literacy and the quality of physician–patient communication during hospitalization. *Journal of Hospital Medicine*, *5*(5), 269–275.

Kutob, RM., Bormanis, J., Crago M, Senf, J., Gordon, P., Shisslak, CM. (2013) Assessing culturally competent diabetes care with unannounced standardized patients. Family Medicine,45(6):400-408.

Ludwig, M., Burke.W. (2014). Physician–patient relationship. University of Washington School of Medicine, Seattle ,Washington. Retrieved from https://depts.washington.edu/bioethx/topics/physpt.html

Mayo Clinic. (2017). Diabetes basics. Retrieved from http://www.mayoclinic.org/diseases-conditions/diabetes/basics/risk-factors/con-20033091

McGraw-Hill Concise Dictionary of Modern Medicine. (2002). Health outcome. In McGraw Hill Concise Dictionary of Modern Medicine. Retrieved from http://medical-dictionary.thefreedictionary.com/health+outcome

Merriam-Webster. (2016). African American. In Merriam- *Webster's online dictionary* (11th ed.). Retrieved from http://www.merriam-webster.com/dictionary/African–American

Moser, A., van der Bruggen, H., Widdershoven, G., & Spreeuwenberg, C. (2008). Self-management of type 2 diabetes mellitus: A qualitative investigation from the perspective of participants in a nurse-led, shared-care programme in the Netherlands. *BMC Public Health*, *8*(1), 91.

Nath, C. (2007). Literacy and diabetes self-management. *The American Journal of Nursing*, *107*(6), 43-49.

Nutbeam, D. (1998). Health Promotion Glossary. Geneva Word Health Organizations, *Health Promotion International*, *13*, 349–364.

Ong, L. M., De Haes, J. C., Hoos, A. M., & Lammes, F. B. (1995). Doctor-patient communication: A review of the literature. *Social Science & Medicine*, *40*(7), 903-918.

Osborn, C. Y., Cavanaugh, K., Wallston, K. A., & Rothman, R. L. (2010). Self-efficacy links health literacy and numeracy to glycemic control. *Journal of Health Communication*, *15 Suppl 2*(Suppl 2), 146–158. doi:10.1080/10810730.2010.499980

Osborne, H. (2012). *Health Literacy from A to Z*. Jones & Bartlett Publishers.

Pagels, P., Kindratt, T., Arnold, D., Brandt, J., Woodfin, G., & Gimpel, N. (2015). Training family medicine residents in effective communication skills while utilizing promotoras as standardized patients in OSCEs: A health literacy curriculum. *International Journal of Family Medicine* (Vol*2015*),129-187.

Powell, C. K., Hill, E. G., & Clancy, D. E. (2007). The relationship between health literacy and diabetes knowledge and readiness to take health actions. *The Diabetes Educator*, *33*(1), 144-151.

Rothman, R. L., DeWalt, D. A., Malone, R., Bryant, B., Shintani, A., Crigler, B., ... & Pignone, M. (2004). Influence of patient literacy on the effectiveness of a primary care–based diabetes disease management program. *Journal of American Medical Association*, *292*(14), 1711-1716.

Rudestam, K. E., & Newton, R. R. (2015). *Surviving your dissertation: A comprehensive guide to content and process*. Newbury Park, Calif: SAGE.

Safeer, R. S., & Keenan, J. (2005). Health literacy: The gap between physicians and patients. *American Family Physician, 72*(3), 463-468.

Sarkar, U., Fisher, L., & Schillinger, D. (2006). Is self-efficacy associated with diabetes self-management across race/ethnicity and health literacy? *Diabetes Care*, *29*(4), 823-829.

Sayah, F., Majumdar, S., Egede, L., &. Johnson, L. (2015) Associations Between Health Literacy and Health Outcomes in a Predominantly Low-Income African American Population with Type 2 Diabetes, Journal of Health Communication, 20:5, 581-588, DOI: 10.1080/10810730.2015.1012235

Sentell, T., Zhang, W., Davis, J., Baker, K. K., & Braun, K. L. (2014). The influence of community and individual health literacy on self-reported health status. *Journal of General Internal Medicine*, *29*(2), 298-304.

Schillinger, D., Piette, J., Grumbach, K., Wang, F., Wilson, C., Daher, C., ... & Bindman, A. B. (2003). Closing the loop: Physician communication with diabetic patients who have low health literacy. *Archives of Internal Medicine*, *163*(1), 83-90.

Schillinger, D., Grumbach, K., Piette, J., Wang, F., Osmond, D., Daher, C.& Bindman, A. B. (2002). Association of health literacy with diabetes outcomes. *Jama*, *288*(4), 475-482.

Schillinger, D., Bindman, A., Wang, F., Stewart, A., & Piette, J. (2004). Functional health literacy and the quality of physician–patient communication among diabetes patients. *Patient Education and Counseling, 52*(3), 315-323.

Sim, D., Yuan, S., Yun, J. (2016) Health literacy and physician–patient communication: a review of the literature. *The International Journal of Communication and Health*, Retrieved November 25, 2019 from http://communicationandhealth.ro/upload/number10/DON-SIM.pdf

Sloane, P. D., Slatt, L. M., & Baker, R. M. (2012). Essentials of family medicine. Baltimore: Williams & Wilkins

Sood, A. Aron, D. (2009). Glycemic Control in Older Adult: Applying Recent Evidence in Clinical Practice. Geriatrics and Aging. *Medscape,12*(3):130-134.

Soriano, F. I. (2013). Conducting needs assessment: A multidisciplinary approach (2nd ed.). (pp. 121-135). Thousand Oaks, CA: Sage Publications

Stewart AL, Nápoles-Springer A., Pérez-Stable EJ, Posner S, Bindman AB, Pinderhughes HL, and Washington AE. (1999). Interpersonal processes of care in diverse populations. *The Milbank Quarterly*, 77, 305-339. PMID: 10526547.

Stiles, E. (2011). Promoting health literacy in patients with diabetes. *Nursing Standard, 26*, 35-40.

Tang, Y. H., Pang, S., Chan, M. F., Yeung, G. S., & Yeung, V. T. (2008). Health literacy, complication awareness, and diabetic control in patients with type 2 diabetes mellitus. *Journal of Advanced Nursing, 62*(1), 74-83.

United States Census Bureau. (2015). Quick Facts DeKalb County Georgia. Retrieved March 24, 2016 from http://www.census.gov/quickfacts/table/PST045215/13089

Wallace, A. (2010). Low health literacy: overview, assessment, and steps toward providing high-quality diabetes care. *Diabetes Spectrum*, *23*(4), 220-227.

White, R. O., Eden, S., Wallston, K. A., Kripalani, S., Barto, S., Shintani, A., & Rothman, R. L. (2015). Health communication, self-care, and treatment satisfaction among low-income diabetes patients in a public health setting. *Patient Education and Counseling*, *98*(2), 144-149.

White, R. O., Chakkalakal, R. J., Presley, C. A., Bian, A., Schildcrout, J. S., Wallston, K. A., ... & Rothman, R. (2016). Perceptions of provider communication among vulnerable patients with diabetes: influences of medical mistrust and health literacy. *Journal of Health Communication*, *21*(sup2), 127-134.

Ziemer, D. C., Doyle, J. P., Barnes, C. S., Branch, W. T., Cook, C. B., El-Kebbi, I. M., ... & Phillips, L. S. (2006). An intervention to overcome clinical inertia and improve diabetes mellitus control in a primary care setting: Improving Primary Care of African Americans with Diabetes (IPCAAD) 8. *Archives of Internal Medicine*, *166*(5), 507-513

Appendix A: Permission to use Research Tool

PEPPERCORN BOOKS & PRESS INC

TOFHLA

TEST OF FUNCTIONAL HEALTH LITERACY IN ADULTS

LICENSE TO REPRODUCE THE TOFHLA FOR USE IN TESTING OR RESEARCH

Permission is granted to: **Brittany Egeh**

To reproduce the TOFHLA for use in personal testing or research program, using the photocopy masters of the TOFHLA supplied with this order.

Reproduction for other purposes such as teaching, grant or funding applications, or general lending is not permitted and is covered by separate agreements. For information about these uses please contact the publisher.

License Number: 58/18
Issued: October 11, 2018

For further information, contact:

Peppercorn Books & Press Inc
68158 Red Arrow
Hartford, MI 49057

Phone: (269) 621-2733
Fax: (269) 621-2709

Email: post@peppercornbooks.com
Website: www.peppercornbooks.com

Appendix B: Demographic Survey

1. Which Gender do you identify most with?

1 = Male
2 = Female
3 = I would prefer not to comment

2. What is your highest education qualification?

1 = Some middle school
2 = Some high school
3 = High school diploma/GED
4 = Some College
5 = College Graduate
6 = Graduate Level or above

3. What is you estimated household Income?

1 = 20,000 or less
2 = 20,000-40,000
3 = 40,000-60,000
4 = 60,000- or more

4. What is your diabetes treatment regimen?

1 = Diet alone
2 = Oral hypoglycemic agents alone
3 = Insulin alone
4 = Insulin + oral hypoglycemic agents

5. What is your hemoglobinA1c Level?

0 = Below 6.5%
1 = 7%
2 = 8%
3 = 9%
4 = 10%
5 = 11%
6 = 12%
7 = 13%
8 = 14% and above

6. Years with Diabetes? _____