RECEPTIVENESS TO SOCIAL SUPPORT: UNDERSTANDING THE CONFLICTING RELATIONSHIP BETWEEN SOCIAL SUPPORT AND MEDICATION ADHERENCE IN ADULTS WITH TYPE 2 DIABETES MELLITUS

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DEDICATION

I dedicate this dissertation to God, the source of all wisdom and knowledge, who has made it possible for me to reach this height in my education. His divine guidance, which I have felt in every step of my life, and the loving and supportive people He has surrounded me with have been instrumental in my academic journey. Without His grace and favor, I would not have achieved this milestone. His presence has been a constant source of strength and inspiration.

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RECEPTIVENESS TO SOCIAL SUPPORT: UNDERSTANDING THE CONFLICTING RELATIONSHIP BETWEEN SOCIAL SUPPORT AND MEDICATION ADHERENCE IN ADULTS WITH TYPE 2 DIABETES MELLITUS

Out of the 38 million Americans living with diabetes, about 34 million have Type 2 diabetes mellitus (T2DM). The chronicity of T2DM, the progression of the disease as pancreatic beta cells continue to decline in function, the propensity of the disease to affect multiple aspects of life, and the complex management strategies required to reduce the risk of diabetes-related complications highlight the significance of diabetes management. Antidiabetic medications are utilized in diabetes management to enhance glycemic control. Although adherence to antidiabetic medications is crucial, non-adherence is common and attributed to a variety of factors, such as social support. While social support is a promising approach for improving medication adherence, research on its influence has produced conflicting results, with some studies reporting significant relationships and others not. Receptiveness to social support might explain the conflicting findings between social support and medication adherence. Thus, a qualitative descriptive study involving 14 adults with T2DM was conducted to describe (a) factors that motivate them to take medications as prescribed, (b) their perceptions of the role of social support in T2DM medication management, and (c) their receptiveness to current or future social support for medication taking. Thematic analysis identified five themes: *receiving the diagnosis* and *taking medications for T2DM* (motivational factors), *receiving support* (perceptions of social support), *envisioning the future*, and *advising others* (receptiveness to social support). Participants described internal and external

motivators for taking their medications and how social support from their support system, including their family, positively influenced their medication management by providing emotional encouragement, practical advice, and increased confidence. Privacy, trust, perceived need, and reluctance to ask for help were identified as factors influencing receptiveness to social support. The findings provide crucial insights into social support's influence on T2DM medication management. They suggest that individuals' openness to social support influences its effectiveness in enhancing medication adherence. These insights can guide future studies to incorporate receptiveness to social support, providing a more comprehensive understanding and enabling the development of instruments to measure it and theories that account for its influence, thereby enhancing the use of social support-related resources to improve medication adherence.

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LIST OF ABBREVIATIONS

T1DM	Type 1 Diabetes Mellitus
T2DM	Type 2 Diabetes Mellitus
ABC	Ascertaining Barriers to Compliance
ADA	American Diabetes Association
CDC	Centers for Disease Control and Prevention
CTSI	Indiana Clinical and Translational Sciences Institute
DKA	Diabetic Ketoacidosis
DPP-4	Dipeptidyl Peptidase
FDA	U.S. Food and Drug Administration
GLP-1	Glucagon-like Peptide 1
NIDDK	National Institute of Diabetes and Digestive and Kidney Diseases
REDCap	Research Electronic Data Capture
SGLT2	Sodium-glucose Cotransporter 2

CHAPTER ONE

INTRODUCTION

More than 38 million Americans are living with diabetes, a chronic disease that results from impaired production or response to insulin (Centers for Disease Control and Prevention [CDC], 2023). A significant proportion of this population, about 90%–95%, have type 2 diabetes mellitus (T2DM), a form of diabetes resulting from the body's impaired response to insulin mainly because of increased cellular resistance (CDC, 2023; Fenstermacher & Hudson, 2020). Lifestyle modifications, such as healthy nutrition and weight management through improved physical activity, are encouraged to optimize the health of individuals with T2DM (American Diabetes Association [ADA], 2017). In addition to lifestyle modifications, most individuals are prescribed antidiabetic medications to help manage this disease. These medications, which are a cornerstone of T2DM management, improve glycemic control by enhancing the body's production and response to endogenous insulin or providing the body with exogenous insulin (Fenstermacher & Hudson, 2020).

While adherence to prescribed antidiabetic medications, whether oral or injectables, is crucial for enhancing glycemic control and reducing the risk of diabetes-related complications in adults with T2DM, non-adherence is common. About 38%–93% of adults with T2DM report non-adherence to these medications (Polonsky & Henry, 2016), a trend that significantly increases the risk of developing microvascular and macrovascular complications. Microvascular complications include retinopathy, neuropathy, nephropathy, and diabetic foot disorders (Beckman & Creager, 2016).

Macrovascular complications include coronary artery disease, stroke, peripheral artery disease, and death (Beckman & Creager, 2016).

Background and Significance

The ADA (2024b) estimates that 1.2 million Americans are diagnosed with diabetes each year, and without adequate management, these new cases contribute to the growing prevalence of diabetes-related complications. Inadequately managed T2DM increases the risk of both microvascular and macrovascular complications, leading to significant economic, health, and mental burdens. For example, the CDC (2024b) reports that in 2019 a total of 61,522 adults in the United States developed end-stage kidney disease, with diabetes as the primary cause. Diabetes ranked as the leading cause of new cases of blindness among adults in the United States in 2021 (CDC, 2024b). The *National Diabetes Statistics Reports* from CDC (2024b) ranks diabetes as the eighth-leading cause of death in the United States in 2021. Diabetes-related complications increase the cost of managing diabetes. In the United States, the total cost of managing diabetes in 2022 alone exceeded $413 billion, with direct costs of $307 billion, and an estimated $106 billion in indirect costs (CDC, 2024b). Costs of managing diabetes are on the rise. For comparison, the total direct and estimated cost of managing diabetes in 2012 was $227 billion (CDC, 2024b).

To reduce the risk of developing the complications previously mentioned, adherence to prescribed antidiabetic medications is essential. Medication adherence is the process by which patients take their medications as prescribed (Vrijens et al., 2012). Medication adherence is a multi-phase process that includes persistence, comprised of initiation and implementation phases, and non-persistence, comprised of the discontinuation phase. As an essential aspect of a holistic approach to diabetes management, there is a need to optimize medication adherence and to understand the factors that influence medication adherence. Understanding and addressing these factors is not only crucial for optimizing adherence but also essential for the self-management of diabetes. A deeper understanding of factors that optimize adherence and promote self-management can inform the development of targeted and effective interventions, ultimately improving health outcomes for adults with T2DM.

While various factors, such as the cost of medications (Kang et al., 2018), limited knowledge about diabetes (Aloudah et al., 2018), mental health issues (Kretchy et al., 2020), and demographic factors are associated with medication non-adherence, social support can potentially mitigate these factors and promote adherence. Social support, defined as the social structure of an individual and the specific functions of others within the social structure (Kent de Grey et al., 2018) can provide essential assistance, including emotional support, access to resources, and practical support to facilitate taking medications as prescribed. Despite the benefits that social support may offer, not all people use social support. As a practicing family nurse practitioner, this research has witnessed first-hand the significant role of social support in T2DM medication management. Some patients rely on that support for T2DM medication management, while others do not. This researcher's professional observations, coupled with an understanding of the role of social support in medication management of chronic diseases, led the researcher to explore how it could be used to optimize medication adherence for individuals with T2DM.

Research on social support suggests that it can provide emotional and practical assistance, enhance diabetes knowledge, and offer resources to overcome financial and psychological barriers associated with medication adherence. However, conflicting reports of its influence on medication adherence exist in literature, with some studies reporting significant influence on improving adherence and others not. This discrepancy underscores the complexity of social support's role in medication adherence and highlights the need for a deeper understanding of how social support influences adherence.

Statement of the Problem

Understanding the influence of social support on medication adherence in adults with T2DM is a promising strategy that could significantly enhance medication adherence. However, existing studies in scientific literature have reported conflicting findings. Some studies have reported a significant positive relationship between social support and medication adherence (Bouldin et al., 2017; Gu et al., 2017; Olagbemide et al., 2021), while others have found non-significant relationships (Lee et al., 2019; Rosland et al., 2014; Walker et al., 2014).

These conflicting findings in studies examining the relationship between social support and medication adherence may be attributed to the multidimensional nature of social support and the various classifications and forms of social support. For instance, the behavior change technique taxonomy classifies social support as practical, emotional, and general (Michie et al., 2013). Social support also is classified based on the following characteristics: quantity and quality of support, utilization, source, content, format, consistency, and roles (Bavik et al., 2020). These studies and classification systems focus on social support but not necessarily on patients' perspectives, their perceptions of and openness to social support, or their willingness to use that support. Understanding patients' perspectives and perceptions of social support in the context of medication adherence will advance the understanding of social support as a potential intervention for optimizing medication adherence.

Receptiveness to social support, defined as *the openness to using social support to take medications as prescribed*, is an emerging concept not found in published literature. Incorporating this new concept might help address the conflicting findings in studies examining the relationship between social support and medication adherence. Unlike previous explorations of social support's influence, which focus on individuals' evaluation of social support after using support, the new concept hypothesizes that individuals' reports often are influenced by their openness to social support and willingness to utilize support to address their medication needs. In other words, individuals more open to social support are more willing to utilize it to achieve their goals and are likely to describe the positive impact of social support on achieving their goals. On the other hand, individuals who are wary of social support often do not utilize support and will report the absence or negative impact when asked about the impact of social support on their medication adherence.

To fully understand the influence of social support on medication adherence, it is necessary to explore the experiences of individuals with T2DM medication management and their receptiveness to social support. The patient perspective on social support is necessary to enhance existing knowledge of the relationship with improving medication adherence to improve patient-centered care. By identifying relevant aspects of social support to improve medication adherence, resources and interventions can be tailored to individual patient needs, thereby enhancing medication adherence, optimizing glycemic control, and improving patient outcomes.

Study Purpose and Aims

The purpose of this qualitative descriptive study is to delineate the factors that support medication adherence and to explore the perceptions of and receptiveness to social support in the context of medication taking among adults living with T2DM.

Study aims are

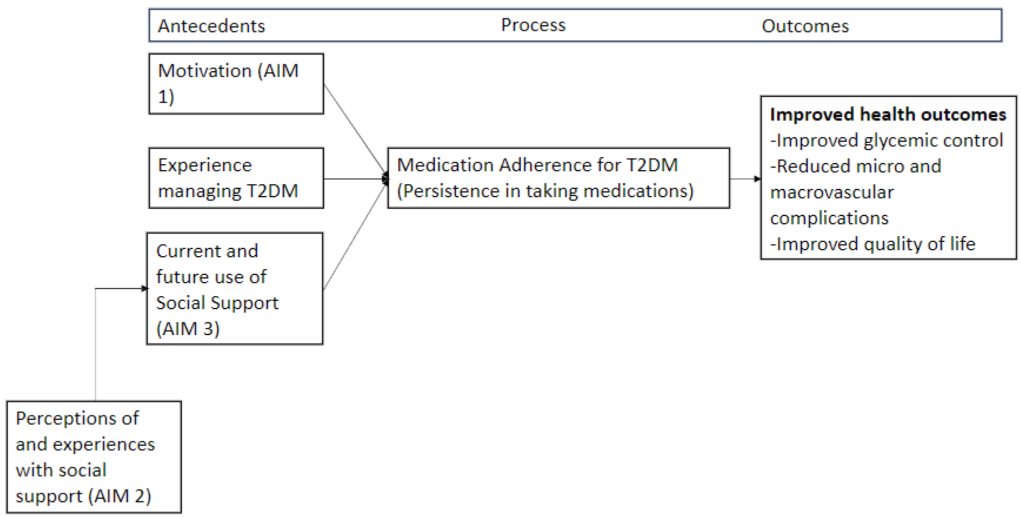
1. To describe factors that motivate participants to take medications as prescribed.
2. To describe participants' perceptions of the role of social support in medication taking for T2DM management.
3. To described participants' receptiveness to current or future social support with medication taking.

Conceptual Framework

Given the novelty of the concept of receptiveness to social support, all existing social support-based theoretical and conceptual frameworks have yet to identify its role in the relationship between social support and medication adherence. The conceptual framework (see Figure 1) used in this study hypothesizes that individuals' motivations to take their medications as prescribed, their experience with managing T2DM, and their current and future use of social support, influenced by their perceptions and experiences with social support, all influence their process of medication adherence, which in turn influences their health outcomes, such as improved glycemic control, reduced micro- and macrovascular complications, and improved quality of life.

Figure 1

Conceptual Framework Guiding Qualitative Study



Note. This conceptual framework was developed from a literature review and clinical experience, highlighting the hypothesized relationship between social support and medication adherence.

The conceptual framework (see Figure 1) hypothesizes that individuals' *motivations* to take their medications as prescribed, their experience with managing T2DM, and their *current and future use of social support* (noted as antecedents in the framework and discussed in more detail in the following sections), influenced by their perceptions and experiences with social support, all effect their process of medication adherence. Medication adherence, in turn, influences their health outcomes, such as improved glycemic control, reduced micro- and macrovascular complications, and improved quality of life. This conceptual framework is not only reflected in the study's purpose and aims, but it also guided the formulation of the interview questions (see Appendix A, Questionnaire 1), ensuring a clear and focused research direction.

Motivation: The complex medication management of T2DM requires individuals with T2DM to have some form of motivation to take their medications as prescribed. The first study aim was to provide more insight into the motivating factors influencing medication adherence. Questions 1, 2, and 3 of the interview questions (see Appendix A, Questionnaire 1) for the qualitative study were designed specifically to understand participants' decision-making process regarding medication adherence and the role of influential individuals in their lives.

Experience managing T2DM: Although not captured in the study aim, individuals' experiences with managing T2DM, a chronic and complex disease, influence their medication adherence. The themes emanating from the study findings capture the context of individuals' experiences managing T2DM.

Current and future use of social support: The conceptual framework underscores the influence of social support on medication adherence, which is influenced by individuals' perceptions of and experiences with social support. Study Aims 2 and 3 provided more insight into individuals' perceptions of the role of social support in medication adherence and their receptiveness to current or future social support with medication adherence. The interview questions (see Appendix A Questionnaire 1), particularly questions 4, 5, and 6, were crucial in gathering data. Questions 4 and 5 asked participants to describe any past, current, or future help in taking their prescribed medications, the type of help they needed or might need, their feelings about needing help, and how others feel about needing and receiving social support. Question 6 encouraged participants to share their insights into what their providers should know about the influence of social support on diabetes management.

Summary

The increasing incidence of diabetes, a chronic disease that results from the body's inability to produce or respond to insulin, and the cost of managing the disease and complications from inadequately managed diabetes pose significant health concerns. Adherence to antidiabetic medications remains crucial in managing this disease and reducing the risk of developing micro- and macrovascular complications associated with the disease. However, medication non-adherence is often reported by a significant proportion of patients with diabetes, and encompasses several factors including the cost of medications, mental health issues, limited knowledge of the disease, and lack of social support.

Studies that examined the relationship between medication adherence and social support have yielded conflicting findings. Although these findings can, to an extent, be attributed to the multidimensionality of social support, it is unknown how one's openness or receptivity to social support affects their use of social support. Understanding how people's receptiveness to social support influences their use of social support to take their medications as prescribed is imperative in addressing medication adherence in adults with diabetes mellitus and other chronic diseases and determining when social support might be advantageous for optimizing adherence. The potential implications of this study's findings on diabetes management could include the development of more effective intervention strategies and the enhancement of patient education programs to incorporate benefits of social support.

Thus, this study was needed to address the gap in knowledge of relationships between social support and medication adherence. This study aimed to describe factors that motivate individuals to take medications as prescribed, describe individuals' perceptions of the role of social support in medication taking for T2DM management, and describe individuals' receptiveness to current or future social support with medication taking. By describing these aims, this study strives to contribute significantly to knowledge regarding the relationship between social support and medication adherence and enhance the tailoring of social support resources to individual needs.

CHAPTER TWO

LITERATURE REVIEW

This chapter on literature review starts by giving an overview of diabetes mellitus, including the common forms: type 1 diabetes mellitus (T1DM), T2DM, and gestational diabetes; the definition of diabetes; the incidence and prevalence of diabetes; risk factors for diabetes; diagnosis of the disease; the complications and impact of inadequately managed diabetes; and the management of T1DM and gestational diabetes. The chapter describes T2DM and its medication management, including the different classes of medications used to treat it. The role of social support in T2DM medication management is examined in the context of the medication adherence process and influencing factors. Several definitions of social support, sources of support, and the multidimensionality of social support as it relates to medication adherence, are described. The chapter also provides a critical analysis of the published literature on social support and medication adherence highlighting gaps in knowledge of the relationship between social support and medication adherence. The conflicts in study findings and the need for further social support-related studies are detailed in this chapter. This chapter ends with a brief description of a concept analysis of receptiveness to social support.

Overview of Diabetes Mellitus

Diabetes mellitus, a chronic disease, occurs with impaired insulin production by the pancreas or impaired response to insulin within the body (CDC, 2023). The most common forms of diabetes are T1DM, T2DM, and gestational diabetes. T1DM is a form of diabetes that results from impaired insulin production as a result of the autoimmune destruction of pancreatic beta cells (Fenstermacher & Hudson, 2020). Gestational diabetes occurs during pregnancy because of increased levels of glucocorticoids from the placenta (Fenstermacher & Hudson, 2020). T2DM, the most common form of diabetes affecting about 90%–95% of people with diabetes, results from impaired insulin response, primarily due to cellular resistance (Fenstermacher & Hudson, 2020).

Incidence and Prevalence

The ADA reported that about 38.4 million Americans had diabetes in 2021 (ADA, 2024a). Approximately 1.2 million Americans are diagnosed with diabetes every year (ADA, 2024a). Diabetes affects adults from all races and ethnic backgrounds according to the following rates: 13.6% of American Indians/Alaskan Native adults, 12.1% of non-Hispanic Black adults, 11.7% of Hispanic adults, 9.1% of Asian American adults, and 6.9% of non-Hispanic White adults (ADA, 2024a).

Risk Factors for Diabetes

The National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK; 2022) recommends that individuals who have symptoms of diabetes be tested for the disease because undiagnosed diabetes can lead to serious complications. Symptoms of diabetes include increased thirst and urination, increased hunger, fatigue, visual disturbances, numbness or tingling in extremities, slow healing wounds, and unexplained weight loss. The NIDDK (2022) notes that the symptoms of T1DM manifest quickly while the symptoms of T2DM often develop slowly, with some individuals not realizing they have the disease until they develop diabetes-related complications.

While it is crucial for individuals to be tested for diabetes if they have any diabetes-related symptoms, it is equally important to remember that many individuals may not show any symptoms. The NIDDK (2022) notes that individuals with T1DM are often diagnosed when they present with symptoms of diabetic ketoacidosis (DKA), including fruity breath, dry or flushed skin, nausea or vomiting, abdominal pain, difficulty breathing, or changes in their level of consciousness. DKA, a life-threatening complication of diabetes, develops when the body, due to insufficient insulin, resorts to burning fats for energy instead of converting glucose to energy. This results in an overload of ketones in the blood. DKA requires immediate medical attention and can lead to a diabetic coma or death if not addressed (ADA, 2024b). This underscores the significance of early detection and the need to proactively test individuals for diabetes if they have the following risk factors, as recommended by the CDC (2024a) and NIDDK (2022):

- *T1DM*: Individuals should get tested for T1DM if they have a family history of T1DM, regardless of their age.
- *T2DM*: Individuals should get tested for T2DM if they are overweight or obese, are age 35 or older, have a parent or sibling with T2DM, are less physically active, have a history of non-alcoholic fatty liver disease, have ever had gestational diabetes or birthed a baby weighing over 9 pounds at birth, or are of the following ethnicities: African American, Hispanic or Latino, American Indian, or Alaska Native.
- *Gestational diabetes*: It is recommended for pregnant women to be tested for gestational diabetes if they have a history of gestational diabetes, have birthed a baby weighing over 9 pounds at birth, are overweight or obese, are more than 25 years old, have a family history of T2DM, have a history of polycystic ovary syndrome, or are of following ethnicities: African American, Hispanic

or Latino, American Indian, Alaska Native, Native Hawaiian, or Pacific Islander.

Diagnosis of Diabetes

The ADA Professional Practice Committee (2024) reports that diabetes can be diagnosed based on A1C or plasma glucose criteria, including the fasting plasma glucose (FPG) value, 2-h plasma glucose value during a 75-g oral glucose tolerance test (OGTT), or random glucose value associated by classic hyperglycemic symptoms/crises criteria, OR confirmatory testing in the absence of hyperglycemia. An A1C $\geq$ 6.5% or FPG $\geq$ 126 mg/dL or 2-h plasma glucose value $\geq$ 200 mg/dL, or random glucose value $\geq$ 200 mg/dL are criteria for diagnosis of diabetes in nonpregnant individuals (ADA Professional Practice Committee, 2024). Diagnosis of diabetes usually requires two abnormal screening test results, either measured at the same time or at different times, unless the diagnosis correlates with clinical manifestations (ADA Professional Practice Committee, 2024).

Complications and Impact of Inadequately Managed Diabetes

Without prompt diagnosis and adequate management of diabetes, individuals with this disease are at high risk of developing macro- and microvascular complications. Microvascular complications include retinopathy, neuropathy, nephropathy, and diabetic foot disorders (Beckman & Creager, 2016). Coronary artery disease, stroke, peripheral artery disease, and death are some of the macrovascular complications that can result from inadequately managed diabetes (Beckman & Creager, 2016).

These complications significantly affect the general economy and the health of individuals with diabetes. The CDC (2024b) reports that about 16.8 million visits to the emergency department listed diabetes as a diagnosis in 2020. About 7.86 million hospital discharges in 2020 listed diabetes as a diagnosis during hospitalization (CDC, 2024b). Out of these 7.86 million hospital discharges, 160,000 patients had lower extremity amputations due to diabetes (CDC, 2024b). Diabetes emerged as the leading cause of new cases of blindness in adults 18–64 years of age and the eighth leading cause of death in the United States according to data from 2021 (CDC, 2024b). Management of these complications continues to rise, costing the United States about $413 billion (from 2022 data), with total direct cost of $307 billion and indirect cost of $106 billion as compared to $316 billion in 2012, with total direct cost of $227 billion and indirect cost of $89 billion (CDC, 2024b).

Management of Other Forms of Diabetes

Effective management of diabetes is crucial in reducing the risk of developing diabetes-related complications. The management approach varies depending on the type of diabetes.

For individuals with *T1DM*, the autoimmune destruction of pancreatic beta cells necessitates the use of exogenous insulin. This insulin is crucial for glycemic control and is supplemented by dietary management and continuous blood sugar monitoring. These measures, as part of a comprehensive treatment plan, help individuals with T1DM maintain their health and well-being (Fenstermacher & Hudson, 2020).

Gestational diabetes is often managed with lifestyle modifications, including healthy eating, more physical activity, and blood sugar level monitoring during pregnancy. For some patients with gestational diabetes who are not able to manage their blood glucose levels despite lifestyle modifications, insulin might be recommended as the first-line medication for gestational diabetes management. Some studies also have examined the efficacy of Metformin for the management of gestational diabetes; however, it is important to note that Metformin should be used cautiously due to its potential to pass through the placenta and affect fetal growth (Tocci et al., 2023). Tocci et al. (2023) recommend that Metformin be considered as a treatment option if the use of insulin is not possible and that women be counseled on existing research on the use of Metformin for gestational diabetes management.

T2DM and Management Strategies

The management of T2DM differs from the management of other forms of diabetes previously described. Management of T2DM is more complex and requires multifactorial interventions to manage the disease, reduce the risk of developing complications, and optimize health outcomes (CDC, 2023; Fenstermacher & Hudson, 2020). Lifestyle modifications are the bedrock for appropriate diabetes management and include weight management by eating healthy and becoming more physically active, smoking cessation, stress management, and blood sugar monitoring (American Heart Association, 2024). Individuals with T2DM can be prescribed medications to stimulate insulin production, increase the body’s sensitivity to insulin, or provide exogenous insulin for glycemic control.

Advancements in research on medication management of T2DM have led to the development of numerous medications for glycemic control. Generally, these medications can be grouped into the following classes: biguanides, alpha-glucosidase inhibitors, sodium-glucose cotransporter 2 (SGLT2) inhibitors, glucagon-like peptide 1 (GLP-1) receptor agonists, meglitinides, dipeptidyl peptidase (DPP-4) inhibitors, thiazolidinediones, sulfonylureas, and insulin (Fenstermacher & Hudson, 2020). Following is a summary of the functions of existing classes of medications used in T2DM medication management and the names of some medications within each class:

- Biguanides: Biguanides, such as Metformin, increase insulin sensitivity in the muscle and fat and decrease hepatic glucose production (Fenstermacher & Hudson, 2020).
- Alpha-glucosidase inhibitors: Alpha-glucosidase inhibitors, including Acarbose and Miglitol, slow intestinal digestion and absorption of carbohydrates, thus preventing rapid increases in blood sugar levels following meals (Fenstermacher & Hudson, 2020).
- Sulfonylureas: Sulfonylureas stimulate the release of insulin from the pancreas (Fenstermacher & Hudson, 2020). Sulfonylureas include medications such as Glimepiride, Glipizide, and Glyburide.
- Thiazolidinediones (TZD): TZDs, such as Pioglitazone, increase the sensitivity of insulin in muscle and fat (Fenstermacher & Hudson, 2020).
- Meglitinides: Meglitinides, including Nateglinide and Repaglinide, stimulate the release of insulin from the pancreas (Fenstermacher & Hudson, 2020).
- Sodium-glucose cotransporter 2 (SGLT2) inhibitors: SGLT2 inhibitors, such as Canagliflozin, Dapagliflozin, Empagliflozin, and Ertugliflozin, decrease the reabsorption of glucose in the kidneys, therefore, increasing the amount of glucose excreted in urine (Fenstermacher & Hudson, 2020).
- Dipeptidyl peptidase (DPP-4) inhibitors: DPP-4 inhibitors increase insulin secretion when glucose levels increase by slowing the degradation of GLP-1

hormones (Fenstermacher & Hudson, 2020). DPP-4 inhibitors include Alogliptin, Linagliptin, Saxagliptin, and Sitagliptin.

- Glucagon-like peptide-1 (GLP-1) receptor agonists: GLP-1 RAs include revolutionary medications such as the popular Semaglutide (Ozempic), and Dulaglutide, Exenatide, Liraglutide, and Lixisenatide. These medications stimulate insulin secretion with increased glucose levels, decreased gastric emptying, and increased satiety (Fenstermacher & Hudson, 2020).
- Insulin: Insulin is administered subcutaneously for patients needing exogenous insulin for glycemic control. Depending on the patient's needs and management goals, rapid- or short-acting insulin (insulin Lispro, Aspart, Glulisine, Regular), or basal insulin, including intermediate-acting insulin (NPH [Humulin N, Novolin N]), longer-acting insulin (Detemir, Glargine), or ultra long-acting insulin (Degludec), can be utilized for glycemic control (Fenstermacher & Hudson, 2020).

Except for insulin and most GLP-1 receptor agonists, the remaining medications mentioned previously for T2DM medication management are oral. Oral Semaglutide, Rybelsus, is a GLP-1 receptor agonist taken orally daily for T2DM management.

The history of insulin, the oldest medication for diabetes management, is well detailed in the U.S. Food and Drug Administration's (FDA; 2022) publication, "100 Years of Insulin," which describes changes in insulin from its development in the early 1920s to the latest approval of Semglee, an interchangeable biosimilar product for Lantus.

The FDA approved the biguanides, alpha-glucosidase inhibitors, sulfonylureas, thiazolidinediones, and meglitinides for T2DM management in the 1990s. The rest of the classes of medications, SGLT2 inhibitors, DPP-4 inhibitors, and GLP-1 receptor agonists, were approved in the 2000s, with the most recent approval of Tirzepatide, a combination of glucose-dependent insulinotropic polypeptide (GIP) and GLP-1 receptor agonist, in 2022 by the FDA for the management of T2DM (Davies et al., 2022). This continuous development of T2DM medications offers hope for the future of diabetes management.

Social Support and T2DM Medication Management

Definitions of Social Support

Social support has been defined in several ways in the literature, such as the "support accessible to an individual through social ties to other individuals, groups, and the larger community" (Li et al., 2021, p. 2; Ozbay et al., 2007, p. 37). Kent de Grey (2018) defined social support as the social structure of an individual's life and the specific functions served by the individual's interpersonal relationships. Social support also has been defined as the "patient's perceived and received support from his or her social network, such as familial relations, friends, neighbors, colleagues, fellow patients, or even pen friends and internet contacts to reduce psychological stress response, relieve mental stress, and improve social adaptability" (Gu et al., 2017, p. 2). In the context of medication adherence, the commonality among these varied definitions of social support is the utilization of support from accessible resources to take medications as prescribed. However, the utilization of social support can be significantly influenced by the individual's receptiveness to social support and their willingness to use support to address their needs. Individuals with low receptiveness to social support resulting from low self-esteem are less likely to utilize support to achieve a goal (Marigold et al., 2014).

Sources of Social Support

Social support has been differentiated according to the support provider with the identification of formal and informal sources of social support in published literature. Informal sources of social support, which are often readily available and accessible, refer to the support provided by informal individuals or organizations. These include support from a spouse/partner, parents, relatives, friends, neighbors, peers, coworkers, and other acquaintances who are non-professionals (Dunst, 2023; Lu et al., 2020; Shiba et al., 2016). Formal sources of social support include resources from formal organizations such as the government and non-governmental programs and agencies, public service departments, and healthcare providers such as physicians and nurses (Dunst, 2023; Lu et al., 2020; Shiba et al., 2016).

In a meta-analysis focusing on formal and informal sources of social support, Dunst (2023) reported that informal social support sources significantly predicted health and well-being compared to formal sources. In a study comparing the uses of formal and informal social support among adolescents, informal sources of social support were considered the most helpful compared to formal sources and were assessed by the highest number of participants (Geulayov et al., 2022). These findings underscore the differences between formal and informal sources of social support and the pressing need for more utilization of informal sources, which are often readily available and accessible to many individuals.

Different Classifications of Social Support

Given the multidimensionality of social support, taxonomies have been developed to classify and standardize social support-related studies. The behavior change technique taxonomy by Michie et al. (2013) is a practical tool for this purpose and classifies social support into emotional, practical, and general (unspecified) categories. Michie et al. (2013) defined *emotional, social support* as “advise on, arrange, or provide emotional, social support (e.g., from friends, relatives, colleagues, ‘buddies’ or staff) for the performance of the behavior.” *Practical social support* refers to practical help to facilitate the performance of behavior (Michie et al., 2013). *Unspecified social support* is the provision of support that is not emotional or practical, or praise or reward that is not dependent on any reason to facilitate the performance of a behavior (Michie et al., 2013).

Citing Cutrona and Suhr (1992), Ko et al. (2013) highlighted five classifications of social support, including informational, emotional, esteem, social network support, and tangible support. Informational support comprises messages that provide knowledge or facts (advice or feedback) about the action (Ko et al., 2013). Emotional support refers to expressions such as caring, concern, and empathy. Communication promoting skills, abilities, and intrinsic value is considered esteem support. Messages from one’s group with similar interests that facilitate their sense of belonging to that specific group are referred to as social network support. On the other hand, tangible support entails providing physical goods and services to individuals in need (Ko et al., 2013).

The existence of several taxonomies/classifications of social support across different disciplines further adds to the conflicting study findings on social support-related studies. To address the different classifications of social support in the literature, Bavik et al. (2020), following their multidisciplinary review and synthesis of social support studies across different disciplines, highlighted six characteristics of social support. These characteristics include the quantity and quality of social support, the utilization of social support, the sources of social support, the content of social support, the format of social support, and the consistency of social support. Compared to most taxonomies that classify social support according to the function of support, Bavik et al.'s (2020) classification considers the function and structure of social support.

Influence of Social Support on Health Outcomes

The relationship between social support and patient health outcomes has been studied in the extant literature, with many findings identifying the significant influence of social support on health outcomes (Li et al., 2021; Ozbay et al., 2007; Reblin & Uchino, 2008; Schwarzer & Leppin, 1991). These findings have practical implications for healthcare professionals and individuals interested in the impact of social support on health. Notably, in an analysis of studies that examined the impact of social support on health, Reblin and Uchino (2008) reported social support's positive influence on health behaviors and general adherence to therapeutic recommendations in patients with several health conditions. Ozbay et al. (2007) noted the moderating effect of social support on developing resilience to stress. In a study examining the relationships between social support and mental health resilience in individuals during the COVID-19 pandemic, social support was identified as a buffer against the negative impact of low resilience on mental health (Li et al., 2021). In a longitudinal study of 75 women with breast cancer, social support was identified as one factor that predicted the risk of death from breast cancer (Cousson-Gelie et al., 2007). Furthermore, significant positive relationships were identified between social support and medication adherence in adults with hypertension, diabetes, and heart failure (de Oliveira & Santos, 2018; Gu et al., 2017; Oosterom-Calo et al., 2013).

Contrary to the studies described previously, social support also has been identified as a barrier to health outcomes. For example, in a qualitative study examining the relationship between social support and medication adherence in individuals with T2DM, social support was identified as a barrier to medication adherence. According to one of the participants, "*I have to attend family gatherings, which creates pressure on me. I don't like when people start asking me what medication I'm taking or what's wrong with me*" (Aloudah et al., 2018, p. 7). These conflicting findings, identifying social support as a facilitator and a barrier to medication adherence, underscore the need for further research and understanding of the multidimensional concept of social support.

Medication Adherence

The Ascertaining Barriers to Compliance (ABC) project defines medication adherence as a comprehensive process, encompassing the persistence stage with its initiation and implementation phases and the non-persistence stage with its discontinuation phase (Vrijens et al., 2012). The complexity of the medication adherence process is underscored further by the influence of patient-related, provider-related, and healthcare system and service delivery factors (Brown & Bussell, 2011; Neiman et al., 2017). Bartlett Ellis and Welch (2017) further elaborated that the medication adherence process is a complex interplay of behaviors that occur across a continuum of care. Behaviors in each context influence the others, and these behaviors affect the medication adherence process and phases of adherence of initiation, implementation, and discontinuation. Factors that influence each phase of the medication adherence process are detailed in the following sections.

Persistence

According to the ABC taxonomy, the persistence stage consists of the initiation and implementation phases and is defined as the time between the first dose and the time the person stops taking a medication as prescribed (Vrijens et al., 2012).

Initiation. The *initiation phase of the medication adherence process*, where the patient takes the first dose of the prescribed medication, is the beginning of the adherence process (Vrijens et al., 2012). Patient-related factors, such as their interest in treatment decisions, cognitive abilities, health beliefs, knowledge of the disease and treatment plan, mental health conditions, and lack of social support, all play a significant role in this decision. Their active involvement in this process is critical to successful medication initiation (Brown & Bussell, 2011; Neiman et al., 2017).

Provider-related factors, such as spending adequate time reviewing the diagnosis of T2DM and educating the patient on the benefits of taking prescribed medications to manage the disease and alternatives to prescribed medications, significantly influence the initiation of antidiabetic medications. Limited access to quality care and the high cost of medications are some healthcare system and service delivery factors that influence medication adherence. (Brown & Bussell, 2011; Neiman et al., 2017).

Implementation. The *implementation phase of the medication adherence* refers to the extent to which the patient takes the dose corresponding to the prescribed dosing (Vrijens et al., 2012). For patients with T2DM, their ability to take their medications according to their prescribed doses might be influenced by patient-related factors, such as lack of motivation to take medication, beliefs about medications, cost of medications, limited support, and insufficient understanding of the medication dose or schedule for taking medications due to complex dosing regimen or unclear instructions on the medication labels (Brown & Bussell, 2011; Neiman et al., 2017).

The implementation process of medication adherence also could be influenced by provider-related factors, such as the prescription of medications with complex dosing regimens, medications that patients cannot easily afford, and constant review of factors that influence patients' abilities to take their medications as prescribed; for instance, providers may regularly assess the patient's understanding of the medication regimen and their ability to afford the medications (Brown & Bussell, 2011; Neiman et al., 2017). The high cost of medications and the consistent pressure for providers to see a specified number of patients within a certain amount of time, thus impairing communication and therapeutic relationships between patients and providers, are some of the ways that the health systems influence the implementation of medications (Brown & Bussell, 2011; Neiman et al., 2017).

Non-persistence, Including the Discontinuation Phase

The non-persistence stage of the medication adherence process encompasses *the discontinuation phase*. Vrijens et al. (2012) noted that non-adherence can occur with late or non-initiation of treatment, not taking medications as prescribed, or stopping medication before the end date by omitting to take the next dose.

According to Vrijens et al. (2012), the discontinuation phase marks the time the treatment ends, and it is characterized by the omission of the next dose or failure to take any more doses of the prescribed medications. While some T2DM patients who see improvement in their glycemic controls can be safely taken off their medications by their providers, others might be required to take their antidiabetic medications for their lifetime. For patients who are required to take their medications and, for some reason, have stopped taking their medications, it is crucial for healthcare providers to understand the factors that prompted the discontinuation of medications and to address them to manage the disease and reduce their risk of developing diabetes-related complications.

The discontinuation phase can be influenced by patient-related factors, such as forgetting to take medications or obtain medication refills, conscious decisions to stop taking medication due to the cost of medication, beliefs about medication, experience of side effects of medications or unmet expectations of benefits of medication in improving condition, and lack of social support (Neiman et al., 2017). The impaired communication and the breakdown in the relationship between patients and their providers due to provider-related factors, such as spending time to educate patients on T2DM and disease management, and health system-related factors, such as access to patients, provision of limited resources to address patients' medication needs and pressure to see many patients daily, also influence the discontinuation phase of medication adherence.

In their meta-ethnographic review and synthesis, Bartlett Ellis and Welch (2017) identified 20 behaviors associated with medication adherence that occur across three contexts: patient–provider clinical encounters, pharmacy encounters, and day-to-day management. In the context of patient–provider clinical encounters, communication between patients and providers emerges as a critical factor that informs medication-taking behaviors, patients' decisions to take their medications, and any necessary changes in the medication management of their diseases. The context of patient–provider encounters involves behaviors such as communication with providers and maintaining current medication lists (Bartlett Ellis & Welch, 2017).

Following patient–provider encounters, patients who decide to take their medications must obtain them from the pharmacy. Obtaining medications through pharmacy encounters involves a range of behaviors, including appraisal, using personal or family past experiences to make decisions, making risk assessments, employing denial as a coping mechanism, accessing resources, and getting prescriptions filled (Bartlett Ellis & Welch, 2017). During the appraisal, patients who have been prescribed medications often question the need for the medications and the risk of taking the medications. Patients might experience denial as a coping mechanism, denying that they need medication to manage the disease. Bartlett Ellis and Welch (2017) noted that personal or family past experiences have a profound impact on appraisal. Following the appraisal, patients access their resources to see if they can afford and obtain the medications, and if appropriate, patients engage in behaviors to fill or refill their prescriptions (Bartlett Ellis & Welch, 2017).

Aside from provider and pharmacy encounters, the day-to-day management of medications provides another context in which patients exhibit certain behaviors to maintain their medication taking. These behaviors include managing side effects, creating or establishing routines, prioritizing medications, preparing correct doses of medications, preparing and administering doses, self-monitoring, using prompts as reminders, responding to forgotten medications, engaging in trial-and-error, keeping equipment needed to titrate doses in good working order, and maintaining prescriptions on hand. According to Bartlett Ellis and Welch (2017), the behavior of seeking information occurs across the context of patient–provider encounters, pharmacy encounters, and day-to-day management encounters.

Understanding factors that influence the medication adherence processes, initiation, implementation, and discontinuation, and the medication-taking behaviors across the contexts of patient–provider encounters, pharmacy encounters, and day-to-day management is crucial in medication management for diseases, especially chronic diseases such as T2DM. Social support has the potential to influence these medication adherence processes and behaviors across all three contexts, thus highlighting the need to understand the mechanism through which social support exerts its influence on medication management. The insight gained from this study's results could improve medication adherence and enhance patient–provider and pharmacy encounters and day-to-day medication management, thereby optimizing glycemic control and health outcomes.

Multidimensionality of Social Support and its Influence on Medication Adherence

Although social support can potentially influence medication adherence, studies on the relationship between social support and mediation adherence continue to report conflicting findings. As previously noted, the multidimensionality of social support significantly influences these conflicting findings. Despite the existence of social support taxonomies, such as the behavior change technique taxonomy, which provides a standardized way to classify and measure social support, social support-related studies continue to classify social support in various ways. Some studies focus on the sources of support, such as family support from family members (Rao et al., 2020), while others examine social support based on its function, such as the impact of instrumental support on medication adherence (Aikens et al., 2014).

In a literature review conducted in 2023 focusing on the relationship between social support and medication adherence, for example, this researcher identified different categories and forms of social support (Elomba & Bartlett Ellis, 2023). Out of the 86 studies examined, only 64 delineated the categories and forms of social support examined. The following categories of social support were reported in the 64 studies:

Family Support: Out of these 64 studies, 10 studies examined the relationship between family support and medication adherence (Adisa et al., 2017; Cabellero et al., 2022; El Masri et al., 2020; Hu et al., 2013; Pirdehghan et al., 2016; Poonprapai et al., 2022; Rao et al., 2020; Sankar et al., 2015; Song et al., 2010; Withidpanyawong et al., 2019). Each study, except for one (Rao et al., 2020), reported a significant association between social support and medication adherence or reported social support as a facilitator of medication adherence. Rao et al. (2020) did not identify a significant association between social support and medication adherence in a study focused on understanding medication adherence among African Americans with T2DM.

Perceived Social Support: Ten studies examined the relationship between perceived social support and medication adherence in adults with T2DM, with seven studies reporting a significant association (Gomes-Villa Boas et al., 2012; Ji et al., 2020; Mayberry et al., 2015; Olagbemide et al., 2021; Paterson et al., 2020; Saffari et al., 2019) or social support as a facilitator of medication adherence (Habte et al., 2017). Two studies reported a non-significant association between perceived social support and medication adherence (Mansyur et al., 2015; Zhong et al., 2011), while one study reported mixed findings regarding the association between perceived social support and medication adherence (Ahia et al., 2014). A significant association was reported between medication adherence and social support from spouses but not social support from non-spouse family members or friends (Ahia et al., 2014).

Peer Support: Five studies each examined the association between medication adherence and peer support (Cummings et al., 2017, 2019; Heisler et al., 2010; McGowan et al., 2019; Simmons et al., 2015). Three of the five studies that examined peer support reported a significant association between peer support and medication adherence (Cummings et al., 2017, 2019; Heisler et al., 2010). Two studies did not report a significant association between peer support and medication adherence (McGowan et al., 2019; Simmons et al., 2015).

Informational, Emotional, Tangible, Positive Social Interaction, and Affectionate Social Support: Five studies examined the relationship between medication adherence and informational, emotional, tangible, positive social interaction, and affectionate social support (Osborn & Egede, 2012; Smalls et al., 2015; Walker et al., 2014, 2015a, 2015b). Most studies (*n* = 4) reported a significant association between these forms of social support and medication adherence (Osborn & Egede, 2012; Smalls et al., 2015; Walker et al., 2015a, 2015b). The remaining study (Walker et al., 2014) examined the independent effects of socioeconomic and psychological social determinants of health on self-care and outcomes in individuals with T2DM and reported a non-significant association between medication adherence and informational, emotional, tangible, positive social interaction, and affectionate social support.

Instrumental Support: Four studies examined the association between instrumental support and medication adherence, and all four reported significant associations (Aikens et al., 2014; Bouldin et al., 2017; Mayberry & Osborn, 2012, 2014).

Support Based on the Socio-ecological Model: Three studies based on the socio-ecological model examined and reported conflicting associations between family's and friends' support, personal support, neighborhood support, and healthcare team support and medication adherence. Two studies reported significant associations between these categories of social support and medication adherence (Garcia et al., 2019; Jiamjarasrangsi et al., 2017). The third study (Soto et al., 2015) reported mixed findings regarding the association, noting that medication adherence was significantly associated with higher levels of personal support (or self-support) but not with family/friend support and healthcare team support.

Social and Family Support: The association between social and family support and medication adherence was examined by three studies (Shrestha et al., 2013; Tiv et al., 2012; Unni et al., 2019). Two studies reported a significant association between social and family support and medication adherence (Tiv et al., 2012) and social support as a facilitator of medication adherence (Unni et al., 2019). No significant association was found between social and family support and medication adherence in a study examining medication adherence to oral antidiabetic medications in individuals with T2DM (Shrestha et al., 2013).

Autonomy Support: Two studies examined the association between medication adherence and autonomy support (Lee et al., 2019, 2021). These two studies reported non-significant associations between medication adherence and social support.

Family and Peer Support: Family and peer support were either significantly associated with medication adherence (Vissenberg et al., 2017) or were reported as a facilitator of medication adherence (Murphy et al., 2017).

Other Categories of Social Support: Out of the remaining 20 studies that examined the association between medication adherence and individual categories of social support, two of them reported non-significant associations between *medication adherence* and *functional social support* (Zhang et al., 2021) and *perceived support needs, perceived support received, and perceived support attitude* (Ku & Kegels, 2015). Perceived support needs, perceived support received, and perceived support attitude were non-significantly associated with medication adherence in a study examining the knowledge, attitudes, and perceptions of individuals with T2DM (p = 0.222, 0.457, 0.620, respectively; Ku & Kegels, 2015).

The remaining 18 studies reported significant association between medication adherence and the following categories of social support: *informational support* (Alzubaidi et al., 2018), *emotional support* (Zajdel et al., 2018), *family support and informational support* (Bukhsh et al., 2020), *social, cultural, and emotional support* (Collinsworth et al., 2013), *social support deficit* (de Freitas et al., 2011), *pharmacist and health promoter support* (Gerber et al., 2010), *objective support, subjective support and support utilization* (Gu et al., 2017), *partner support* (Haines et al., 2018), *spousal support* (Helgeson et al., 2020), *social connectedness, perceived social support and actual social support* (Kim et al., 2015), *structural and functional support and autonomy support* (Mayberry et al., 2021), *structural and perceived support* (Mayberry et al., 2019), *clinical pharmacist support* (Nabulsi et al., 2020), *enacted support* (Nundy et al., 2014), *emotional and instrumental support* (Pesantes et al., 2018), *partner and family support* (Pereira et al., 2019), *self-management support* (Trief et al., 2022), and *community health worker and clinical pharmacist support* (Sharp et al., 2018).

Further Findings from Literature Review

Social Support as a Facilitator of Medication Adherence

Sixteen qualitative studies in the literature review identified social support as a facilitator of medication adherence. Participants emphasized the importance of social support from their spouses, children, friends, healthcare providers, pharmacists, colleagues, neighbors, and peers in helping them take their prescribed antidiabetes medications (Abuelmagd et al., 2019; Al-Qazaz et al., 2011; Alzubaidi et al., 2018; Borgsteede et al., 2011; Bukhsh et al., 2020; Gerber et al., 2010; Habte et al., 2017; Hu et al., 2013; Lv et al., 2021; Mousavizadeh et al., 2018; Murphy et al., 2017; Peeters et al., 2015; Pesantes et al., 2018; Sherman & Williams, 2018; Song et al., 2010; Unni et al., 2019).

Participants in Habte et al.'s (2017) study, which sought to identify barriers and facilitators to antidiabetic medications among Ethiopian patients, described a diverse range of ways that family members facilitated their medication adherence. These methods included providing moral support, reminding them to take their medications, helping them obtain the medications, and even covering for them at work when they experience side effects from the antidiabetic medications.

Significant Relationships Between Social Support and Medication Adherence

Out of the 57 studies that utilized the *quantitative study design*, 42 studies reported significant relationships between social support and medication adherence in adults with T2DM (Aikens et al., 2014, 2015; Alzubaidi et al., 2018; Bouldin et al., 2017; Cummings et al., 2017, 2019; de Freitas et al., 2011; Garcia et al., 2019; Garay-Sevilla et al., 2011; Gomes-Villas Boas et al., 2012; Gu et al., 2017; Gyawali et al., 2021; Haines et al., 2018; Heisler et al., 2010; Helgeson et al., 2020; Ji et al., 2020; Jiamjarasrangsi et al., 2017; Kim et al., 2015; Lai et al., 2019; Mayberry & Osborn, 2014; Mayberry et al., 2015, 2019, 2021; Naqvi et al., 2020; Olagbemide et al., 2021; Osborn & Egede, 2012; Pereira et al., 2019; Pirdehghan & Poortalebi, 2016; Poonprapai et al., 2022; Saffari et al., 2019; Sankar et al., 2015; Schoenthaler et al., 2012; Sharp et al., 2018; Smalls et al., 2014, 2015; Tiv et al., 2012; Trief et al., 2022; Walker et al., 2015a, 2015b; Withidpanyawong et al., 2019; Zajdel et al., 2018; Zomahoun et al., 2016).

Ten of the 13 studies that utilized mixed-methods studies reported a significant association between social support and medication adherence (Aloudah et al., 2018; Cabellero et al., 2022; Castillo et al., 2010; Collinsworth et al., 2013; El Masri et al., 2020; Mayberry & Osborn, 2012; Nabulsi et al., 2020; Nundy et al., 2014; Paterson et al., 2020; Vissenberg et al., 2017).

Non-significant Relationships Between Social Support and Medication Adherence

Thirteen of the 57 studies that utilized the *quantitative study design* reported non-significant associations between social support and medication adherence in adults with T2DM (Dobler et al., 2018; Guenette et al., 2016; Ku & Kegels, 2015; Lee et al., 2019, 2021; Mansyur et al., 2015; McGowan et al., 2019; Rosland et al., 2014; Shrestha et al., 2013; Simmons et al., 2015; Walker et al., 2014; Zhang et al., 2021; Zhong et al., 2011).

Mixed Findings on the Relationships Between Social Support and Medication Adherence

Two studies that utilized *quantitative study design* reported mixed associations between social support and medication adherence (Ahia et al., 2014; Soto et al., 2015). Medication adherence was significantly associated with social support from spouses but not with non-spouse family members or friends (Ahia et al., 2014). In Soto et al.'s (2015) study examining the ecological perspective of Latinos on diabetes self-care support, self-management behaviors, and hemoglobin A1C, higher levels of self-support were significantly associated with medication adherence ($p < 0.001$), while family/friends and healthcare support were not significantly associated with medication adherence (Soto et al., 2015).

Three studies that utilized *mixed-methods study design* reported mixed findings on the associations between social support and medication adherence (Adisa et al., 2017; Islam et al., 2013; Rao et al., 2020). In a study (Adisa et al., 2017) examining social support, treatment adherence, and outcomes among patients with hypertension and T2DM in an ambulatory care setting, medication adherence was significantly associated with family support ($p = 0.035$) but not with financial support ($p = 0.547$). In another study examining medication adherence among adults with T2DM who identified as Black/African American, the quantitative results did not report a significant association between social support and medication adherence at baseline and follow-up (Rao et al., 2020). The study's qualitative results identified the presence of social support as a facilitator and a lack of social support as a barrier to medication adherence (Rao et al., 2020).

Conflicts in Study Findings

As previously noted, conflicting findings have been reported in social support studies. While some studies reported significant relationships between social support and medication adherence in adults with T2DM, others did not. Although these conflicting findings have been attributed to the different categories and forms of social support studied, they also underscore the need for further research. These conflicting findings also can be attributed to individual experiences of social support, their openness to the use of social support, and their description of the influence of social support on their medication-taking behaviors. For example, Rao et al. (2020) identified social support as a facilitator and barrier to medication adherence. Participants who reported social support as a facilitator of medication adherence noted that the presence of social support enhanced their adherence. A participant who reported social support as a barrier described the lack of social support as a factor influencing medication adherence. According to Rao et al. (2020), the participant initially had social support from her children in the form of emotional support to help enhance her medication adherence. However, one child moved, and the other did not see her frequently. The absence of these sources of support influenced the participant's medication adherence. Thus, her report of the influence of social support on her medication adherence is influenced by her experience of social support and her openness to using the support from her children to help with her medication taking.

Understanding the nuances of individual experiences of social support and their receptiveness to it is crucial for understanding the influence of social support on medication adherence and developing effective interventions for patients with T2DM, highlighting the need for further social support-related studies.

Need for Further Social Support-related Studies

Given the intricate nature of T2DM management and the crucial role of social support in disease control, particularly as the condition advances, the availability of social support from proximal sources to adults with T2DM and the ease of adjusting social support without necessitating extensive structural changes, there is a compelling need to delve into the factors influencing the conflicting reports from studies on the relationship between social support and medication adherence. As previously noted, the existence of various categories and forms of social support and numerous studies that have examined their influence using different instruments further add to conflicting findings in the literature.

The Medical Outcomes Study Social Support Survey (Ahia et al., 2014), the Chronic Illness Resources Survey (Soto et al., 2015), the Diabetes Family Behavior Checklist (Mayberry & Osborn, 2012), Diabetes Family Behavior Checklist II (Mayberry et al., 2015), the Norbeck Social Support Questionnaire (Aikens et al., 2015), the Duke-UNC Functional Social Support Questionnaire (Kim et al., 2015), and the Diabetes Care Profile (Ku et al., 2015), are some of the prominent instruments used to measure social support. Although these instruments effectively measure different categories and forms of social support, studies that utilize the instruments report conflicting findings—even studies that use similar instruments also report conflicting findings.

For example, the Medical Outcomes Study Social Support Survey measures emotional/informal support, tangible support, affectionate support, and positive social interaction (RAND, 2024). This instrument includes a question that asks participants to rate if they have someone to do things with them to help them get their minds off things. Although Walker et al. (2014) utilized the Medical Outcomes Study Social Support Survey, the authors reported non-significant relationships between social support and medication adherence. Smalls et al. (2015) used the same instrument to assess the relationship between neighborhood factors and diabetes-related health outcomes and self-care behaviors. The authors reported significant relationships between social support and medication adherence ($p < 0.05$). Although the authors in both studies utilized the same instrument to measure the same categories and forms of social support, they reported conflicting findings. Even though the instrument measured the same categories and forms of social support, its use resulted in conflicting findings because of a failure to account for the influence of individuals' receptiveness to social support on their use of social support and their reporting of the influence of social support to address their needs.

These conflicting reports and the potential for social support to significantly influence medication adherence while mitigating the effects of other factors that influence medication adherence highlight the need for further social support studies focusing on understanding receptiveness to social support. Based on the assumptions that individuals gauge the impact of social support on their medication adherence based on their openness to, use of, and experience with social support, a comprehensive concept analysis was conducted by this researcher. This analysis is instrumental in deepening our understanding of receptiveness to social support, providing valuable insights for future research and clinical practice.

Concept Analysis: Receptiveness to Social Support

To gain more insight into the influence of receptiveness to social support on using social support to enhance medication adherence, this researcher conducted a yet-to-be-published concept analysis of receptiveness to social support using Walker and Avant's (2019) method. Based on a review of 29 studies, the concept analysis identified several attributes, antecedents, and consequences of receptiveness to social support. The antecedents for individuals to be receptive to social support, as revealed by the concept analysis, include the presence of a social network, social relationships, social environment, past experiences with social support, and beliefs about social support. These antecedents work in synergy to foster individuals' receptiveness to social support. Those who are more receptive to social support exhibit the following attributes: the presence of a supportive, positive, and trusting relationship with the support person; effective communication and collaboration with the support person; perception of support from the support person; and influence of the support person on their medication adherence. Individuals who were receptive to social support reported using it to improve their medication-taking behaviors and health outcomes, thereby establishing positive relationships between social support and medication adherence.

Summary

The increasing incidence and prevalence of diabetes and the propensity of this disease to affect different aspects of health necessitates a multilevel approach to optimize the management of this disease. Individuals diagnosed with T2DM are required to make significant lifestyle modifications, including continuous blood sugar monitoring, that are often discouraging and increase their risk of developing macrovascular and microvascular complications associated with T2DM. Adults with T2DM who have been prescribed medications to manage their diabetes have to take their medications while navigating barriers that can influence their medication adherence, such as the cost of their medications, their knowledge about the disease and their medications, other health comorbidities, and the availability of social support.

Various research has examined the relationship between social support and medication adherence, with conflicting findings reported in extant literature. While some studies report significant relationships between social support and medication adherence, others do not. The multidimensionality of social support has been identified as a factor influencing study findings on the relationship between social support and mediation adherence with different forms and categories of social support studied. The theoretical frameworks used in the multiple studies depend on the category of social support being studied and also contribute to conflicting findings on the relationship between social support and medication adherence. Finally, individuals' reports of the influence of social support on their medication adherence based on their openness and use of social support also contribute to the incongruent findings.

A yet-to-published concept analysis of receptiveness to social support revealed that individuals who were more receptive to social support reported their use of social support to improve their medication adherence. Individuals' receptiveness to social support was influenced by antecedents, such as the existence of a social network, social relationships, social environments, past experiences with social support, and their beliefs about social support. Individuals who were more receptive to social support reported attributes such as the existence of a supportive, positive, and trusting relationship with the support person, good communication and collaboration with the support person, perception of support from the person, and influence of the support person on their medication adherence.

The literature review and concept analysis results highlight the need for further studies to gain additional insight into factors that influence individuals' receptiveness to social support and, thereby, their utilization of social support to enhance their medication-taking behaviors. The insight will optimize the assessment of individual needs and tailoring of limited social support-based resources to address their needs and optimize the management of their disease and health outcomes.

CHAPTER THREE

MATERIALS AND METHODS FOR QUALITATIVE RESEARCH

This chapter describes the methods used for the qualitative descriptive study. The chapter details the specific aims, study design, inclusion criteria, exclusion criteria, sample size, sampling technique, ethical considerations, sampling area, agreement to participate in the study, data collection, data management, and data analysis.

Purpose and Specific Aims

The purpose of this qualitative descriptive study is to delineate the factors that support medication adherence and to explore the perceptions of and receptiveness to social support in the context of medication taking among adults living with T2DM.

The aims of the study were to:

- Describe factors that motivate participants to take medications as prescribed.
- Describe participants' perceptions of the role of social support in medication taking for T2DM management.
- Describe participants' receptiveness to current or future social support with medication taking.

Study Design

The qualitative descriptive research method was utilized because it provides insight into a poorly understood or new phenomenon, such as receptiveness to social support (Kim et al., 2017). The qualitative descriptive research method provides insight into the subjectiveness of the phenomenon and the different experiences of individuals related to the phenomenon (Doyle et al., 2020). The qualitative descriptive research method has been linked to the philosophical framework of constructionism, which presents the dynamic and multiple interpretations of realities regarding a phenomenon (Doyle et al., 2020). Receptiveness to social support is subjective, and adults with T2DM will likely have different experiences that might have influenced their receptiveness to social support. The varying experiences regarding receptiveness to social support may influence adults' willingness to use or not use social support.

Thus, the use of qualitative descriptive research helps describe factors that motivate participants to take their antidiabetic medications as prescribed, describe participants' perceptions of the role of social support in taking their medications, and describe participants' receptiveness to current or future social support with medication taking.

Population and Setting

Inclusion Criteria

Participants were recruited to the study if they were English-speaking adults 18 years old or older with a confirmed diagnosis of T2DM who had been prescribed at least one oral antidiabetic medication to enhance their glycemic control. Although T2DM is becoming more common in children and young adults due to increasing obesity and lifestyle patterns, this study's age limit was 18 years old or older. This age limit was specified due to the various complex factors that might influence children's and young adult's decisions to take their prescribed antidiabetes medication, such as the presence of their parents or caregivers and the potential influences of these factors in their decisions to take or not take their antidiabetes medications. Diagnosis of T2DM was confirmed by the patient's report of their last A1C. A confirmed medical diagnosis of T2DM was needed to ensure that individuals with other forms of diabetes, such as type 1 diabetes, gestational diabetes, and prediabetes, were not included in the study. The onset and management of these other forms of diabetes differ from the onset and management of T2DM. Since T2DM can be managed non-medically with lifestyle modifications, verifying that individuals recruited to the study had been prescribed at least an antidiabetic medication ensured that the target population was recruited for the study. A screening questionnaire was used to screen participants to ensure they met the inclusion criteria (see Figure A1).

Exclusion Criteria

Individuals who were cognitively or developmentally impaired or were non-English speaking were excluded from the study because these criteria might impede their ability to participate in the study. Family members, including spouses and children of participants, also were excluded from the study to reduce the risk of redundant responses to the interview questions and to enhance the responses' heterogenicity.

Sample Size

Different sample sizes have been proposed in qualitative research, with no consensus on the appropriate sample size (Vasileiou et al., 2018). Data saturation, based on concurrent data collection and analysis, is the gold standard for sample size in qualitative research. However, Doyle et al. (2020) note a movement away from the use of data saturation to determine sample size. This deviation from the emphasis on data saturation is due to the inconsistent and questionable report of data saturation in existing studies. Doyle et al. (2020) also argue against the determination of sample size prior to collecting data, noting that doing so might influence data analysis. Thus, it is recommended that researchers who engage in qualitative research ensure that they have collected sufficient data to meet their study aims (Doyle et al., 2020). The sample size for this qualitative descriptive research was based on the collection of rich data from participants who have diverse experiences of T2DM and differ based on their years of diagnosis of T2DM and their management of this disease.

Sampling Technique

According to Doyle et al. (2020), the purposive sampling technique is generally used in descriptive qualitative research. The purposive sampling technique is a non-random sampling technique that involves selecting research participants with knowledge and experience of the phenomenon being examined. Doyle et al. (2020) recommend recruiting participants with a wide range of experiences related to the phenomenon to address the potential of this sampling technique to influence the recruitment of diverse participants. Using the purposive sampling technique, participants were recruited for the study based on their availability, knowledge, and experience of T2DM, decisions regarding taking or not taking their prescribed antidiabetic medications, and if and how others influence their decisions to take their prescribed antidiabetic medications.

Recruitment Settings

The study participants were recruited from the Indiana Clinical and Translational Sciences Institute (CTSI) and Riggs Community Health Centers. The Indiana CTSI supports research to improve patient and community health mainly through its statewide research partnership among Indiana University, Purdue University, the University of Notre Dame, the Regenstreif Institute, and other non-academic organizations in the community (Indiana CTSI, 2024). To recruit participants from the Indiana CTSI registry, this researcher consulted with members of the Indiana CTSI team. Following the consultation, this researcher attended the All IN for Health iConnect training offered by the Indiana CTSI to learn more about recruitment from the registry. After the training, this researcher was authorized to post information about the study on the registry with the consultation team's help and begin recruiting participants. The recruitment fliers for the study were posted on the Indiana CTSI registry (see Figure A2). Individuals within the Indiana CTSI registry could answer the screening questions on the website and provide their information for the scheduling of interviews.

Riggs Community Health Center is a federally qualified health center in Indiana that provides patient-focused, cost-effective, and comprehensive care to patients in underserved communities in Lebanon and Lafayette, Indiana (Riggs Community Health Center, 2021). The researcher sought permission from the chief executive officer of the health center to recruit participants from the center. Information about the study, including the IRB approval (see Figure A3), was provided to the chief executive officer and the director of residency and education. Following their approval to recruit participants from the clinic and the signing of the Nurse Practitioner Student Ph.D. Dissertation Agreement from Riggs (see Figure A4), copies of the recruitment fliers were provided to the center (see Figure A5) for patient distribution. The recruitment fliers provided to Riggs Community Health Center included a QR code leading to the screening questionnaire on the Research Electronic Data Capture (REDCap), a secure web application for managing databases available through Indiana University (Research Electronic Data Capture, n.d.).

Information on the Indiana CTSI and the recruitment fliers provided to Riggs Community Health Center included the study purpose, inclusion and exclusion criteria, and the offer of financial compensation of a $20 gift card for each participant after completing the interview.

Consent and Enrollment

The study information sheet detailing significant elements of the study, such as the purpose of the study, activities involved in the study, risks and benefits associated with participation in the study, use and protection of information obtained from the study, contacts to call with questions or problems related to the study and the voluntary nature of the participants' decisions to participate in the study, was available on REDCap for the participants to review and indicate their interest in participating in the study (see Appendix A, Study Information Sheet).

Participants who agreed to participate in the study, from either recruitment site, were required to answer screening questions on the Indiana CTSI website or REDCap form if recruited through Riggs Community Health Center to verify their age, ability to read and understand the English language, an official diagnosis of T2DM, whether they were taking any medication for their diabetes, and if someone helped them take their medications. The researcher contacted individuals who indicated interest in the study to provide more information and answer any questions about the study. Additional discussions were held with individuals who agreed to participate in the study to decide the format for the interview, whether over Microsoft Teams (a collaboration application developed by Microsoft), phone, or the location if the interview was to be conducted in person.

Ethical Considerations

Approval from the Indiana University Institutional Review Board was obtained before recruitment began to ensure that the study provided adequate participant protection (see Figure A3). As noted previously, an agreement also was signed with Riggs Community Health Centers prior to being authorized to recruit from their facilities (see Figure A5).

Data Collection, Management and Analysis

Data Collection

Individuals who agreed to participate in the study were enrolled, and data were collected at a one-time point through recorded, in-depth, semi-structured interviews conducted by the researcher. The in-depth interviews consisted of open-ended questions reviewed by a senior nurse researcher with expertise in qualitative research (see Appendix A, Questionnaire 1). Microsoft Teams, phone interviews, and physical interviews at a public location were utilized to conduct the interviews. All interviews were digitally recorded and transcribed using NVivo Transcription and Microsoft Word, and all recorded interviews were destroyed after data analysis.

Data Management

Data from the in-depth semi-structured interviews, the transcribed data from NVivo and Microsoft Word, and the analyzed data were stored in a secured, university-approved Microsoft Teams site, accessible only to three reviewers: the researcher, the committee chair, and a committee member who is a senior nurse scientist with experience in qualitative research. After uploading the interview data and the transcripts to the secure Microsoft Teams site, all recordings and files on the recording computer were destroyed, with data analysis occurring only on the secure Teams site. During analysis, the names of the participants were not used. Each participant was described according to the sequence of their interview, with an example of the first participant being labeled as dissertation participant 1 (DP1).

Data Analysis

After uploading the transcripts to the secure Microsoft Teams site, the transcribed data was first read then re-read to ensure transcription accuracy and correct transcriptions based on voice recordings. Thematic data analysis was employed to identify, analyze, and report themes within the transcribed data (Vaismoradi et al., 2013). Data analysis was conducted using the following analytic phases of thematic analysis recommended by Braun and Clarke (2006) and highlighted by Vaismoradi et al. (2013) to provide guidance and enhance the credibility and accuracy of the coding process:

Phase One - Familiarizing with Data: In this phase, three reviewers, including the researcher, the committee chair, and a committee member with extensive knowledge of qualitative research, reviewed the transcribed data multiple times to familiarize themselves with it while noting down initial ideas.

Phase Two - Generating Initial Codes: Following familiarization with the data, an initial codebook was developed and revised as the data analysis began. Text units that described the unique meanings and actions of the participants were highlighted by each reviewer and labeled according to their line numbers and alignment with the codes from the codebook. The researcher entered the line numbers for all transcripts into a Microsoft Excel spreadsheet according to the codes in the codebook. The line numbers for seven transcripts (Transcripts 1–4 and 12–14) were highlighted by the two other reviewers and entered into the Excel sheet for comparison. The line numbers for each code from the seven participants were compared. Discrepancies were resolved by discussions held over several meetings among the three members. Following agreement with most of the coding, decisions were made to review the coding the researcher had highlighted for the rest of the transcripts and indicate if the other two reviewers agreed or disagreed with the code. Any discrepancies were once again resolved by discussions among the three members.

Phase Three - Searching for Themes: The initial codes were collated into emergent themes. All data that were relevant to each code and theme were gathered. The generated themes were reviewed by the committee member with expertise in qualitative research. Appropriate codes and supporting statements were documented for each theme by the researcher and submitted for revision by the other two reviewers.

Phase Four - Reviewing Themes: The emergent themes were compared to the codes and the entire data set to ensure appropriateness.

Phase Five - Defining and Naming Themes: While comparing the codes and the entire data set to the emergent themes, the themes were defined and refined as needed to have clear definitions and names of the themes.

Phase Six - Producing the Report: Final themes identified from the data were reported with compelling statements from the data.

Evaluation of the Quality of the Final Product

Preserving the quality of the research was paramount to accurately describe the experiences of individuals with T2DM, their decisions regarding their antidiabetes medications, and the influence of social support on these decisions. Doyle et al. (2020)

underscore the significance of employing Lincoln and Guba's four criteria for evaluating quality in qualitative descriptive research. Megheirkouni and Moir (2023) further elaborate on the four criteria: credibility, transferability, dependability, and confirmability.

Credibility

Credibility establishes whether the study findings emerged from the data analysis and accurately reflect the participants' experiences (Megheirkouni & Moir, 2023). Prolonged engagement, triangulation, and reflexivity were used to maintain credibility (Megheirkouni & Moir, 2023). Responses from participants were reviewed before scheduling interviews and at the onset of the interviews to ensure accurate reports of their T2DM medication management. During data analysis, investigator triangulation was utilized to independently analyze the transcripts and highlight supporting statements from the participants for each code and theme, ensuring that the codes and themes reflected the participants' experiences. Reflexivity through memoing and discussing interpretations with other researchers also enhanced the credibility of this study.

Dependability

Dependability establishes whether the study findings are consistent and reliable and can be obtained with replicated studies, regardless of the context of the study or the researcher (Megheirkouni & Moir, 2023). To ensure the study's dependability, all materials used in the study detailing the methods, the data collection process, the analysis steps, and the codebook for interpretation of the codes and themes are on the Microsoft Teams site. Debriefing with other reviewers also was utilized to ensure that all the protocols for the study were followed, with committee members reviewing and approving every decision made regarding the study.

Transferability

Transferability is a key consideration in qualitative research, referring to the extent to which study findings can be applied to other settings, contexts, or populations (Megheirkouni & Moir, 2023). To enhance the transferability of the study findings, detailed descriptions of the recruitment process, including the settings and demographics of the study participants, were provided. These descriptions would enable other researchers to assess the study's applicability to their settings or populations of interest.

Confirmability

Confirmability establishes the extent to which data analysis is influenced by researcher bias and whether data are derived from the participants' statements (Megheirkouni & Moir, 2023). Several actions were taken to ensure the confirmability of this qualitative study, such as submitting a study protocol that was reviewed and approved by the committee members. The committee members also approved any deviation from the study protocol, including a revision of the study purpose and aims in April 2024. Several meetings were held with the committee members involved in the data analysis stages, with discussions involving the interpretation of codes and themes from the data and consensus on resolving any discrepancy in understanding the codes and themes. The codebook also was utilized in data analysis, limiting the influence of researcher bias in interpreting the codes and themes. All documents utilized in this study were uploaded to the Microsoft Teams site, forming an audit trail of the entire research process. Finally, reflexivity through memoing was also valuable in enhancing the confirmability of data.

Summary

The qualitative descriptive research method utilized for this study is crucial in understanding individual differences in receptiveness to social support and their unique experiences that might influence their receptiveness to social support. The process of thematic data analysis, which involves identifying patterns or themes within the data, ensures that the themes from data analysis reflect and are supported by the data from the in-depth interviews with participants. Utilizing Lincoln and Guba’s four criteria of credibility, dependability, transferability, and confirmability for the evaluation of the quality of the study ensured that the study findings were derived from the participants’ statements, accurately reflected their experiences, were reliable and replicable across different contexts, and could be applied to other settings. Ensuring the quality of the study enhances the utilization of study findings in practice or future research examining the influence of social support on medication adherence. By employing the qualitative descriptive research method, this study describes factors that motivate participants to take their antidiabetic medications as prescribed, participants’ perceptions of the role of social support in taking their medications, and their description of their receptiveness to current or future social support in terms of medication taking.

CHAPTER FOUR

QUALITATIVE RESEARCH FINDINGS

This chapter details the findings from data analysis of in-depth interviews with adults with T2DM. It provides more insight into the experiences of adults with T2DM and the influence of receptiveness to social support on their use of social support to maintain their medication-taking behaviors.

Sample Demographics

Fourteen participants (four females and 10 males) were interviewed for the study (Table B1). Of the 14 participants, two identified as Black or African American. Ten participants identified as Caucasians of non-Hispanic/Latino ethnicity. The remaining two participants identified as Caucasian with Hispanic/Latino ethnicity. The participants' ages ranged from 53 years to 75 years, with a mean age of 66.5 years. The years since the diagnosis of T2DM differed, ranging from one year to 44 years. Participants' A1C levels varied from 5.6% to 8.5%. Interviews with most participants (n = 13) were held over the phone. Only the interview with DP4 was held at a physical location at the local university. All interviews in the study occurred between November 2, 2023, and December 6, 2023. The duration of the interviews ranged from 8.07 minutes to 34.38 minutes because some participants gave more context about their experience with T2DM and medication management while others answered the interview questions with brief responses. The average length of time for the interviews was 16.48 minutes.

Themes, Categories, and Codes

The codes identified during data analysis were reviewed and compared with the codebook to create categories and themes. After the review and comparison, the codes were collated and formed into final categories. These categories were then used to generate themes organized by the study aims. The following themes emerged: receiving the diagnosis, taking medications for T2DM, receiving support, envisioning the future, and advising others (see Table B2). The theme of *receiving the diagnosis* included the categories (codes) context (context of diagnosis), emotional response (response to diagnosis), and actions taken (actions after diagnosis). The following categories (codes), initiating treatment (first medication regimen and reaction to taking medicine), maintaining treatment (medication adjustments and actions to manage diabetes), and motivation to adhere to treatment (internal motivation) were merged into the theme, *taking medications for T2DM*. The theme, *receiving support*, included categories (codes), important others (who supports), forms of support (what supports), impact of support on T2DM management (impact on participant), and needing help (past/present need, and feeling about past/present need). *Envisioning the future* as a theme comprised of the categories (codes), anticipated needs (future needs), openness to help (feeling about future needs, openness to forms of support, and other's openness to social support), and anticipated barriers (barriers to asking for or seeking help). The final theme, *advising others*, includes two categories (codes): the role of social support (opinion on social support influences, general) and advice for others living with T2DM (need for people to be open). The following sections describe themes in detail.

Receiving the Diagnosis

The theme, *receiving the diagnosis*, encompasses categories and codes, including context (context of diagnosis), emotional response (response to diagnosis), and actions taken (actions after diagnosis).

Context (Context of Diagnosis)

Based on the codebook, the context of diagnosis was coded when participants either described what prompted them to get tested for T2DM or the context of testing or the circumstances surrounding their diagnosis. Participants described different circumstances surrounding their diagnosis of T2DM, including diagnosis following a partial pancreatectomy (DP1) resulting from poor weight management and unhealthy lifestyles (DPs 2, 8) and previously diagnosed with prediabetes (DPs 5, 7, 9). DPs 4, 11, 12, and 13 described their diagnosis of T2DM following their experience of symptoms, such as excessive thirst and urination. According to DP13, "*I remember I had been thirsty a lot of the time and urinating a lot more than I thought was normal, so I knew something was not right*."

Emotional Response (Response to Diagnosis)

Participants' statements were coded as response to diagnosis when participants described their initial reaction to being diagnosed with diabetes, including how they felt about the diagnosis or the reasons for their reactions. The emotional responses to being diagnosed with T2DM varied among participants. Participants' descriptions of their initial reactions ranged from shock and surprise to denial and disappointment. Following their diagnoses with T2DM, several participants described how shocked they were at diagnosis (DPs 1, 6, 9, 14). A few of the participants described their surprise at being diagnosed with T2DM (DPs 2, 11, 13). DPs 3 and 9 reported being in denial following the diagnosis of T2DM. DP9 stated, "*In fact, I was probably in a little bit of denial at the very beginning because I was 30 years old. I was in good health, and I didn't understand how I could have Type 2 diabetes*."

DP13 felt both surprised and disappointed, stating,

> I guess I was surprised and disappointed that it was diabetes, but it was what it was, and we needed to deal with it. No one in my family that I am aware of has ever had diabetes. So, it was something new.

Similarly, DP 4 expressed fear, particularly because he considered himself to be healthy.

For some participants, the diagnosis of T2DM did not significantly impact their lives. DP5 and DP7 noted that their diagnosis of T2DM did not impact them due to a previous diagnosis of prediabetes. DP8 described how the initial diagnosis of T2DM did not feel like a life-changing event due to his perspective on his health, noting that he felt good and did not feel any changes in his health from the diagnosis. DP12 described the diagnosis of T2DM as an educational experience, noting that he had a good physician who played a crucial role in buffering the effect of the diagnosis.

Actions Taken (Actions after Diagnosis)

Actions taken after diagnosis include participants' behaviors after being diagnosed with T2DM. Participants described that upon being diagnosed with T2DM they engaged in a range of behaviors and actions. These actions included reaching out to family and friends, consulting healthcare providers, attending diabetes educational sessions, researching the condition online, and, in some cases, taking no immediate action (DP 7). As stated by DP6,

> I talked to two of my closest friends and a cousin who [has] Type 1. He has lived with it for over 40 years, and his mom...kind of became mom to me on that [diabetes]. I did some reading. My doctor told me to go through education classes with two nurse practitioners—their specialty was diabetes. I learned a lot through that.

Taking Medications for T2DM

Initiating Treatment

First Medication Regimen. Most participants, except for DPs 8, 11 and 12, were prescribed Metformin either as a monotherapy or with insulin for managing their diabetes. DP4, who was hospitalized at the time of diagnosis because of worsening hyperglycemia, described being prescribed Metformin and long and rapid-acting insulin for medication management of T2DM. DPs 8, 11, and 12 described being prescribed Glipizide, Actos, and Diabeta, respectively, as the first medication regimen to manage their diabetes.

Reaction to Taking Medication. Reaction to taking medications as a code described participants' feelings about taking medications to manage their T2DM and any challenges they have had with taking the medications. Participants expressed different reactions to taking medications to manage their diabetes. These reactions ranged from having no understanding of medication (DP8) to being fine with taking medication (DPs 5, 7, 9, 12), feeling defeated (DP13), experiencing side effects from taking medications (DPs 3, 6), being scared to take medications (DP4), and hoping that the medication would help manage T2DM (DPs 1, 2, 10). DP13 stated,

> I suppose like most people, when you are prescribed a long-term medication, I felt a little bit defeated, like I hadn't lived the healthy lifestyle that I thought I was living or that I hadn't paid attention to my health...but taking a daily medication, especially an oral medication, is not an inconvenience. It's not a big deal.

Regarding reactions to taking either oral medications or injectables, several participants (DPs 1, 5, 11, 14) described how glad they were to be taking oral medications over using insulin. In contrast, DP3 described being switched to insulin due to side effects from oral medications and expressed how glad she was that the insulin helps her manage her T2DM without the side effects she was experiencing with the oral medications. DP4, who is on both oral medication and insulin, expressed his optimism about improving his health to the point when he no longer needs to take as many injections or pills to manage his T2DM.

Maintaining Treatment

Medication Adjustments. Any medication changes in participants' medications since they were first prescribed medications to manage their diabetes were coded as medication adjustments. Five participants described medication adjustments to their regimen due to the progression of their disease (DPs 2, 8, 10, 13, 14). The duration of time since the diagnosis of T2DM for these participants ranged from 18 years (DP14) to 33 years (DP 13), with an average 24.6 years since diagnosis. Per DP8, "*As my disease progressed, I was prescribed Janumet, and I don't think that I have ever missed a dose in all the years I have had [the medication]*."

Two participants (DPs 1, 3) described making changes to their medications due to side effects from the first regimen prescribed. According to DP1, "*Every six months I see the doctor and we will make adjustments as needed. I was taking Jardiance for a period of time, but it caused side effects that I couldn't tolerate*." DP3 described switching from oral medications to insulin due to getting sick from oral medications.

Actions to Manage Diabetes. The action to manage diabetes code was applied to statements in which participants described using a tool or approach to manage their medications. Seven participants described actions that they have taken to ensure that they are taking their medications to manage their T2DM, including the use of alarms (DP3), pill boxes (DPs 3, 13, 14), keeping medications in open view (DP5), adjusting the timing of medications (DP4), use of technology such as Dexcom and Omnipod (DPs 10, 12, 13), and, interestingly, the use of a diabetic alarm dog, as with DP3. DP3 stated, "*I have a dog going through a program called Medical Mutts. He's a diabetes alert dog. So, he lets me know when my sugar is high and low*."

Motivation to Adhere to Treatment

Participants' statements describing personal reasons for taking or not taking their medications were coded as internal motivation. Except for DP12, who did not express any internal motivator for taking his medications, the remaining participants described various internal motivators for managing their T2DM. These included managing the disease (DPs 1, 4, 5, 6, 7, 10, 11, 13), avoiding complications from T2DM (DPs 2, 3, 4, 5, 8, 9, 11, 14), and a strong commitment to staying healthy for the sake of their families (DPs 1, 9). DP1 stated that he takes his medications because he wants to control his T2DM, live a normal life, be healthy, and be around for his grandchildren. DP3 reported having two strokes because of uncontrolled diabetes and described her fear of another stroke as a motivator to take her medications. DP4 stated, "*Yeah, I want to collect my Social Security, and I don't want to spend another two weeks in the hospital. So basically, I'm scared not to*."

Receiving Support

Important Others (Who Supports)

The code of who supports was applied to statements about others who have supported or continue to support participants in taking their medications as prescribed. Eleven participants identified others who supported them in taking their medications as prescribed. The sources of support ranged from immediate family, including wives, daughters, and sons (DPs 1, 3, 9, 13) to primary care physicians (DPs 3, 6, 7, 8, 10, 12, 13, 14), specialists (DP4), and health insurance providers (DP8). DP8 described several ways his health insurance and his family physician support him in managing his diabetes. In his own words, "*You know, the motivation that I get is really driven by the support I get from my insurance provider and my family physician. The outside influences from my friends are really negligible because it's not a topic of conversation*."

Forms of Support (What Supports)

Participants' descriptions of any form of support from individuals to help them take their prescribed medications were grouped under the code of what supports. Several participants described different forms of support they have received from various sources to help them take their medications as prescribed. Most of the support involved encouragement (emotional support) from family members, friends, and healthcare professionals to take their medications as prescribed (DPs 3, 4, 6, 7, 8, 9, 10, 12, 13). According to DP3,

> My son is a father of four. He said, "Mom, when we were young, you took us to all these enrichment programs. You made us go and tap the maple syrup trees. You made us take horseback riding lessons. You took us on vacation every year. I want you to live long enough to do that with my children."

Two participants described getting informational support from their healthcare professionals, friends, and coworkers about disease management (DPs 4, 12). DPs 8 and 13 described getting financial support from their health insurance providers, which enabled them not to have to make financial decisions regarding the affordability of medications. Per DP8,

> I'd say my support comes from my health insurance provider, who communicates daily via voicemail and provides all my testing supplies at no cost. When I have low or high blood glucose readings uploaded to my records, I get calls and coaching from [my health insurance provider] about what I need to do.

Most participants who described getting support from others to manage their T2DM were usually provided support because others identified that they needed it (DPs 3, 6, 7, 8, 9, 12, 13, 14). As noted previously, DP3's sons identified that she needed social support and provided emotional support in the form of encouragement to enhance her medication adherence. DP7 8 also described the emotional and practical support he received from his health insurance group to enhance his medication adherence due to the health insurance's identification that he needs support managing his T2DM. In contrast, DPs 4 and 10 described the provision of support based on their need and because others also identified that they needed support. DP4, newly diagnosed with T2DM, described getting informational support from his healthcare providers and peers to help him learn how to manage his T2DM better. He also described support from his healthcare providers with the administration of his insulin due to his providers' identification that he needed support with the administration of insulin.

Impact of Support on T2DM Management (Impact on Participant)

The code of impact on participant involves participants' descriptions of the impact of the influence from other individuals to take their medications as prescribed. The support from various sources influenced several participants to take their medications as prescribed (DPs 1, 6, 8, 10, 12, 13), recognize the importance of diabetes management (DPs 6, 8, 12), and gain more confidence in managing their T2DM (DP 6). DP6 described feeling confident in her management of T2DM based on support from her cousin, doctor, and nurse practitioners. Her report stated,

> For me, the support I got at the beginning from my doctor and nurse practitioners, besides the support from my cousin, was probably the best thing. [The support] helped me to be able to ask for help and gave me confidence.

While describing the impact of support from his physician on his T2DM medication management, DP12 stated, "*And it's proven factual. He motivated me in a way that made me think about myself and my future, which caused me to be disciplined about my treatment and medication*."

Needing Help

Past/Present Need. This code included participants' responses to questions about needing help to take their prescribed medications either in the past or at the time of the interview. Most of the participants, except for DPs 4, 9, and 14, denied needing help in the past or the present with medication management for their T2DM. Some participants, like DP3, might have needed help but never asked for or accepted help. In DP3's words, "*So, have I needed help? Uh, I probably should have had [help], but [I] wouldn't have accepted it*." DPs 4 and 14 described their past need for help with their medications. DP4 described needing help while being hospitalized to learn how to use his flex pen for his insulin. DP14 described how help from his mother with administering insulin made a difference in his diabetes management. DP9 described getting help from his wife with going to appointments for his diabetic retinopathy. He reported, "*I have diabetic retinopathy, and my wife has to drive me to my eye doctor's appointment to get a shot in my eye every couple of months.... I get help with that and allow her to [help]*."

Feeling About Past/Present Need. Participants' reports of their feelings about asking for and receiving help from others to take their medications in the past or at the time of the interview were coded as feeling about past/present need. DPs 4, 9, and 14 described how they felt receiving help in the past or present with managing their diabetes.

For DP4, he described how glad he was to have help and to be open-minded to learn how to manage his diabetes and leave the hospital. He explained,

> I was completely open-minded. All I wanted to do was get out of the hospital and go on my way. I can't say put this behind me but learn how to live with [T2DM]. So, I was extremely open-minded and open to any suggestions or help that I could receive from any quarter.

DP14 also expressed gratitude for having help with managing his medications and T2DM. In his report, he stated, "*It was a relief that [my mother] was there to help out with [injecting insulin] because I was depressed and was in a wheelchair for a couple of months after the surgery on my foot*."

While describing receiving help from his wife with going to his diabetes appointment for management of his diabetic retinopathy, DP9 stated,

> I don't love [receiving help] because I have always been a very strong and independent man. I don't love the idea of having anybody help me with anything, but...I am not so proud that I wouldn't ask for help if I needed it.

Envisioning the Future

Anticipated Needs (Future Need)

The code, future need, applied to statements regarding participants' responses to questions about their future need for help taking their prescribed medications. The participants described possible future needs with administering their insulin (DPs 1, 7, 10), verifying the dosing of their medications (DP 1), sorting their pills (DP 13), being reminded to take their pills (DPs 6, 13), and helping to fill Omnipod with insulin (DP13). Several participants described possibly needing help in the future with their medications as they age (DPs 1, 6, 7, 8, 9, 10, 13). As they considered aging, participants identified needs related to memory and physical aspects of medication management, as reflected in the following participant's statement. DP6 reported, "*Probably, when I am older and* *have more medical issues...I might forget to take my pills or have other medical issues that would make it harder for me to take my medication*."

Openness to Help

Feeling about Future Need. Participants' descriptions of their feelings regarding asking for and receiving help in the future to take their prescribed medications were coded as feeling about future need. Many participants described that they would have no problem asking for help in the future with their medication management, except for DPs 3 and 6, who described their resistance to asking for help. As stated by DP8, "*Well, now I would be very forthright. Yeah, I would say I don't have any hesitation to ask for help because I know it affects me personally*." DP6 described her reluctance to ask for help but stated that it would depend on her mental, physical, and emotional health at that time. In her own words,

> Yeah, I'll feel bad about it because I have this idea that I can do this, and it sometimes takes me a while to ask for help, but I think it will generally depend on where I am at that point in my life...where I am mentally, physically and emotionally.

Openness to Forms of Support. Some of the participants reported being in online social groups for support. As reported by DP8, "*I have been in and out of online support groups like Facebook...[They] help me when I feel I need more help*." DP9 described his need to trust any source of support prior to receiving support from that source. He stated, "*I wouldn't let somebody help me if I didn't trust them. I have very big trust issues, and so you would definitely have to be somebody that I trusted, like my wife or one of my daughters*."

Others' Openness to Social Support. Participants were asked to describe factors that influenced people's openness to social support. These factors were grouped according to personal factors, support system factors, support person factors, and the environment where support is provided.

- *Personal Factors:* Participants described personal factors such as individuals' thoughts of failing in being able to manage their disease (DP1), resistance to asking for help (DPs 2, 4, 8), privacy (DPs 4, 5, 8, 12, 14), open-mindedness (DP4), perspective on life (DPs 4, 8), belief about diabetes (DP7), stigma related to diabetes (DPs 7, 14), knowledge of diabetes and diabetes management (DP7), denial that help is needed (DP8), thoughts that diabetes makes them a lesser person (DP8), pride (DP11), guilt about asking for help (DP11), stubbornness and independence (DPs 6, 9, 10), trust for the source of support (DP 13), access to support (DPs 10, 11, 13), hating to ask for help (DPs 9, 14), and embarrassment about needing help (DP14).
- *Support System Factor*: DPs 6 and 10 described the influence of the nature of the support system, including communication and the strength of the relationships within the support system. DP6 stated, "*I think that for a lot of people, where it helps them is if they've got a good support system behind them. If they don't have that support system, I think [taking their prescribed medication] gets worse*."
- *Support Person Factor:* DP4 noted that the personality of the person providing support influences others' openness to social support. DP4 stated,

  > You can have a support person in a facility, whether a hospital or rehabilitating [sic] care, but not everybody is a people person...

> There were 1 or 2 RNs while I was in the hospital that I would prefer not to see them coming, you know because I felt like they were dragging their own problems into a room where you are supposed to be helping.

- *Environment Where Support is Provided*: DP9 described how the setting in which support is provided might influence individuals' openness to social support. He reported, "*My patients have mental illnesses. Many of them were street people. If they are in a setting that would help them, I think most of them would allow you to help them with their meds*."

Anticipated Barriers (Barriers to Asking for or Seeking Help)

Barriers to asking for or seeking help included participants' statements about factors that posed or would pose a barrier to participants asking for help. A few participants described some barriers that might prevent them from asking for or seeking help with medication management for their T2DM, such as not having anyone to ask (DPs 7, 10), not spending enough time with their sources of support (DP8), being afraid that others might not understand the disease or its management (DP10), not making others uncomfortable (DP13), not wanting to make their family concerned about the diagnosis and disease management (DP5), and a desire for independence in managing their care (DP3). DP3 described her reluctance to ask for help due to her independence in managing her disease, "*I can't think of an honest reason why I would ask for help or what would make it easier for me to ask for help. I just don't do that [ask for help]*." DP5 explained that he didn't want his family members to know or be concerned about his diagnosis. "*There are members of my family I haven't told. I just don't want them to know or to be concerned or to be asking me how things are with diabetes*," he explained.

Advising Others

The Role of Social Support (Opinion on Social Support Influences, General)

The code of opinion on social support influences, general, include participants' report or description of their opinion about if and how social support makes a general difference in medication management for themselves or others. All participants who were asked about the role of social support on management of T2DM reported positive influences of social support on general management of T2DM. According to DP5, "*I think it would help, just having that encouragement... Talking to people who have diabetes and how they managed it as well. Kind of a support group*."

DP13 reported, "*Just the mere thought that somebody from time to time might ask how you are doing as a reminder of medications... I think a support network is absolutely important in the long term to help with medication*."

Advice for Others Living with T2DM (Need for People to be Open)

Participants' encouragement for others to be more open to the idea of asking for and receiving help with their T2DM management was coded as a need for people to be open. Three participants (DPs 2, 9, 11) advocated for individuals living with T2DM to be more open to the idea of asking for and receiving help. According to DP9,

> You have to really swallow your pride to ask for help…. I do think that there is a lot of value in allowing people to help you with things like that to...give you your shots, pass out meds so you could make sure that you take them.

Alignment of Qualitative Findings with Study Aims

The following section describes how the study findings align with the study aims. Chapter Five further discusses the study findings based on the study aims and in the context of prior literature.

Aim 1: Factors that Motivate Participants to Take Medications as Prescribed

Internal and external motivators played a complex role in influencing participants' medication taking. The internal motivators were shaped by the context of diagnosis, emotional response after diagnosis, and actions taken after diagnosis. Participants' motivations to take medications also were influenced by the first medications they were prescribed, their reactions to taking the medication, medication adjustments due to their experience of side effects or the progression of their disease, and actions they have taken to enable them to continue to take their prescribed medications. The external motivator included their sources of social support and the various ways they influenced participants' decisions to take their prescribed medications.

Aim 2: Participants' Perceptions of the Role of Social Support in Medication Taking for T2DM Management

Participants' perceptions of the role of social support in medication taking for T2DM management were influenced by the forms of support provided by their sources of support and the impact of the support on their medication-taking behaviors.

Aim 3: Participants' Receptiveness to Current or Future Social Support with Medication Taking

Receptiveness to current or future social support with medication taking included participants' opinion on the general role of social support in medication taking, their past, current, and future experiences needing help to manage their medications, their openness to forms of social support, factors that might influence theirs and others' openness to social support, and possible barriers that might impede their ability to ask for help.

Summary of Qualitative Findings

This qualitative descriptive study was conducted to describe the factors that support medication adherence among adults with T2DM and explore their perceptions and receptiveness to social support in the context of medication taking. The findings from the study highlighted five themes: receiving the diagnosis, taking medications for T2DM, receiving support, envisioning the future, and advising others, corresponding to individuals' experience from diagnosis to their present experience with managing their T2DM.

The theme, *receiving the diagnosis*, included three categories: context, emotional response, and actions taken. These categories corresponded with the following codes from the participants' interviews: context of diagnosis, response to diagnosis, and actions after diagnosis. These themes, categories, and codes described participants' experiences prior to their diagnosis (context of diagnosis), their reaction to being diagnosed with T2DM (response to diagnosis), and the actions the participants took after being diagnosed with T2DM (actions after diagnosis). Study participants described different circumstances surrounding their diagnosis of T2DM. While some of the participants were previously diagnosed with prediabetes that progressed into T2DM, many of the participants were tested and diagnosed with T2DM following their reports of symptoms reflecting inadequately managed T2DM, such as increased thirst and/or urination and vision changes. Following their diagnosis of T2DM, participants reported a myriad of emotions, such as shock, surprise, denial, and disappointment. Some participants, especially those who had developed T2DM from worsening prediabetes, expressed no emotions at the time of diagnosis or reported any significant impact on their lives. After being informed of their diagnosis of T2DM, participants described several actions they took to learn more about T2DM and the management of the disease. While some participants talked to their family, close friends, and medical team about the diagnosis and developing plans to manage the disease, others reported attending diabetes educational sessions and conducting online research to learn more about the disease. One participant reported not taking any action after the diagnosis of T2DM.

The theme, *taking medications for T2DM*, described participants' experiences from taking their first T2DM medications to their internal motivations to continue taking their medications. This theme included the following categories and codes: initiating treatment (first medication regimen and reaction to taking medication), maintaining treatment (medication adjustments and actions to manage diabetes), and motivation to adhere to treatment (internal motivation). Most participants reported being prescribed Metformin either as a monotherapy or in conjunction with insulin as a first-line therapy for their T2DM medication management. Three of the participants reported being prescribed Glipizide, Actos, and Diabeta, individually, as their first medication regimen. Study participants expressed several reactions to taking their prescribed medications. While some participants were okay with taking the medication, others had different reactions. One participant felt defeated at the idea of taking medication for a long time to manage his T2DM. Others reported taking their medications out of fear that T2DM might worsen or hoped that the medication would help them manage their T2DM. Some participants reported their experience of side effects from taking the medications and described medication adjustments to enable them to continue taking their medications. Medication adjustments also were reported by participants who needed intensification of their medications due to the progression of their disease. To enable them to continue taking their medications, participants reported several actions, such as using alarms and pill boxes, adjusting the timing of their medications, keeping the medications in view, and developing routines for taking them. Despite their reactions to taking the medications for a long time to manage their T2DM and the medication adjustments due to side effects or progression of T2DM, study participants highlighted internal motivators for taking their medications. These internal motivators included taking medications to manage T2DM, reducing the risk of developing diabetes-related complications, and living a healthy life.

The third theme, *receiving support*, described others who have supported participants with taking their prescribed medications, the form of support provided, the impact of the support on participants' T2DM medication management, and participants' past and present need for help. The following categories and codes were grouped under this theme: important others (who supports), forms of support (what supports), the impact of support on T2DM management (impact on participant), and needing help (past/present need and feeling about past/present need). Participants described the impact of different forms of support from their immediate family members, close friends, coworkers, peers, and healthcare providers in managing their T2DM. These forms of support included emotional encouragement, provision of more information about T2DM and medication management, and financial support to afford medications. These forms of support enabled participants to take their medications as prescribed, recognize the importance of diabetes medication management, and become more confident in their T2DM disease management. Although most participants reported the impact of the different forms of support on their medication management, only three participants stated expressly that they had received support in the past or present. These participants expressed their gratitude for receiving help to enhance their management of T2DM. One participant reported not being compliant with her medication despite the availability of support from her family members.

Envisioning the future as a theme included categories and codes, such as anticipated needs (future need), openness to help (feeling about future needs, openness to forms of support, others' openness to social support), and anticipated barriers (barriers to asking for or seeking help). The theme reflects participants' reports of future needs with managing their T2DM, if any, their feelings about needing help in the future, their openness to forms of support, factors that influence others' openness to social support, and barriers that might impede others' ability to ask for or seek help. Several study participants described needing help as they age, noting that possible future needs might be related to taking their prescribed medications, such as help administering their insulins, verifying the dose of their medications, sorting their pills, and reminders to take their medications. Many of the participants noted that they would have no problem asking for or receiving help in the future with managing their medications. Study participants who had received support from different forms of social support, such as support from online social groups (e.g., Facebook), described mixed reactions to these forms of social support. While some participants reported that support from online groups or resources helped or would have helped if sought, a participant described her bad experience with online groups and noted that seeing others live and manage their T2DM in person was more influential than online support. Study participants also described several factors that influenced others' openness to social support. These factors were grouped into personal factors (such as privacy, belief about T2DM, trust, and access to support), support system factors (including the communication and strength of the relationship within the support group), support person factor (personality of the support person), and environmental support (settings where support is provided). In addition to these factors, participants identified barriers to asking for or receiving help, such as lack of access to support persons or resources, avoidance of questions about T2DM and disease management plans, a desire to maintain independence in managing care, and thoughts that most people who do not have the disease will not understand its management.

Finally, the code of advising others described participants' opinions on the general influence of social support on medication management and participants' advice for others living with T2DM to be more open to asking for and receiving support. The categories and codes under this theme are the roles of social support (opinion on social support influences, general) and advice for others living with T2DM (need for people to be open). All participants described the positive influence of social support on their T2DM medication management. These descriptions are in tandem with their reports on the impact of social support from different sources on their management of T2DM. Despite the overwhelming report that social support influences medication management, several factors influence its use, as described in the previous theme, posing a barrier for individuals with T2DM to ask for or to receive help with their T2DM management. Three study participants, reflecting on their experience with T2DM, encouraged others living with T2DM to be more open to the idea of social support. While offering encouragement for individuals with T2DM to be more open to social support, one participant highlighted the value of allowing others to help in any way they can to manage their T2DM better.

CHAPTER FIVE

DISCUSSION

The purpose of this qualitative study was to describe factors that motivate participants to take medications as prescribed, participants' perceptions of the role of social support in medication taking for T2DM management, and participants' receptiveness to current or future social support with medication taking. The chapter includes the summary of key findings, discussions of findings based on the study aims and, in the context of prior literature, how the findings advance and contribute to the science of social support and medication adherence, as well as limitations and implications for future research.

Summary of Key Findings

The study findings identified five themes: *receiving the diagnosis*, *taking medications for T2DM*, *receiving support*, *envisioning the future*, and *advising others*. These themes reflect a continuum of individual experiences beginning with their T2DM diagnosis and their management of this disease so far. The theme of *receiving the diagnosis* vividly describes individuals' experiences starting from circumstances that led to their diagnosis, their emotional response to being diagnosed with T2DM, and their actions after the diagnosis to learn more or manage their T2DM. The theme, *taking medications for T2DM*, provides a window into individuals' experiences with the medication adherence process. Similar to the persistence stage of the ABC taxonomy of the medication adherence process encompassing the initiation and implementation phases, the theme of taking medications for T2DM describes the initiation of treatment with emphasis on the first medications prescribed for the management of T2DM and individuals' reactions to taking the medication. The theme of taking medications for T2DM also details the implementation of treatment, including medication adjustments and actions taken to maintain adherence and internal motivation to continue taking medication.

The theme of *receiving support* underscores the crucial role of the support system in managing T2DM. It describes the various forms of support individuals receive for their medication-taking behaviors and the significant impact of this support on T2DM medication management. The theme also delves into individuals' past experiences seeking and receiving support for their T2DM management.

The theme *envisioning the future* highlights individuals' anticipated needs with their medications, their openness to asking for or receiving help to address their needs, and barriers that might impede their ability to ask for or receive help. The final theme, *advising others*, describes individuals' opinions on the general influence of social support on T2DM medication management and their encouragement for others living with T2DM to be more open to the idea of asking for and receiving support to help with their needs.

Thus, as initially stated, the themes exist in a continuum beginning with circumstances surrounding diagnosis of T2DM and ending with individuals' profound reflections on their journey managing their T2DM thus far and their invaluable advice for others living with T2DM.

Findings Based on Study Aims and in the Context of Prior Literature

Aim 1: Factors that Motivate Participants to Take Medications as Prescribed

The main finding related to motivation for medication adherence is the existence of internal and external motivators (support from others) to take medications. Both internal and external motivations for managing diabetes were influenced by the utmost desire to manage the disease, live a healthy life, and be present for important others.

Internal Motivation

Study participants described taking their medications to manage their T2DM, avoid complications, and ensure that they could remain healthy and be present for their families. These internal motivations were influenced by their experience and perception of T2DM management, impacted by the context of diagnosis, emotional response and actions taken after diagnosis, medication prescribed for T2DM management and the reactions to taking medication, medication adjustments, and actions taken to manage T2DM (Abdollahi et al., 2022; Alharbi et al., 2023; Kalra et al., 2018; Khunti et al., 2019). Kalra et al. (2018) noted the influence of emotional reactions following the diagnosis of T2DM and impacted by the contexts of diagnosis, on emotional distress, including feeling overwhelmed by the diagnosis, frustration with the diagnosis, and management of the disease. These beliefs about T2DM and its complex management influence medication adherence (Khunti et al., 2019).

The finding regarding the influence of internal motivation on medication adherence is consistent with the report by Onwuchuluba et al. (2021) who highlighted the influence of positive perceptions, decision-making, and family support on medication adherence. Onwuchuluba et al. (2021) described positive perception as the perceived need to stay alive and have a positive mindset about T2DM. In their study, Eshete et al. (2023) also highlighted the influence of illness perception and internal motivation on medication adherence. According to Eshete et al. (2023), patients with positive illness perceptions, indicated by their improved understanding of diabetes, their belief in the effectiveness of diabetes management, and their feeling of being empowered to manage their condition, were more likely to take their medications as prescribed.

External Motivation (Support from Others)

While the motivation to stay healthy was primarily internal, many participants also were driven by the desire to be present for their families, highlighting the social motivations behind their adherence to T2DM treatment. Study participants described how social support from informal sources of support, including their family members, relatives, peers, and coworkers, and formal sources of support, including their healthcare providers and health insurance provider, influenced their decisions to take their medications as prescribed through emotional encouragement and to recognize the importance of their T2DM medication management and gain more confidence in their management of T2DM through informational support regarding T2DM.

The study findings of the positive influence of social support on medication adherence provide more insight into the heavily debated relationship between social support and medication adherence. While some studies report that social support is associated with enhanced medication adherence and improved glycemic control (Gu et al., 2017), others report that social support does not influence medication adherence (Lee et al., 2021).

Shahin et al.'s (2021) systematic review underscores the multifaceted nature of social support in enhancing medication adherence and long-term management of chronic diseases. They highlight the role of emotional support from family members, friends, and healthcare providers in educating participants on disease management, supporting their medication-taking behaviors, and supervising or reminding participants to take their prescribed medications. These findings align with the experiences of the participants in this study who also emphasized the role of social support in providing emotional and informational support to enhance their medication adherence and management of T2DM.

In contrast, Ladin et al.'s (2018) systematic review and meta-analysis found no significant association between social support and medication adherence or health outcomes. This discrepancy in findings could be due to the participants' subjective evaluation of the social support they received (Shahin et al., 2021). This study's findings support Shahin et al.'s (2021) suggestion that individual perceptions of social support influence the role of social support as a motivational factor. The findings from this study further highlight the influence of receptiveness to social support on the role of social support as a motivational factor.

Aim 2: Participants' Perceptions of the Role of Social Support in Medication Taking for T2DM Management

An important finding of this study is the overall positive perceptions of social support's role in medication taking for T2DM management. Although not all participants reported changes in their medication adherence due to the provided social support, most of those who did noted that they received help because others identified their need for assistance. In some cases, participants' need for assistance aligned with the help provided and improved their medication adherence, such as needing help with insulin administration. In other cases, the provided emotional support by a concerned adult child wanting to ensure his mother was taking her T2DM medication did not align with her need for assistance and did not change her adherence to her medications.

Shen et al. (2022) highlighted inconsistencies in perceptions of social support, noting that while some studies report the positive influence of perceived social support on medication adherence, others report negative influences. Study participants' report of the positive perception of the role of social support on medication adherence aligns with Almaghamsi and Alzahrani's (2024) report of the positive influence of perceived support on medication adherence. Adisa et al. (2017) highlighted participants' negative perceptions of government and non-governmental organizations support's role in medication adherence.

Shahin et al. (2021) attributed the discrepancy in reports on the role of social support on medication adherence to participants' satisfaction with the use of provided social support to address their needs. Adisa et al. (2017) highlighted the need for available and provided social support to correspond with the support required by patients to manage their medication needs and optimize the usefulness of social support. In addition to satisfaction with using provided support to manage their needs, it is worth noting that the perception of social support often varies from the actual support provided and is influenced by factors such as gender, race/ethnicity, culture or social environment, availability of support, source of support, amount of support, and delivery of support (Strom & Egede, 2012). Thus, individuals who are satisfied with the provision of social support to address their medication needs report a positive influence of social support on their medication taking. In contrast, those unsatisfied with the social support provided to address their needs report a negative role of social support. The availability and provision of support from various sources might have influenced the participants' perceptions of social support and, subsequently, their reporting of the role of social support on medication adherence, even for participants who did not report changes in their medication adherence due to social support. Aim 2 study findings emphasize the importance of understanding the individual needs of patients in providing social support for medication adherence.

Aim 3: Participants' Receptiveness to Current or Future Social Support with Medication Taking

The study findings highlight the influence of various factors on individuals' receptiveness to social support for managing their T2DM medication. Personal factors, support system factors, support person factors, and environmental support were all factors that influenced individuals' receptiveness to social support. These factors posed barriers to participants asking for or receiving help with their T2DM medication management. The study findings are consistent with an analysis of prior literature in a yet-to-published concept analysis that identified the influence of supportive, positive, and trusting relationships with the support person, communication and collaboration with the support person, perceptions of support, and past experiences with social support on receptiveness to social support.

Study findings of the factors that influence receptiveness to social support align with previous research investigating the accessibility of resources for disease management. Salaheddin and Mason (2016) identified stigma, perception of disease severity, independence in care management, difficulty in seeking help, and fear of negative outcomes as barriers to seeking help for mental health management. These findings also were echoed in Pfeiffer et al.'s (2022) report on barriers to accepting support in clinics, such as patient knowledge and past experiences, shame, pride, stigma and discrimination, beliefs and lack of understanding, fear, and mistrust.

Receptiveness to social support also was influenced by individuals' needs in managing certain aspects of their T2DM medication. Most participants expressed receptiveness to social support, especially as they age, in tasks such as medication reminders, sorting, and dosage verification. The chronic nature of T2DM and the disease's progression often require lifelong medication use and regimen intensification to improve health outcomes, leading to diabetes-related distress, particularly among older individuals. In addition to T2DM, older adults might have other comorbidities, such as cardiovascular disease, that make managing T2DM harder (Wiebe et al., 2016). The distress from managing T2DM and other existing chronic conditions adds to the existing diabetes distress, feelings of failure, higher emotional burden, and lack of confidence in diabetes self-management experienced by individuals prescribed insulin for T2DM medication management (Baek et al., 2014). Social support from members of the social network, including family and friends, and satisfaction with support significantly reduced diabetes-related distress and emotional burden (Baek et al., 2014) and improved health outcomes, especially as individuals with T2DM age (Wiebe et al., 2016). Therefore, individuals experiencing diabetes-related distress, especially older adults, have a greater need for social support, making them more likely to be receptive to social support (Kristianingrum et al., 2018; Thi et al., 2021).

Contribution to the Science of Social Support and Medication Adherence

The study findings provided insight into individual motivators influencing medication adherence, such as the need to manage T2DM, live a healthier life, and be present for their families. The study findings also highlighted the influence of external support on medication taking. The findings provided more insight into the role of individuals' perceptions of social support in their reports of social support, supporting existing knowledge that individuals who are satisfied with social support provided and perceive social support to help address their needs report a positive influence while those who do not report the negative influence of social support on their medication taking. These findings not only deepen our understanding of the role of individuals' perceptions of social support in their reports of social support but also underscore the importance of ensuring that individuals are satisfied with the social support they receive, as it can positively influence their medication adherence.

Aside from providing deeper insights into the motivational factors that influence medication adherence and the perception of the role of social support in this process, this research study presents new knowledge. It is the first to describe the factors that influence receptiveness to social support from the perspective of current and anticipated future needs for social support in the context of T2DM. Most studies on barriers to seeking or receiving help in literature focus on mental health management. While these barriers can be applied to individuals with T2DM, they do not fully account for the factors that influence asking for or seeking help from the perspective of individuals with T2DM. To the best of the researcher's knowledge, this dissertation is the first study to highlight the influence of support system factors, support person factors, and environmental factors on the ability to ask for or to receive help to manage medication needs. It is also one of the first to link receptiveness to social support to diabetes-related distress that often arises from the complex management of T2DM, especially with aging and intensification of T2DM medications from progressive worsening of the disease.

Practice Implications

The study findings based on the aims have several practice implications. First, the study highlighted the influence of internal and external motivation on individuals' decisions to take their medications as prescribed. Internal motivations included decisions to take medications to manage T2DM, avoid diabetes-related complications, and remain healthy for their families. External motivations influenced participants to take their medications as prescribed, recognize the importance of their T2DM medication management, and become more confident in managing their disease. In addition to prescribing appropriate medications for managing the disease, healthcare providers, through shared decision-making conversations with individuals with T2DM, need to have open and honest conversations about the motivational factors that might influence their patients' decisions to take their prescribed medications. Healthcare providers might inquire about individuals' treatment goals, previous experiences with taking medications, the support they needed in the past with taking their medications, and who provided the support. Family members and important others also can be incorporated into developing T2DM management plans to gain more insight into individuals' medication-taking behaviors and solicit the support needed with T2DM management. This approach, which values the patients' and their family members' input in T2DM management, can improve their participation in care, enhance their medication adherence, and improve their health outcomes.

Secondly, the study findings underscore the significant influence of the perception of social support on medication taking. Participants uniformly reported positive perceptions of the role of social support on medication adherence, although some acknowledged no changes in their medication-taking behaviors due to social support. These findings provide more insight into the differences between the influence of actual support provided and perceived social support on medication adherence. It is crucial for healthcare providers to understand that most individuals who are provided support might not perceive the support to be helpful and that their perception of social support might be influenced by factors such as culture and social environment, source of support, quantity and quality of social support, and the delivery of support. Therefore, healthcare providers play a vital role in engaging in open and honest conversations with their patients to assess their perceptions of the social support provided and whether it helps them address their needs.

Thirdly, the study findings underscore the pivotal role of social support in T2DM management. They also highlight the need for individual assessment of factors influencing receptiveness to social support and any issues with medication management at diagnoses and follow-up visits. Understanding the unique factors that influence individuals' receptiveness to social support is key to addressing their specific T2DM management challenges and adjusting their management plans. By taking these factors into account, the allocation of resources can be optimized to help individuals with T2DM meet their medication needs and improve their glycemic control.

Implications for Future Research

The increasing incidence and prevalence of diabetes and the significant financial, economic, and mental impact of T2DM-related complications highlight the need for further evaluation of diabetes management, especially medication management. There is a need to explore factors that influence T2DM medication management, such as social support, and address conflicting findings from studies examining the relationship between social support and medication management. Receptiveness to social support might explain these conflicting findings. According to the yet-to-be published concept analysis, individuals who reported the existence of supportive, positive, and trusting relationships with support persons, good communication and collaboration with support persons, perception of support from support persons, and influence of support persons on their medication taking, were more receptive to social support and more likely to report their use of social support to facilitate their medication taking. These findings underscore the potential benefits of understanding receptiveness to social support, highlighting the value of further studies examining the influencing effect of this concept on the relationship between social support and medication adherence.

This qualitative study provides invaluable insight into factors that motivate individuals to take their medications as prescribed, their perceptions of the role of social support in medication taking for T2DM management, and their receptiveness to current or future social support with medication taking. The potential impact of this study on future research and diabetes care cannot be overstated. Future research must build on these findings by incorporating receptiveness to social support in future social support-related studies and developing or modifying instruments to account for this crucial factor to further our understanding of receptiveness to social support.

Incorporating Receptiveness to Social Support in Future Studies

There is a need to include this concept in future social support-related studies to gain more insight into the influence of receptiveness to social support. This qualitative descriptive study has highlighted personal factors, support system factors, support person factors, and environmental support factors that influence receptiveness to social support. Future qualitative studies examining participants' descriptions of receptiveness to social support and factors influencing their receptiveness to social support can provide more insight into how this concept moderates the relationship between medication adherence and social support. More knowledge of receptiveness to social support has the potential to address the knowledge gaps regarding the conflicting relationship between social support and medication adherence.

By addressing these knowledge gaps, we can significantly mitigate the colossal effect of the multidimensionality of social support on future studies examining the relationship between social support and medication adherence. Furthermore, this endeavor can lead to a substantial improvement in the use of social support to enhance medication taking, improve glycemic control, and optimize health outcomes.

Instrument Development

Several instruments have been utilized to measure social support in literature, such as the Medical Outcomes Study Social Support Survey (Rao et al., 2020; Walker et al., 2014), Chronic Illness Resources Survey (Garcia et al., 2019; Trief et al., 2022), Diabetes Family Behavior Checklist (Mayberry & Osborn, 2012), Norbeck Social

Support Questionnaire (Aikens et al., 2014), Duke-UNC Functional Social Support Questionnaire (Kim et al., 2015), and Diabetes Care Profile (Ku et al., 2015). Although these instruments have been utilized to measure social support in the literature, they measure different forms of support. For example, the Medical Outcomes Study Social Support Survey measures emotional/informational support, tangible support, affectionate support, and positive social interaction, providing a practical tool for assessing various forms of support (RAND, 2024). The Chronic Illness Resources Survey is based on the socio-ecological framework and measures the support available to the individual from multiple sources within their socio-ecological system, offering a practical approach to understanding support systems (Glasgow et al., 2005).

An analysis of existing instruments suggests that participants are required to rate social support based on their use of social support to accomplish a goal. However, none of these studies account for past experiences with social support or individuals' perceptions of social support. This study's findings clearly demonstrate that needs, perceptions, and experiences of social support change over time, and even for those who may not be using it now, they identified potential needs for it in the future. By including items exploring individuals' perceptions of social support, their experiences with social support, and their anticipated medication-taking needs, especially due to intensifications of medications related to aging and progression of the T2DM, in future instruments, significant knowledge of social support can be obtained, leading to changes in the measurement of the use of social support to facilitate medication adherence. The knowledge could also lead to a more tailored use of existing limited social support-related resources, thereby enhancing the use of social support in improving health outcomes.

Limitations

This qualitative descriptive study is limited by the age and gender of the study participants, recruitment settings, and verification of diagnosis of T2DM. The ages of the study participants ranged from 53 to 75 years, with most participants in their 60s and 70s. Including participants in other age groups might have added more information to the study findings and yielded more information about the experience of individuals with T2DM and their receptiveness to social support. While the initial plan was to recruit an equal number of male and female participants, the study resulted with 10 males and four females. A balanced gender representation could have provided a more comprehensive exploration of the factors influencing receptiveness to social support, enhancing the study's findings.

Most participants were recruited from Indiana CTSI, with only one from Riggs Community Health Centers. The initial plan was to recruit from two facilities: one rural and one suburban. However, challenges in obtaining permissions for the suburban facility led to changes in recruitment settings. Diverse recruitment settings would have facilitated a more comprehensive comparison of the influence of social determinants of health on individuals' experiences of T2DM and their receptiveness to social support.

The initial study proposal included plans to verify participants' diagnoses of T2DM from their medical records from the facilities. However, with the changes in recruitment settings, there was no way to verify participants' diagnoses of T2DM. Given the financial compensation available for participants after the interviews, the risk of recruiting participants who did not have a diagnosis of T2DM existed. At the beginning of an interview with one participant who had reported being diagnosed with T2DM and taking multiple medications to manage his T2DM, the researcher discovered, while trying to verify the participant's responses to the screening questions, that he was not being truthful about his diagnosis. The patient had written "drugs" when asked to list any medications he was taking to manage his diabetes. While trying to verify what the patient meant by drugs, he reported taking an "SGLT2." Further prompts to get the exact name of the medication the participant was taking or his last A1C were abortive as he kept on repeating "SGLT2"" and reporting A1Cs in the hundreds. The participant was thanked for his interest in the study, and the interview was terminated. Verifying participants' reports of T2DM diagnosis will ensure that appropriate participants are recruited for the study.

Conclusion

Diabetes, a chronic disease with significant economic, health, and mental impacts, is a pressing issue that cannot be ignored. As pancreatic beta cells continue to decline in function, the disease's progression worsens (Schroeder, 2022). The chronicity and progression of diabetes pose a significant challenge for about 38 million Americans currently living with diabetes and the 1.2 million Americans diagnosed every year with diabetes. Adequate diabetes management is crucial to reduce the risk of diabetes-related macrovascular and microvascular complications. The economic burden of managing these complications is staggering, estimated to be around $413 billion based on data from 2022 (CDC, 2024b). These statistics underscore the urgent need for effective management strategies. For many patients with T2DM, adequate management of their condition entails the initiation of medications, and although medication adherence is crucial, non-adherence continues to be reported among this population.

Several factors, such as social support, influence medication adherence. However, studies that have examined the relationship between social support and medication adherence report conflicting findings, highlighting the need for further examination of patients' use of social support. Receptiveness to social support, a concept that refers to an individual's willingness and ability to accept and utilize social support, promises to offer more insight into the use of social support. However, little is known about this concept and how it influences individuals' use of social support to take their medications as prescribed due to its novelty.

This qualitative descriptive research is poised to impact healthcare practices significantly. By addressing the gap in the knowledge of the influence of social support on medication adherence, the study describes the factors that motivate individuals to take their medications as prescribed, their perceptions of the role of social support in their medication taking, and their receptiveness to social support in the context of medication taking. These findings can be employed to assess individuals' social needs with their medications, address any barriers to asking for or receiving help, and enhance the tailoring of limited social support-based resources, which, in turn, can potentially improve medication adherence, optimize glycemic control, and subsequently, enhance health outcomes.

APPENDIX A

MATERIALS UTILIZED IN QUALITATIVE STUDY

Questionnaire 1

Interview Questions for Qualitative Study

1. **Tell me about when you were first diagnosed with type 2 diabetes. What was that like for you?**

Probes: If the participant is uncertain or needs further clarification, ask about specific time points: visit or phone call during which diagnosis was given; days following diagnosis (did they spend time information seeking or talking with friends and family?); next visit with a provider.

2. **Tell me about when you were first prescribed medications to manage your diabetes.**

Probes: What were you prescribed? How did you feel about taking diabetes medications?

3. **I would like to understand how you decided whether to take the medications prescribed to you.**

A) Did you fill your prescription?

(If yes) Tell me how you decided to take the medications as prescribed. Did anything, in particular, motivate you to follow through with the provider's recommendation?

(If no) Tell me more about what happened after you received the prescription.

Probes: Did you have concerns about taking the medication? What were your concerns? Did anything make it difficult to fill the prescription (e.g., insurance, financial status, transportation)?

B) Were there any important people in your life, such as your family, friends, health care providers, or online support communities or apps, that influenced your decision? Please describe what they said or did that influenced your decision.

4. **Have you ever needed help taking your diabetes medication as prescribed?** Help might include assistance from the important people in your life to remember to take your medications, organize your pill planners, get your refills, or take your medications a certain way.

   A) (If yes, has needed help) Describe for me the type of help you needed.

      a. Were you able to get the help you needed?

         i. <u>If so,</u> who helped? How did you feel about receiving help? Is there anything that made it difficult to ask for or receive help? Did anything make it easier to ask for or receive help?

         ii. <u>If not,</u> what did you do to manage your diabetes without the help you needed?

   B) (If no, has not needed help) Do you expect that at some point in the future, you may need help taking your diabetes medication? If so, what might that look like? How would you feel about asking for help? What might make the process difficult? What might make it easier?

5. I want to understand how people feel about the idea of needing and receiving social support to manage their diabetes. Is there anything you'd like to add to help me understand this better? Are there other questions you think I should ask in future interviews?

6. What should providers know about how social support affects diabetes management?
7. Is there anything else you would like to add?

Figure A1

Screening Questionnaire for Qualitative Study

Screening Questions for Qualitative Study

What is your date of birth?	
Can you read and understand English language?	
When were you diagnosed with diabetes (Month/Year)?	
What is your last Hemoglobin A1c level?	______%
List any medications you take for your diabetes	
Does someone else help you take your medications?	

Figure A2

Indiana CTSI Posting of Qualitative Study

Home About All IN For Health Become a volunteer My Dashboard

Adults with Type 2 Diabetes Needed for Research Study on Medications!

Rebecca Ellis
Primary Investigator

Recruitment status
Currently Open

Interested in the study?
Select a study center that's convenient for you, and get in touch with the study team.

Contact a study center

Overview

What is this study about?
The purpose of this study is to explore how people's openness to social support influences their use of social support to improve how they take their prescribed medications to manage their diabetes.

Who can take part?
English-speaking adults ≥18 years old with a confirmed medical diagnosis of type 2 diabetes who have been prescribed at least one oral anti-diabetes medication.

Description

What happens during the study?

- Volunteers will participate in a one-time interview lasting approximately 1 hour.
- Interviews will be conducted either in person or over phone or Microsoft teams, depending on the participant's preference (participants who decide to conduct the interviews in person will be asked to come to IU School of Nursing building for the interview).
- During this interview, questions will be asked about their diagnosis of type 2 diabetes mellitus, their use of social support to manage this condition, and how their openness to social support influences their use of social support to take their medications as prescribed by their healthcare provider

Incentive/compensation

- Participants who decide to participate in the study and complete the interview will be given a one-time $20 Amazon gift card.

Additional information
Study title: Receptiveness to social support: Understanding the conflicting relationship between social support and medication adherence in adults with type 2 diabetes mellitus

This study is being conducted by Dr. Rebecca Ellis and Charles Elomba in the School of Nursing at Indiana University School of Medicine.

To learn more about PI Rebecca Ellis, PhD and her research interests, please visit this link: https://nursing.iu.edu/directory/profiles/ellis-rebecca-bartlett.html/

Eligibility

You may be eligible for this study if you meet the following criteria:

- Conditions:
  type 2 diabetes
- Age: Between 18 Years - 100 Years
- Gender: Male or Female

Inclusion Criteria:

- English-speaking
- Have been diagnosed with Type 2 Diabetes
- Have been prescribed anti-diabetes medications

Exclusion Criteria:

- Any cognitive impairment
- Family members of participants in study

Online study

Updated on 16 Nov 2023. Study ID: 20021

Pre-Screener

Please complete this prescreener to see if you are eligible to participate in this diabetes study > Enter contact details > Select a study center

Are you 18 years or older?

- Yes
- No

Next →

Contact Us

If you need help finding a study or have any questions, please contact us at **inhealth@iu.edu** or by phone at **(888) 264-0005.**

Follow us

Privacy Policy

Powered by TrialX iConnect

Figure A3

IRB Approval for Qualitative Descriptive Study

PROTOCOLS

INDIANA UNIVERSITY

APPROVAL LETTER

To: Ellis, Rebecca

Protocol #: 20021

Protocol Title: Receptiveness to Social Support: Understanding the Conflicting Relationship between Social Support and Medication Adherence in Adults with Type 2 Diabetes Mellitus

Type of Submission: Initial

Level of Review: Exempt

Approval Date: Friday, September 29th 2023

Expiration Date: no date provided

**If Expiration Date = "No date provided," this research does not require annual renewal; thus there is no expiration date.*

The Indiana University HRPP approved the above-referenced submission. Conduct of this study is subject to the IU HRPP Policies, as applicable.

Additional Notes:

This research is exempt under the following category: Category 2(ii)

Documents approved with this submission:

Attachments

Other	Elomba Final Screening Questionnaire.docx
Study Information Sheet	Elomba Study Information Sheeet.docx
Recruitment Materials	Elomba Recruitment Flier.png
Other	Elomba Interview Questions.docx

You should retain a copy of this letter and all associated approved study documents in your research records.

If you have any questions or require further information, please contact the HRPP via email at irb@iu.edu or via phone at (317) 274-8289.

Figure A4

Nurse Practitioner Student Ph.D. Dissertation Agreement from Riggs

Riggs
community health center

Nurse Practitioner Student Ph.D. Dissertation Agreement

I, ______________________________ agree to the following terms:

- I agree to provide Riggs with a formal project proposal, including project timeline, and a detailed explanation of your expectations of Riggs for a project site.
- I understand that I am representing my university and Riggs Community Health Center and agree to conduct myself in a professional manner; abiding by all policies, procedures, and mission at all times.
- I will respect the confidential nature of all data collected throughout this project, adhering to all IRB and HIPAA rules and regulations.
- I will provide proof of Institutional Review Board (IRB) approval prior to project implementation.
- I will immediately notify Riggs of any changes to the project that impact the initial project agreement, including any breach of confidentiality of data.
- I will finish my dissertation in its entirety and provide Riggs with a final presentation highlighting the impact of the project.
- I understand that Riggs reserves the right to rescind this agreement at any time for any reason.

A copy of this document, along with the all other documents related to your dissertation project will be kept on file at Riggs for a minimum of three years.

Riggs Chief Executive Officer

Signature______________________________ Date____________

Nurse Practitioner Ph.D. Student

Signature______________________________ Date 11/2/2023

FQHC

Riggs Community Health Center • 1716 Hartford St • Lafayette, Indiana 47904
Phone: 765-742-1567 • Administration Fax: 765-742-2700 • www.riggshealth.com

RECOGNIZED NCQA PATIENT CENTERED MEDICAL HOME

Figure A5

Recruitment Flier Provided to Riggs Community Health Centers

Study Information Sheet for Qualitative Study

INDIANA UNIVERSITY STUDY INFORMATION SHEET

DISSERTATION: RECEPTIVENESS TO SOCIAL SUPPORT: UNDERSTANDING THE CONFLICTING RELATIONSHIPS BETWEEN SOCIAL SUPPORT AND MEDICATION ADHERENCE IN ADULTS WITH TYPE 2 DIABETES MELLITUS

You are being asked to participate in a research study. Scientists do research to answer important questions that might help change or improve the way we do things in the future. This document will give you information about the study to help you decide whether you want to participate. Please read this form and ask any questions you have before agreeing to be in the study.

All research is voluntary. You can choose not to take part in this study. If you decide to participate, you can change your mind later and leave the study at any time. You will not be penalized or lose any benefits if you decide not to participate or choose to leave the study later.

The purpose of this study is to explore how people's openness to social support influences their use of social support to improve how they take their prescribed medications to manage their diabetes.

If you agree to be in the study, you will do the following things. If you are interested in this study, you will be asked some questions to make sure you qualify to be in the study.

If you qualify, you will participate in an interview lasting approximately 1 hour in person, on Microsoft Teams, or over the phone. During this interview, questions will be asked about your diagnosis of type 2 diabetes mellitus, your use of social support to manage this condition, and how your openness to social support influences your use of social support to take your medications as prescribed by your healthcare provider.

Before agreeing to participate, please consider the risks and potential benefits of taking part in this study. If you decide to participate in this study, the risks include being asked questions that might make you uncomfortable and the possible loss of confidentiality. You do not have to answer any questions that may make you feel uncomfortable. All efforts will be made to keep your information and responses confidential, such as using information protection systems approved by Indiana University. We don't think you will have any personal benefits from taking part in this study, but we hope to learn things that will help researchers in the future.

You will be paid for participating in this study. If you decide to participate in the study and complete the interview, you will be given a one-time $20 Amazon gift card. This gift card will be immediately available to you upon completion of the interview if conducted in person or sent to you if the interview is conducted over the phone. **There is no cost to participate in the study.**

We will protect your information and make every effort to keep your personal information confidential, but we cannot guarantee absolute confidentiality. No information that could identify you will be shared in publications about this study. The information from the interview will be audio recorded and provided to a company to transcribe into written format. The audio recordings will only be accessible to the company and the principal investigators for comparison after the audio recordings have been transcribed. The audio recordings will be destroyed after the data in the study has been analyzed. No audio recording will be published or shared with parties not involved in the study.

WHO SHOULD I CALL WITH QUESTIONS OR PROBLEMS REGARDING THE STUDY?

If you have any questions or problems regarding the study, please don't hesitate to contact the principal investigator and dissertation

r @iu.edu. You can also contact the Co-principal investigator, Ph.D. student

This study has been approved by the Indiana University IRB (Study #20021). However, if you have any questions about your rights as a participant or need to discuss problems or concerns about the research study, please get in touch with the Indiana University Human Subjects Protection Office at 800-696-2949 or irb@iu.edu.

CAN I WITHDRAW FROM THE STUDY?

Taking part in this study is voluntary. At any point in time, you may choose not to participate in the study. Leaving the study will not result in any penalty or changes in the quality of care provided to you at the health center or your relationship with the healthcare providers at the clinic.

PARTICIPANT'S AGREEMENT

I understand the benefits and risks of participating in this research study and agree that I am:

- 18 years of age or older
- Can read and understand the English language
- Have been diagnosed with type 2 diabetes mellitus
- Have been prescribed anti-diabetes medications by a healthcare provider
- Able to self-manage or need help to take my prescribed medications

APPENDIX B

QUALITATIVE STUDY RESULTS

Table B1

Demographics of Study Participants

Demographics	Number of Study Participants *n*(%) *N* = 14
Gender	
Male	10(71)
Female	4(29)
Race	
White/Caucasian	12(86)
Black/African American	2(14)
Ethnicity	
Hispanic	2(14)
Non-Hispanic	12(86)
Age in Years	
50–59	1(7)
60–69	8(57)
70+	5(36)
Years Since Diagnosis of T2DM	
1–9	2(14)
10–19	5(36)
20–29	3(21)
30–39	3(21)
40–49	1(7)
Current A1C levels	
5%–5.9%	3(21)
6%–6.9%	5(36)
7%–7.9%	4(29)
8% and above	2(14)

First Medication Prescribed for T2DM Management	
Metformin/Glucophage	9(64)
Actos	1(7)
Glipizide	1(7)
Diabeta	1(7)
Metformin + Insulin	1(7)
Metformin + Glimepiride	1(7)
Current Medications for T2DM Management	
Oral only	5 (36)
Injectable only	0 (0)
Oral + Injectable	9 (64)

Table B2

Alignment of Themes, Categories, and Codes with Study Aims

Themes	Categories	Codes	Alignment with Study Aims
Receiving the diagnosis	Context	Context of diagnosis	Aim 1: Factors that motivate participants to take medications as prescribed
	Emotional response	Response to diagnosis	
	Actions taken	Actions after diagnosis	
Taking medications for T2DM	Initiating treatment	First med regimen	
		Reaction to taking med	
	Maintaining treatment	Medication adjustments	
		Actions to manage diabetes	
	Motivation to adhere to treatment	Internal motivation	
Receiving support	Important others	Who supports	
	Forms of support	What supports	Aim 2: Participants' perceptions of the role of social support medication taking for in T2DM management
	Impact of support on T2DM management	Impact on participant	
	Needing help	Past/present need	Aim 3: Participants' receptiveness to current or future social support for medication taking
		Feeling about past/present need	
Envisioning the future	Anticipated needs	Future need	
	Openness to help	Feeling about future need	
		Openness to forms of support	
		Other's openness to social support	

	Anticipated barriers	Barriers to asking for or seeking help	
Advising others	The role of social support	Opinion on social support influences, general	
	Advice for others living with T2DM	Need for people to be open	

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CURRICULUM VITAE

CHARLES DONALD ELOMBA

Education

Doctor of Philosophy — December 2024

Indiana University Indianapolis

Major: Nursing Science

Minor: Social and Behavioral Sciences

Master of Science in Nursing — August 2020

Indiana University School of Nursing, Indianapolis, IN

Major: Nursing

Certificate: Family Nurse Practitioner

Bachelor of Science — May 2016

Indiana University School of Nursing, Indianapolis, IN

Major: Nursing

Minor: Health Psychology

Professional Experience

Family Nurse Practitioner

Centurion Health, Plainfield IN — March 2023–Present

MPAC Healthcare, Kokomo, IN — December 2022–March 2023

Registered Nurse

Ascension St. Vincent Indianapolis, IN — December 2019–December 2020

October 2021–December 2022

May 2023–January 2024

Ascension St. Vincent Carmel, IN	May 2019–November 2019
Indiana University Health Hospitals, IN	June 2016–June 2019
Patient Care Intern	
Indiana University Health Hospital, IN	October 2014–June 2016

Academic Work Experience

Research Assistant (RA), Indiana University School of Nursing, IN	May 2020–May 2022
Teacher's Assistant (TA), Indiana University School of Nursing, IN	Summer 2020
Teacher's Assistant (TA), Indiana University School of Nursing, IN	Spring & Fall 2019
	Spring 2020
Teacher's Assistant (TA), Indiana University School of Nursing, IN	Summer 2019
Research Assistant, Indiana University School of Nursing, IN	Spring 2015

Licensure and Certifications

APRN Prescriptive Authority License	January 2023–October 2025
CSR Prescriptive Authority License	January 2023–October 2025
Family Nurse Practitioner Certification	September 2020–September 2025
Registered Nurse License	May 2016–October 2025

Professional Associations

Sigma Theta Tau International Honor Society of Nursing	April 2016–Present
Coalition of Advanced Practice Registered Nurses of Indiana (CAPNI)	February 2023–Present
Association of Nurse Practitioners (AANP)	February 2020–2023
The National Society of Collegiate Scholars, IUPUI Chapter	August 2013–May 2016

Posters, Presentations, Publications

Bartlett Ellis, R. J., Andrews, A., Elomba, C. D., Remy, L. M., Ruggeri, S. Y., Russell, C. L., & Ruppar, T. M. (2023). Managing medications and medication adherence among US adults during the early phase of the Covid-19 pandemic. *Patient Preference and Adherence, 17*, 369–383. https://doi.org/10.2147/PPA.S393749

Carpenter, J. S., Sheng, Y., Elomba, C. D., Alwine, J. S., Yue, M., Pike, C. A., Chen, C. X., & Tisdale, J. E. (2021). A systematic review of palpitations prevalence by menopausal status. *Current Obstetrics and Gynecology Reports, 10*, 7–13. https://doi.org/10.1007/s13669-020-00302-z

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Cullen, D., Oberle, M., Elomba, C., & Stiffler, D. (2016). Unexpected infant sleep deaths: A case study. *Journal of Forensic Nursing, 12*(3), 141–146. https://doi.org/10.1097/JFN.0000000000000120

Mogos, M., & Elomba, C. (July 2015). *Trend in placental syndromes among delivery-related hospital discharges in the United States (2001–2011)*. Presented at IUPUI's Diversity Scholar Research Program (DSRP) poster day in 2015.

Oberle, M., Elomba, C., Stiffler, D., & Cullen, D. (December 4, 2015). Indiana University Health, 41st Annual Nursing Research Conference Podium Presentation: *Exploring infant risk death variables: A case study*.

Oberle M., Elomba C., Stiffler D., & Cullen D. (April 17, 2015). IUPUI Research Day Poster: *Child and infant mortality: Risk factors related to SUID in Marion County*.

Sheng, Y., Carpenter, J. S., Elomba, C. D., Alwine, J. S., Yue, M., Chen, C. X., & Tisdale, J. E. (2021). Effect of menopausal symptom treatment options on palpitations: A systematic review. *Climacteric, 25*(2), 128–140. https://doi.org/10.1080/13697137.2021.1948006

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Fellowship

Indiana University–Purdue University Indianapolis (IUPUI) [now Indiana University Indianapolis] University Fellowship August 2020–Present