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The background of the title page features a large, faint watermark of the University of Cape Coast crest. The crest is a shield with a red top section containing a yellow eagle with spread wings. The middle section has blue and white wavy horizontal stripes. The bottom section is a yellow circle with a red stylized human figure. A red ribbon banner wraps around the bottom of the shield with the Latin motto 'VERITAS LUMEN NOBIS' in white capital letters.

**HEALTH LITERACY, DIABETES DISTRESS, HEALTH
FUNCTIONING AND SELF-MANAGEMENT BEHAVIOURS AMONG
GHANAIS LIVING WITH TYPE 2 DIABETES MELLITUS**

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AND SELF-MANAGEMENT BEHAVIOURS AMONG GHANAIS
LIVING WITH TYPE 2 DIABETES MELLITUS

BY

GILBERT PROMISE ATIMU

Thesis submitted to the Department of Education and Psychology, Faculty of
Educational Foundations, College of Education Studies, University of Cape
Coast, in partial fulfilment of the requirements for the award of Master of
Philosophy degree in Clinical Health Psychology

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DECLARATION

Candidate's Declaration

I hereby declare that this thesis is the result of my own original research and that no part of it has been presented for another degree in this university or elsewhere.

Signature: _____ Date _____

Candidate's Name: _____

Supervisor's Declaration

I hereby declare that the preparation and presentation of the thesis were supervised in accordance with the guidelines on supervision laid down by the University of Cape Coast.

Signature: _____ Date _____

Supervisors' Name: _____

ABSTRACT

This research examined the predictive connection between health literacy, self-management behaviours, diabetes distress, and health functioning in individuals with type 2 diabetes. The research utilised a quantitative approach with a cross-sectional design. The sample consisted of 119 participants selected through consecutive sampling. Descriptive statistics were employed to analyse the data using IBM SPSS Statistics. Additionally, PLS-SEM with Smart-PLS was utilised to investigate the relationships between the variables of interest. The study found that participants generally exhibited a high level of health literacy across different domains, with 94.1% demonstrating adequate diabetes health literacy. Participants reported low levels of distress related to their diabetes, although 33.6% experienced moderate to severe distress. Self-management behaviours were generally optimal across subdomains, and participants reported low levels of impairment in health functioning. Statistical analyses revealed that diabetes health literacy positively impacted diabetes self-management behaviours. Diabetes distress had a negative effect on self-management behaviours but a positive effect on health functioning, but the influence of self-management behaviours on health functioning was not significant. The study also showed that the link between diabetes distress and health functioning was not mediated by self-management behaviours. In conclusion, this study provides important perspectives on the relationships among health literacy, diabetes distress, self-management behaviours, and health functioning among Ghanaians with type 2 diabetes.

KEYWORDS

Health functioning

Diabetes

Health literacy

Self-management behaviours

Diabetes distress



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DEDICATION

To my mother, my siblings and my late father, David Gilbert K. Atimu.



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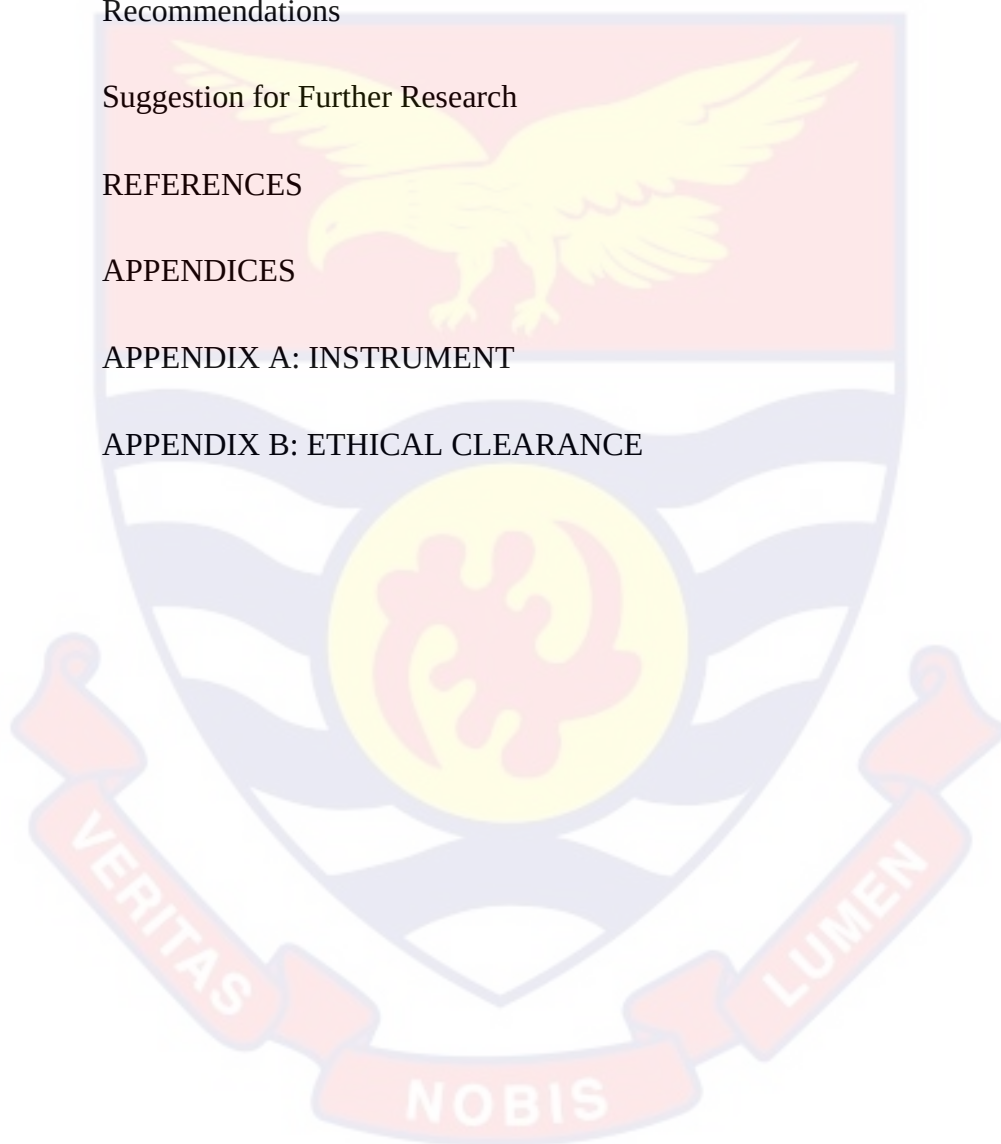
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CHAPTER ONE

INTRODUCTION

In Ghana, type 2 diabetes mellitus (T2DM) is becoming a more serious health issue. Diabetes hardship and low health literacy contribute to its increased prevalence, which can result in poor self-management and unfavourable health consequences. The intention behind this research is to assess health literacy, diabetic distress, self-management practices and overall health functioning in this vulnerable group, especially in resource-constrained settings, by identifying important determinants of health functioning.

Background to the Study

In 2014, 8.5% of adults aged 18 had diabetes. In 2017, there were 476.0 million cases of diabetes globally, with an estimated mortality of 1.37 million cases and an incidence of 22.9 million cases. According to Lin *et al.* (2020), these figures are projected to increase to 570.9 million, 1.59 million, and 26.6 million by 2025, respectively. Diabetes was ranked in 2019 as the 9th most prevalent cause of mortality and 48% of all fatalities caused by diabetes happened before the age of 70 (World Health Organisation [WHO], 2021) and was directly responsible for 1.5 million deaths. Garrofé *et al.* (2014) revealed that diabetes now affects 415 million individuals globally, which is anticipated by 2040 to reach 642 million. However, the International Diabetes Federation in 2020 reported that 463 million people worldwide (from 20 to 79 years) had type 2 diabetes mellitus (T2DM) in 2019, and by 2045, it is anticipated that this figure will rise to 700 million. (International Diabetes Federation [IDF], 2020).

Approximately 90% of all individuals with diabetes have diabetes-related complications, such as cardiovascular disease, retinopathy, and renal

disease, are common in patients with T2DM (Van Smoorenburg *et al.*, 2019). According to Mbanya *et al.* (2010), Type-2 Diabetes is prevalent in Africa, although most cases go undetected. The situation is similar in a developing nation like Ghana, with a substantial burden of diabetes (Hall *et al.*, 2011). Similarly, Shaw *et al.* (2010) indicated that by 2030, the number of Ghanaian individuals with diabetes is anticipated to more than double from 500,000 in 2010.

Diabetes accounts for 2.58 percent of all fatalities in Ghana, has an age-adjusted mortality rate of 36.81 per 100,000 people and is the sixth medical cause of mortality, according to statistics from the World Health Organisation (WHO). This situation necessitates identifying potential intervention methods at several levels to deliver the best possible healthcare to these persons. Danquah *et al.* (2012) alluded to comorbidities and complications, which can lead to vision loss, limb amputations, and kidney failure, significantly impacting the health functioning of these individuals (Obirikorang *et al.*, 2016).

In order to achieve the best results in managing Diabetes Mellitus, Funnell *et al.* (2010) opine that interdisciplinary healthcare professionals and patients must work together to promote successful self-care in a variety of tasks, such as adherence and management of varied medication schedules, execution of specific eating habits, promotion of physical activity, and involvement in preventive care strategies. Yao *et al.* (2019) indicated that T2DM is a chronic disorder that has long-term effects on patients, who are expected to practise appropriate self-management. Self-management, according to Ansari *et al.* (2019) and Funnell *et al.* (2011), is the best way to manage T2DM and lessen its impact on patients and healthcare systems. The Worldwide Guideline

recommends four key diabetes self-management competencies: diet control, consistent medication use, exercise, and self-checking blood sugar levels (International Diabetes Federation [IDF], 2014).

Several studies have indicated the critical significance of competencies in lowering glycaemic levels and enhancing the quality of life in people with diabetes (Chrvala *et al.*, 2016; He *et al.*, 2017; Van Hecke *et al.*, 2017). Consequently, worldwide, patients do not always follow through on their self-care regimens. (Reyes *et al.*, 2017; Kurnia *et al.*, 2017; Huang *et al.*, 2014). In order to lower the risk of sequelae, including hypertension, amputation, and nephropathy, people with type 2 diabetes (T2DM) must effectively control their illness (Aikins *et al.*, 2013; Mbanya *et al.*, 2010). Self-management practices comprise dietary guidelines, exercising, taking prescription drugs (Norris *et al.*, 2002), and managing stress levels and weight (Schillinger *et al.*, 2002). Studies show that diabetics do not always take care of themselves according to recommended practices (Garca-Pérez *et al.*, 2013). Consequently, it has become important to identify the elements that influence T2DM patients' compliance with self-care activities.

According to Van den Broucke (2014) and Schwarz and Riemenschneider (2016), health literacy is more accepted as an important component when it comes to public health and creating public health initiatives. Bohanny *et al.* (2013) argued that health literacy is another factor affecting self-care behaviours. Health literacy refers to the cognitive and social skills that determine a person's willingness and ability to acquire, absorb, and apply information in ways that promote and preserve good health (WHO, 1998). According to Berkman *et al.* (2010), there has been an increased focus on the

idea that health literacy encompasses not just the abilities required of a person to absorb information about their health but also the requirements placed on the healthcare system with regard to how information is delivered. Health literacy is crucial in diabetes self-management (Berkman *et al.*, 2011). Low health literacy has been associated with poor glycemic control, plus a higher chance of problems among Ghanaians with T2DM (Obirikorang *et al.*, 2016).

Another critical factor that has implications for diabetes self-care and management is health literacy. Diabetic health literacy, a measure of knowledge, has impacted diabetes self-care habits (van der Heide *et al.*, 2014). Diabetes self-care issues, according to Powell *et al.* (2007), are less common in patients with good health literacy than in those with poor health literacy. Conversely, suboptimal health literacy has been found to correlate with insufficient knowledge about diabetes, elevated levels of glycated haemoglobins, inadequate self-regulation of glucose levels, and reduced participation in physical activities (van der Heide *et al.*, 2014). In the same research, individuals with adequate knowledge of diabetes were unlikely to smoke and exhibited effective self-regulation of glucose levels. Moreover, diabetes knowledge mediated the association between health literacy and self-regulation of glucose (van der Heide *et al.*, 2014).

Since T2DM is a chronic condition with just a few visits to the doctor each year, patients must manage all of these aspects independently for the rest of their lives. Patients carry the day-to-day burden of managing the condition by themselves despite the help of professionals. It is challenging to live with a chronic disease such as diabetes. Patients may get irritated, irate, overwhelmed, and disappointed when given difficult, demanding, and occasionally ambiguous

self-care instructions. As a result, self-care motivation may be compromised. Diabetes distress is a type of psychological discomfort affecting people with diabetes. It includes the disease's burdens, worries, problems, and consequences (Snoek *et al.*, 2015). Diabetes distress, also known as diabetes affective disorder, is a multifaceted illness characterised by concern, conflict, frustration, and discouragement that can accompany life with diabetes and is closely linked to depression (Thanakwang *et al.*, 2014).

Diabetic distress reduces a person's problem-solving ability, which is necessary for diabetes self-care. This can lead to poor self-care practices and, as a result, poor glycaemic control (Ikeda *et al.*, 2014). Since emotional health and diabetes-related discomfort affect self-management, perceived burden, and future glycaemic control, psychosocial evaluation in diabetes treatment improves results (ADA, 2014; Polonsky *et al.*, 1995; Aikens, 2012). The treatment of diabetes distress is crucial since it is associated with poor diabetes control and self-care practices (Fisher *et al.*, 2012; Fisher *et al.*, 2005; Glasgow *et al.*, 2009).

Shortly after someone is diagnosed with diabetes mellitus, their lives are changed (Chew *et al.*, 2015). Daily routines are completely altered as a consequence of the demands of leading healthier lives more often, taking medication as prescribed, and making appointments with different medical professionals (Chew *et al.*, 2015). Repeated medical investigations and therapy reiterating the notions of threats to physical well-being and chronic issues (West & McDowell, 2002) could lower the patients' sense of self-worth and confidence, which motivates them to engage in adventures and other activities (Rasmussen *et al.*, 2013). Additionally, according to Burns *et al.* (2013) and

Rosland *et al.* (2012), families and colleagues would refrain from addressing the effects of the illness with the patients. People may sometimes feel stigmatised at family gatherings (Schabert *et al.*, 2013) or even social events connected to their jobs (Browne *et al.*, 2013). If neglected with these psychological and physical assaults, many patients may experience feelings of being overwhelmed, shaken, and doubting their values and beliefs on the significance of self-regulation and self-management (Rasmussen *et al.*, 2013). When this occurs, it might be assumed that the patient's ability to perform in terms of their health may be compromised.

Gregg and Menke (2018) stated that numerous studies consistently show people with diabetes to have a 50%–90% higher risk of experiencing a variety of disability-related conditions, such as mobility loss, a reduction in instrumental or essential activities of domestic functioning, and work disability. The most commonly noted causes of the disparity in impairment risk between those with and without diabetes are obesity, coronary heart disease, disorders of the lower limbs, depressive disorders, and strokes. Diabetes and increased disability risk are likely related to several other factors (Gregg & Menke, 2018). Physical health and health-related outcomes have been linked to emotionally unpleasant feelings like anger, anxiety, guilt, and exhaustion.

Various findings have established a connection between T2DM and a significant burden of physical limitations and functional disability (Dhamoon *et al.*, 2014; Fishman, 2015; Godino *et al.*, 2017; Sakurai *et al.*, 2012; Wong *et al.*, 2013). Impairment rates in individuals with T2DM are 25.0% greater than those without the condition (Fishman, 2015), making them more prone to develop impairment. Research suggests that within six years of being diagnosed with

T2DM, around 13.6% of patients may develop a disability in at least one activity of daily living (ADL), while 38.3% may experience new functional impairments. On average, there is a 1.0% decline in function per year (Dhamoon *et al.*, 2014; Sakurai *et al.*, 2012). Consequently, if left untreated, the progression of the disease may lead to a decline in activities such as self-care, mobility, and ambulation.

Accurate estimations of T2DM-associated impairment are crucial for their medical care requirements, given the literature on the health outcomes linked to T2DM that has been published. Studies on the functioning of Ghanaians with T2DM's health are few and far between. As a result, determining their health functioning would not only clarify the scope of the issue relating to disability or impairment but also aid in developing suitable and specific screening initiatives to lessen the burden of disability on society and enhance health outcomes for people with T2DM in Ghana. This investigation, therefore, sought to establish the health functioning and its predictors amongst Ghanaians with T2DM.

Statement of the Problem

Sub-Saharan Africa is experiencing an increase in the incidence of diabetes, which is a severe public health concern. Patients with diabetes must develop particular self-management practises to lessen the load on healthcare systems and others impacted. Diabetes management necessitates significant patient-specific self-management practises or behaviours (Davies *et al.*, 2018). Since T2DM is a chronic condition with just a few visits to the doctor each year, patients must manage all of the aspects independently for the rest of their lives (Van Smoorenburg *et al.*, 2019). Patients carry the task associated with

maintaining their conditions despite the help of professionals. Consistency and dedication are necessary for these self-management techniques since they affect how well people with diabetes will fare (Korkor, 2015). Generally, data regarding diabetes self-management levels in Ghana are sparse. Previous research, such as Kugbey *et al.* (2017) and Parwar (2018), has not established the self-management behaviour levels in persons with T2DM. As a result, one cannot say whether Ghanaians with T2DM have optimal or suboptimal diabetes self-management behaviours. This is a gap this study seeks to address.

Additionally, diabetes causes vast and extensive issues, affecting many facets of society. Increasing a population's awareness and understanding of these diseases is one of the essential components of the strategy for battling them. Based on research, low health literacy in patients with T2DM is independently linked to worse glycaemic control, greater prevalence of retinopathy (Breder *et al.*, 2024), and lower self-rated health (Bailey *et al.*, 2014). According to Katz *et al.* (2007), inadequate health literacy is linked to a decreased interaction in doctor-patient encounters, and given Ghana's low doctor-to-patient ratio, which suggests that doctors tend to spend little time with their patients, it can be assumed that these patients will have low health literacy skills. However, investigations on diabetes health literacy have been predominantly researched in advanced nations, i.e the United States (US) (Sheridan *et al.*, 2011) and South Korea (Lee *et al.*, 2021) with the high physician-patient ratio is suggestive of the fact ample time is spent with patients who come in for consultation or review and as a result, patients' health concerns can be adequately addressed without the session being rushed. However, in

Ghana, a nation facing a low physician-patient ratio, no study has investigated diabetes health literacy and how it affects diabetes self-management.

The findings in these developed nations cannot be applied in Ghana because the low physician-patient ratio can affect the availability and frequency of interaction between patients and healthcare providers. Consequently, the dynamics of physician-patient communication and opportunities for health education may differ compared to countries with high physician-patient ratios. To ensure the relevance and legitimacy of our study, it is crucial to assess the level of health literacy in individuals with T2DM in Ghana. This becomes even more significant considering the country's low physician-patient ratio.

Additionally, over the years, the majority of the studies that investigated health literacy among T2DM patients, for example, Bohanny *et al.* (2013) and Gomes *et al.* (2020), among others, used a non-diabetes-related health literacy instrument. It appears that only a few studies (example Lee *et al.*, 2021) used a diabetes-related health literacy instrument specifically tailored to assess the health literacy among T2DM patients; hence, it is vital to use a diabetes-related instrument for this study.

Diabetes distress has often been found in T2DM patients as a possible obstacle to self-management behaviours. Fisher *et al.* (2008) expressed concern that, while major depressive disorder is still common among diabetic patients, most are not clinically depressed; instead, they are distressed about their diabetes and how it is managed. Diabetes discomfort is more closely connected to worse self-management, according to a growing body of research (Amankwah-Poku *et al.*, 2020; Fisher *et al.*, 2010a). However, most of these findings stem from qualitative studies, with minimal quantitative evidence to

back them up (Khan & Choudhary, 2018). There appears to be no research in Ghana that has investigated the link between diabetic distress and self-management behaviours. This is perhaps the case since most of the investigations focused on psychological distress (e.g., Akpalu *et al.*, 2018; Obo *et al.*, 2021) in terms of disorder or psychopathology; hence, there is a need to measure more disease-related distress, diabetes distress.

Diabetes distress has been linked to poor health outcomes (Ikeda *et al.*, 2014) and can increase healthcare utilisation. Self-management behaviours, on the other hand, have been reported to improve well-being in persons with T2DM (Chrvala *et al.*, 2016; He *et al.*, 2017; Van Hecke *et al.*, 2017). Although evidence suggests a relationship among these variables, none of the studies investigated the structural relationship of these variables. Thus, how the impact of diabetes distress on health functioning is mediated by diabetes self-management behaviour. Assessing the intervening mechanisms, such as the mediating role of self-management behaviours, is crucial because it can help understand the nature of interaction among these variables to promote effective self-management strategies. This may improve the health status and general well-being of those with type 2 diabetes. This study, therefore, investigated the intervening mechanisms and structural relationships among these variables.

Purpose of the Study

The primary objective of this investigation was to explore the predictive relationship between diabetes distress, health literacy, health functioning and self-management behaviours in individuals with type 2 diabetes.

Research Objectives

This study specifically investigated the:

1. level of health literacy, diabetes distress, self-management behaviours and health functioning in individuals with T2DM.
2. influence of health literacy on self-management behaviours of individuals with T2DM.
3. influence of diabetes distress on a) self-management behaviours and b) health functioning of individuals with T2DM.
4. influence of self-management behaviours on health functioning of individuals with T2DM.
5. mediating effect of self-management behaviours on the influence of diabetes distress on the health functioning of individuals with T2DM.

Research Questions

1. What is the level of a) health literacy, b) diabetes distress, c) diabetes self-management, and d) health functioning among individuals with T2DM?

Research Hypotheses

1. **H₁**: There is a significant influence of health literacy on self-management behaviours of individuals with T2DM
2. **H₂**: There is a significant influence of diabetes distress on a) self-management behaviours and b) health functioning of individuals with T2DM
3. **H₃**: There is a significant influence of self-management behaviours on health functioning of individuals with T2DM
4. **H₄**: Self-management behaviours will mediate the influence of diabetes distress on health functioning of individuals with T2DM

Significance of the Study

This study holds considerable significance across multiple fronts, impacting practice, policy, and research in T2DM management. In practice, it informs critical insights by shedding light on these dynamics. Healthcare practitioners can tailor interventions and support mechanisms to better address the unique needs of diabetes patients, thereby enhancing overall treatment efficacy and patient outcomes.

From a policy standpoint, the findings of this study carry weight in advocating for targeted measures and resources aimed at improving diabetes care within healthcare institutions like the University of Cape Coast (UCC) Hospital. Policymakers can leverage this research to enact initiatives that bolster health literacy, alleviate diabetes distress, and reinforce self-management strategies among affected populations, thus fostering a more conducive environment for effective diabetes management.

In terms of research, this study enriches the existing body of literature on type 2 diabetes by offering fresh insights into self-management behaviours as a mediator. Contributing to this expanding knowledge base paves the way for further exploration and refinement of interventions, theories, and methodologies in diabetes research, ultimately advancing our understanding of this multifaceted condition and informing future investigations.

Delimitation

The research was conducted in the Metropolis of Cape Coast. This investigation was restricted to just T2DM individuals who are 20 years of age and above and specifically focused on T2DM patients receiving primary care. Again, the study focused on measuring health literacy, diabetes distress, self-

management behaviours and health functioning among the patients. The predictive relationship among the variables was assessed and the mediating effect of self-management behaviours on the influence of diabetes distress on health functioning was also assessed.

Limitations

One significant limitation pertained to the gathering of data. The diabetes clinic where the research was conducted operates solely once a week, specifically on Tuesdays. This limited operating schedule presented several challenges in both recruiting participants and administering the questionnaire. Patients attending the clinic were required to arrive as early as 4:00 am, and those who arrived early were approached to participate in the study. However, due to the exceptionally early clinic hours, many participants arrived late, impacting the recruitment process negatively. Furthermore, a substantial portion of late arrivals declined participation in the study, possibly due to fatigue or time constraints. Consequently, the total sample size necessary for the study was not achieved, potentially affecting the generalisability and robustness of the results to the broader populace of individuals with T2DM. The study's non-probabilistic sampling limits representativeness, introduces potential bias, and restricts generalizability owing to the study design.

Operational Definition of Terms

The actions and behaviours that a person with diabetes engages in to manage and treat their illness are referred to as **diabetes self-management behaviours**. These activities are physical activities, medication adherence and glucose control.

Diabetes Health Literacy in this study refers to a diabetes patient's

capacity to communicate, process, and comprehend fundamental medical information that supports them in making informed medical choices.

Diabetes distress in this study represents the emotional issues of dealing with diabetes and controlling it yourself constantly.

Health functioning in this study represents the overall health status of a diabetic patient and their ability to perform everyday tasks, social engagement and mental actions, among others.

Organisation of the Study

This work has five chapters, each focusing on different aspects of the research. The first chapter provides a comprehensive synopsis of this investigation from various viewpoints. It emphasises the importance of conducting this study by incorporating relevant statistical data and research findings to support the rationale. The second chapter concentrates on the literature review, which involves examining and synthesising the works of authors from diverse disciplines who have written about the variables examined in this study. It presents a theoretical, conceptual, and empirical review to establish a solid foundation for the research. The third chapter of this investigation presents the research methodology. This covers the study design, target population and research instruments, among others. The fourth chapter is dedicated to presenting and analysing data collected during the study process. It gives a detailed account of the findings, highlighting the key outcomes and observations. Finally, the fifth chapter serves as the concluding chapter. It summarises the research and presents the conclusions and recommendations. Additionally, it suggests potential areas for future research exploration.

CHAPTER TWO

LITERATURE REVIEW

Introduction

The preceding chapter provided an overview of the investigation's context, research inquiries, and reasons for undertaking the study. This chapter aims to examine pertinent literature associated with the study.

Theoretical Framework

Social Cognitive Theory

Social Cognitive Theory (SCT), developed by Albert Bandura, is an influential theory in psychology that emphasises the interplay between personal factors, environmental influences, and behaviour (Bandura, 1986). This theory offers a thorough foundation for comprehending human behaviour, motivation, and learning processes. At the core of SCT is the concept of reciprocal determinism, which suggests that behaviour, personal factors (such as cognitive, affective, and biological factors), and environmental factors influence one another dynamically and reciprocally (Bandura, 1989). This means that individuals are not merely passive recipients of external influences but rather active agents who shape their environments and are shaped by them. Self-efficacy, or one's conviction in their capacity to do a certain job or activity, constitutes one of the central concepts. Self-efficacy influences a person's motivation, effort, persistence, and resilience in the face of challenges. Greater confidence in oneself makes people more inclined to take on difficult activities, make bigger objectives, and stick with something when things go hard (Bandura, 1997).

Observational learning also known as modelling is also emphasised by SCT (Bandura, 1977). Through observing others, individuals can acquire new behaviours, attitudes, and cognitive strategies. Observational learning is facilitated by attention, retention, production, and motivation processes (Bandura, 1977). This concept has significant implications for education, behaviour change interventions, and social learning. Another central concept in SCT is outcome expectations, which refer to an individual's beliefs about the consequences of their behaviour. These can be self-evaluative, social, or physical, and they play a crucial role in motivating and regulating behaviour (Bandura, 2001).

SCT has been widely applied in various domains, including health promotion, education, organisational behaviour, and sports psychology. For example, in health promotion, SCT has been used to develop interventions to promote healthy behaviours such as physical activity, dietary changes, and smoking cessation (Glanz *et al.*, 2015). These interventions often focus on enhancing self-efficacy, providing social support, and addressing environmental barriers and facilitators.

Diabetes self-management

In applying Social Cognitive Theory (SCT) to explain diabetes self-management, we can examine how various constructs of SCT interact to influence behaviours related to self-care. An essential component of diabetic self-management is self-efficacy. Individuals with higher levels of self-efficacy are more likely to adhere to their prescribed diet, medications, and exercise routines despite the challenges posed by diabetes. Bandura (1997) emphasised that self-efficacy influences motivation and persistence, which are essential for

maintaining healthy behaviours. Observational learning, or modelling, is also significant in diabetes self-management. Individuals may learn effective self-management strategies by observing others, such as family members, peers, or healthcare providers, who successfully manage their diabetes. Bandura (1977) highlighted the importance of attention, retention, production, and motivation in observational learning processes.

Outcome expectations have an impact on the regulation and motivation of diabetic selfcare practices. Individuals with diabetes may consider the consequences of their actions, such as the impact of adhering to their medication regimen on their blood glucose control or the potential complications of not monitoring their glucose levels regularly (Bandura, 2001). Environmental influences, including access to healthy food options, social support networks, and healthcare resources, shape diabetes self-management behaviours. SCT suggests that environmental factors interact with personal factors and behaviours in a reciprocal manner (Bandura, 1989).

Applying SCT to diabetes self-management interventions involves enhancing self-efficacy, providing opportunities for observational learning, addressing outcome expectations, and modifying environmental factors to support healthy behaviours. For instance, Glanz *et al.* (2015) demonstrated how SCT principles can inform interventions aimed at promoting physical activity and dietary changes in individuals with diabetes. These interventions may involve providing education and skill-building activities to enhance self-efficacy, incorporating role models or peer support groups to facilitate observational learning, addressing outcome expectations through goal setting

and feedback mechanisms, and modifying environmental factors to promote healthy behaviours.

Diabetes distress

Diabetes distress, a prevalent and impactful phenomenon among individuals living with diabetes, can be effectively understood and addressed through the lens of SCT). In the context of diabetes, individuals with low self-efficacy may doubt their capacity to follow prescribed treatment plans, manage blood sugar levels, or cope with the psychosocial aspects of living with a chronic condition. This lack of confidence can contribute to feelings of distress and overwhelm.

Moreover, SCT highlights the importance of observational learning or modelling in shaping behaviour (Bandura, 1977). People living with diabetes may observe others in their social networks or media representations managing their condition effectively or struggling with similar challenges. Positive role models and successful coping strategies observed in others can enhance self-efficacy and provide a roadmap for managing diabetes-related distress. Conversely, witnessing negative outcomes or unsuccessful coping strategies may increase distress and diminish self-efficacy.

Additionally, SCT emphasizes the role of outcome expectations, which are beliefs about the consequences of one's actions (Bandura, 2001). Individuals experiencing diabetes distress may hold negative outcome expectations, fearing complications, stigma, or limitations imposed by their condition. Addressing these negative outcome expectations through education, support, and cognitive restructuring can alleviate distress and foster more adaptive coping strategies.

Applying SCT to interventions for diabetes distress involves targeting these key constructs. Interventions can enhance self-efficacy through skills training, support groups, and coaching aimed at building confidence in diabetes management tasks. Providing opportunities for observational learning, such as peer mentoring or multimedia resources showcasing successful coping strategies, can also empower individuals to adopt effective behaviours and beliefs. Additionally, addressing negative outcome expectations through psychoeducation, cognitive-behavioural therapy, and motivational interviewing can help individuals reframe their perceptions of diabetes and its consequences.

Health Literacy Model(HLM)

This Model was proposed by Sorensen *et al.* (2012) as a framework to comprehend the factors that determine health literacy. Health literacy is defined as the ability of individuals to obtain, process, and understand basic health information and services required to make appropriate health decisions. According to the model, three variables influence health literacy: the individual, the healthcare system, and societal and cultural issues.

Individual characteristics such as motivation, socio-cognitive skills, knowledge and self-efficacy are critical for comprehending and managing health data. The person's capability of a person to read and comprehend material relating to health, motivation to manage their well-being and assurance in being able to manage their ailment, for example, can all impact their health literacy (Sørensen *et al.*, 2012). Healthcare systems are made up of the planning, delivery, and interactions between clients and medical personnel. Health literacy can be affected by the availability of resources and assistance for managing health and variables in the healthcare system that affect the quality

and accessibility of health information (Sørensen *et al.*, 2012). Social and cultural components are the broader social and cultural context in which people live, which includes their socioeconomic level, social standards, and cultural views. Sørensen *et al.* (2012) indicated that these elements can substantially impact health literacy by affecting a person's capacity to manage their illness, access to healthcare services, and comprehension of information related to health.

The HLM stresses the significance of addressing all three components to enhance health outcomes and literacy. The Model also emphasises that individuals, healthcare professionals, and healthcare institutions all have responsibilities for ensuring that people are literate in health matters. The model also emphasises the need for a comprehensive strategy for enhancing health literacy that considers the many factors that affect health literacy. This HLM provided by Sørensen *et al.* (2012) provides the foundation for understanding diabetes health literacy from three determinants (individual, healthcare system, and societal and cultural variables).

In the context of diabetes health literacy, individual factors refer to the socio-cognitive skills, knowledge, drive, and self-efficacy of persons with diabetes. These factors play a crucial role in diabetes management, determining how well individuals understand and manage their condition (Sørensen *et al.*, 2012) i.e.; individuals with poor health literacy may struggle to understand and interpret blood glucose readings or may be unsure how to manage their diet or medication regimen. Thus, improving individual factors such as health literacy and self-efficacy can lead to better diabetes management and improved health outcomes.

Healthcare system factors refer to the design and delivery of health services and the communication between healthcare providers and patients. In this context, healthcare system factors include the availability of diabetes education programs, the accessibility of healthcare services, the quality of communication between healthcare providers and patients, and the availability of resources and support for diabetes management (Sørensen *et al.*, 2012). Improving healthcare system factors can lead to better diabetes outcomes.

Social and cultural factors refer to the broader social and cultural context in which individuals live, including their cultural beliefs, social norms, and socioeconomic status. In the context of diabetes health literacy, social and cultural factors can significantly impact an individual's access to healthcare services, their understanding of diabetes, and their ability to manage their condition (Sørensen *et al.*, 2012). For example, individuals from low-income backgrounds or specific ethnic groups may face unique challenges in accessing healthcare services or understanding diabetes management due to cultural beliefs or language barriers. Thus, improving social and cultural factors such as access to healthcare services and cultural competency training for healthcare providers can lead to better diabetes management and improved health outcomes.

Applying the HLM highlights the significance of addressing individual, healthcare system, and social and cultural factors to improve diabetes management and promote better health outcomes. By approaching diabetic health literacy from a holistic perspective, healthcare providers can better understand the needs of people with diabetes and develop more effective strategies for improving health literacy and diabetes management.

Biopsychosocial Model of Disability

Researchers created the biopsychosocial model of disability to incorporate the social and biological explanations of impairment. Gatchel *et al.* (2007) opines that the concept was initially put out by George Engel in 1977, and it maintains that in addition to physical factors, one should also take social and psychological factors into account. The bio aspect refers to the physical aspects of an individual's health, including physiological disorders. The psycho component relates to an individual's thoughts, emotions, and behaviours, encompassing psychological distress, fear/avoidance beliefs, coping strategies, and attribution. The social element encompasses socio-economic, socio-environmental, and cultural factors that surround an individual, such as work-related issues, family circumstances, and economic benefits (Gatchel, 2016).

This model suggests that physical impairments or medical conditions do not solely cause disability but are a multifaceted connection of social, biological, and psychological features (Gatchel, 2016). When applied to health functioning, this model can help explain how these factors impact a person's health outcomes. As an illustration, the Biopsychosocial Model might suggest that a person's physical health is influenced not only by their genetic makeup or medical conditions but also by psychological factors such as their beliefs about health and their coping strategies for managing health challenges, as well as social factors and environmental factors (Gatchel, 2016). By considering the complex interplay of these factors, the Biopsychosocial Model can help healthcare professionals better understand and address the issues that affect health functioning. It can also help guide the development of more

comprehensive and integrated healthcare interventions that address physical and psychosocial aspects.

Conceptual Review

Diabetes mellitus (DM)

Diabetes mellitus (DM) is arguably one of the oldest illnesses known to humankind. About 3000 years ago, an Egyptian book first mentioned it (Ahmed, 2002). The metabolic condition group known as diabetes mellitus, or simply diabetes, is characterised by persistently elevated blood sugar levels (WHO, 2014). According to Shoback and Gardner (2011), diabetes results from either a lack of insulin production by the pancreas or improper insulin utilisation by body cells. The differentiation between Type 1 and Type 2 diabetes mellitus (DM) was established clearly and definitively in 1936. By aetiology and clinical manifestation, DM can be grouped into three thus, type 1, type 2 and gestational diabetes. In this study, type 2 diabetes was the main subject. The metabolic syndrome originally became known to include type 2 diabetes in 1988 (Patlak, 2002). The most prevalent kind of diabetes is type 2 diabetes (Maitra & Abbas, 2005). According to Chen *et al.* (2012), type 2 DM is thought to be caused by interactions among genetic, environmental, and behavioural risk factors. Persons with type 2 diabetes are more likely to experience various issues that commonly cause early mortality.

There are some dysfunctions connected to type 2 diabetes mellitus, including hyperglycaemia (Khardori, 2022). Diabetes can cause retinal, renal, and perhaps neuropathic illness as microvascular consequences. Macrovascular complications of diabetes mellitus encompass conditions such as peripheral vascular and coronary artery diseases. Diabetic neuropathy, on the other hand,

impacts both autonomic and peripheral nerves. It is worth noting that, unlike individuals having T1DM, those having T2DM do not entirely rely on insulin for lifelong management (Khardori, 2022).

However, insulin is used to treat many individuals with type 2 diabetes. They are seen as needing insulin but not depending on it because they still have some endogenous insulin secretion capacity. The earlier terms have been dropped, nonetheless, because of the confusion that could result from categorisation based on treatment rather than aetiology (Khardori, 2022). Even though T2DM usually impacts people over 40 and also two-year-olds who have a family history of the illness have been identified. Children with newly diagnosed diabetes now outnumber those with type 1 diabetes in several communities.

Self-Management behaviours

Diabetes self-management involves engaging in recommended behavioural activities like proper nutrition, compliance with medications, staying engaged, glucose monitoring, decreasing risks, solving issues, and adaptive coping, all required to effectively manage the disease (Tomky *et al.*, 2008). Rural Health Information Hub (2022) defines it as an individual's actions and attitudes to manage and treat their illness. Regular health checks are necessary for people with diabetes. Diabetes self-management typically takes place at home and involves checking blood sugar (glucose), eating healthy meals in the right portions, exercising regularly, staying hydrated by drinking water, taking prescribed medicines as directed, modifying medications as necessary, checking one's own feet, and keeping an eye on any other symptoms or signs of diabetes. People with diabetes can lower their blood sugar (glucose)

levels, avert problems, enhance their quality of life, and spend less money on medical treatment by adopting these habits. People with diabetes need to adopt and practice self-management techniques, but it is also possible for family members, friends, or other caregivers to get engaged. These individuals can offer emotional support, act as role models by staying active, help monitor glucose, administer insulin or other prescription medications, and enable discussions about practical self-management approaches (Rural Health Information Hub, 2022).

Health literacy

The advancement of society's social, economic, and health systems depends more and more on health literacy. Improving health care and disease control will be beneficial if a community's health literacy improves (Chen *et al.*, 2014). The American Medical Association (AMA, 1999) described health literacy as a set of abilities comprising the ability to carry out the fundamental comprehension and math tasks necessary to function in the healthcare setting; this description has been criticised for simply bringing fundamental literacy skills relevant to the field of healthcare (Frisch *et al.*, 2012). The social and intellectual capacities that influence a person's willingness and capacity to receive, analyse, and make use of knowledge in ways that promote and preserve wellbeing is referred to as health literacy (WHO, 1998). A more comprehensive description is how information about health is obtained, comprehended, evaluated, and used to decide how to treat themselves, prevent disease, and promote their well-being (Sorensen *et al.*, 2012). To treat and self-manage their condition, individuals who have diabetes need to have the required abilities to seek out, understand, analyse, interact, and list information connected to their

condition in the healthcare setting and their daily lives (Lee *et al.*, 2018). This is known as diabetic-related health literacy. All individuals require these abilities, for example, to complete medical and insurance documents, navigate a hospital, and interact with healthcare professionals. Persons with poor literacy and numeracy abilities may have trouble interpreting glucose readings, changing medication, estimating carbohydrate intake, and carrying out other self-care tasks (Wolff *et al.*, 2009).

Diabetes distress

This concept, which is sometimes referred to as diabetes-specific distress or diabetes-related distress, is how one reacts emotionally to having the condition, the responsibility of strict self-care practices and the potential for life-long consequences (Fisher *et al.*, 2014; Gonzalez *et al.*, 2011; Skinner *et al.*, 2020). It can also result from the societal impact of diabetes and the financial implications of the condition (Fisher *et al.*, 2015). According to Fisher *et al.* (2014), there are several diabetic-related discomfort levels. This emotional distress is an inherent part of living with and managing diabetes; it peaks at difficult times and varies in strength over time. Which are the early stages of diagnosis, significant changes in treatment, or the onset or progression of long-term complications. Furthermore, managing one's diabetes can also become too much to handle during increased stress (Fisher *et al.*, 2019). The stability or fluctuation of diabetes distress over time depends on the specific source of the distress, as highlighted by Ehrmann *et al.* (2015). Mild diabetes distress, if left untreated, frequently persists and might potentially escalate into psychopathology (Fisher *et al.*, 2016; Ehrmann *et al.*, 2015).

Living with diabetes presents numerous challenges. Among individuals with both type 1 and type 2 diabetes, the most commonly reported areas of concern are worrying about the future and the potential for serious complications (Snoek *et al.*, 2011) and experiencing feelings of guilt and anxiety when diabetes management becomes difficult (Delahanty *et al.*, 2007).

While stressors are common across all types of diabetes, depending on the kind of diabetes, many types of discomfort may exist. For example, type 1 diabetes is often associated with concerns related to insulin treatment and episodes of hyperglycaemia or hypoglycaemia. In contrast, T2DM is more frequently associated with social implications, dietary restrictions, and issues related to overweightness (Sturt *et al.*, 2015).

Diabetes management is a constant and demanding task that requires making decisions and taking action throughout the day, often with unpredictable and unsatisfactory outcomes. Following all recommendations and guidelines does not guarantee stable blood glucose levels, as the same actions can yield different results from one day to the next (Skinner *et al.*, 2020). As these difficulties and discomforts mount, diabetes burnout and detachment from diabetes management may result. Diabetes distress, according to Fisher *et al.* (2014), encompasses similar emotional symptoms with various recognised psychological issues, such as depression. Nevertheless, it is crucial to emphasise that depression and diabetes distress are distinct concepts, each necessitating distinct assessment and management strategies. Unlike major depression, diabetes distress does not imply the presence of psychopathology; instead, it is an expected response to the challenges of living with diabetes, whereas

depression refers to a more general assessment of an individual's overall life satisfaction (Gonzalez *et al.*, 2011).

Health functioning

According to the World Health Organization (WHO, 2010), health functioning refers to a person's capacity to execute and participate in a variation of activities associated with their physical, mental, and social well-being. It encompasses different aspects of daily life and a range of domains, including cognition, mobility, self-care, getting along with others, and life tasks.

The cognition domain of health functioning involves comprehension and communication. It denotes an individual's capability to process information, comprehend concepts, think critically, and effectively communicate their thoughts and ideas. Concerning mobility encompasses movement and navigation. It pertains to an individual's physical capability to move around, perform tasks that require physical agility, and navigate their environment safely and independently. Self-care involves personal hygiene, dressing, eating, and independent living. It encompasses an individual's ability to care for their physical needs and engage in activities necessary for their daily well-being and independence. Getting along refers to interpersonal communication thus communication with family members, friends, colleagues, and the broader community. Life tasks encompass responsibilities at home, work, school, community engagement, and recreational activities. This domain includes an individual's capacity to fulfil various roles and effectively meet the demands of their personal and professional life. WHO (2010) indicated that when an individual encounters difficulty or requires assistance from others to perform tasks that fall under these areas of functioning, it can be considered a health

impairment or disability.

The multidimensional notion of health-related quality of life includes a person's subjective assessments of every facet of functioning, such as physical functioning, role functioning, social functioning, pain, mental health, and energy. Similar factors include cognition, self-care, mobility, interpersonal interactions, job, home, and community and civic responsibilities in the World Health Organisation Disability Assessment Schedule. Since they have similar dimensions and are used to measure health status and outcomes, this review will include literature measuring Health-Related Quality of Life.

Empirical Review

This review discusses a variety of relevant empirical investigations. The objectives that are directing this study were taken into consideration when conducting the empirical review. The empirical review supports the discussion of this study's findings and aids in understanding the diverse views of researchers.

Health literacy

Health literacy plays a pivotal role in effectively managing type 2 diabetes, as it empowers individuals to understand and navigate the complexities of their condition. Various studies have explored the levels of health literacy among diabetic populations, yielding diverse findings. A study by Mogessie *et al.* (2022) in Southeast Ethiopia indicated that a considerable proportion of adult patients with diabetes were found to have inadequate levels of diabetes-specific health literacy. Specifically, 41.8% fell into the low literacy category, while 27.9% demonstrated moderate literacy and 30.3% had high

literacy levels. This indicates a notable prevalence of low health literacy among diabetic patients, albeit with a majority possessing moderate to high literacy levels.

Tefera *et al.* (2022) observed similar trends in their research, where 17.3% of participants exhibited low diabetic-related health literacy, 26.3% demonstrated moderate literacy, and 56.5% had high literacy levels. These results align with the research conducted by Singsalasang *et al.* (2022), it was stated that a vast majority (90.90%) of their participants exhibited adequate health literacy regarding diabetes.

However, contrasting results have been noted in other studies. Souza *et al.* (2014) observed that over half (56.6%) of older adults with type 2 diabetes had health literacy levels below adequacy. Similarly, Azreena *et al.* (2016) discovered that a noteworthy percentage (85.8%) of individuals with T2DM had limited health literacy. Furthermore, Abdullah *et al.* (2019)'s recent systematic review, which included seven nations revealed a wide-ranging prevalence of limited health literacy levels among diabetic populations, varying from 7.3% to 82%. These findings call attention to the importance of addressing health literacy as a crucial component of diabetes management, with implications for designing tailored interventions to improve understanding and self-management in those with T2DM.

Self-management behaviours

Ji *et al.* (2014) found lower scores in foot care and blood sugar monitoring behaviours T2DM persons. Only 22.76% of patients achieved the target blood glucose goal, indicating poor self-management behaviours and glycaemic control. The study suggests that improving self-management

behaviours may lead to better blood glucose control in diabetes patients. A follow-up cross-sectional study by Ji (2018) showed that the proportion of patients with appropriate self-management practices was just 16.4%.

Habebo *et al.* (2020) investigated the prevalence of poor self-management behaviours among diabetic patients in Ethiopia. The pooled prevalence of poor self-management behaviour was 49.79% among diabetic patients, with varying magnitudes across different regions. The worst self-management component was self-blood glucose monitoring (80.91%), while medication adherence showed relatively better rates (24.65%). A recent systematic review by Paudel *et al.* (2022) found low prevalence rates in South Asia. Adherence to blood glucose monitoring was 65%, medication adherence was 64%, physical activity was 53%, diet was 48%, and foot care was 42%, while alcohol consumption was reported by 25.2% and tobacco use by 18.6% of individuals.

Contrasting perspectives emerged from Huang *et al.* (2014), who conducted a study in China, reporting a notably higher prevalence of good self-management behaviour among Chinese patients. Their findings depicted 46% exhibiting good behaviour, 45% fair, and only 6% poor behaviour, indicating a relatively more optimistic scenario compared to other regions. The overall findings of this study indicated a higher prevalence of good self-management behaviour among Chinese patients.

Diabetes distress

Researchers Aljuaid *et al.* (2018) observed that 25% of patients had moderate to severe DRD, with emotional distress being the most prevalent and physician-related discomfort coming in second. Similarly, Al-Otaibi *et al.*

(2021) reported a prevalence of 35.6% for moderate to severe DRD among people with type 2 diabetes. Another study by Huynh *et al.* (2021) revealed that 23.6% and 5.8% of individuals with type 2 diabetes experienced moderate or high levels of distress, indicating a significant distress rate among this population. Geleta *et al.* (2021) observed a frequency of 36.8% in persons with T2DM, with emotional distress being the most prevalent domain, accounting for 43.6% of distress cases. Similarly, El Sherbini and Abdou (2014) reported a high diabetes distress level in 45.6% of their patient sample. Bhaskara *et al.* (2022) found that 60.5% of their participants experienced diabetes-related distress. In a study by Hu *et al.* (2020), 90.82% of patients suffered from diabetes distress, with 57.14% experiencing severe distress, 33.67% having moderate distress, and 9.18% reporting no distress. The most frequently reported severe distress domains were related to the regimen, emotional burden, and interpersonal factors.

Health functioning

In U.S. individuals aged >60 years, Kalyani *et al.* (2010) discovered a substantial correlation between diabetes and functional impairment across various categories. Individuals with diabetes described challenges with IADL, ADL, leisure and social activities, lower extremity mobility, and overall ability to move around. Diabetes-related impairment odds ratios varied between 1.97 for overall mobility and 2.53 for ADL. Notably, the odds ratios were higher when impairment was characterised as the incapacity to perform tasks, ranging from 2.64 to 3.93.

Using standard subclinical measures, including seat stands, stability when standing, and stride velocity, De Rekeneire *et al.* (2003) found that having

diabetes increased the chance of functional impairment by 40%. Using data from 26 worldwide research, a meta-analysis and systematic review by Wong *et al.* (2013), discovered that diabetic patients encounter mobility disabilities, core activity limits, and ADL restrictions.

Breton *et al.* (2013) investigated the impact of diabetes on lost productivity in the workforce. They found that individuals with diabetes had significantly more absences from work than those without diabetes. Moreover, people with diabetes were more likely to retire early due to illness. Sinclair *et al.* (2008) conducted a population-based case-control study. When compared to matched controls, they noticed that patients with diabetes significantly had less physical function, as assessed by validated tools measuring physical function.

Health literacy and self-management behaviours

Self-management habits may be impacted by health literacy among diabetes patients. This means that self-management behaviours can improve or not based on their literacy level. Diabetes literacy and self-management were revealed to significantly positively correlate by Rachmawati *et al.* (2019). This suggests that individuals with better diabetes literacy are more likely to practise good self-management activities. Similarly, ALSharit and Alhalal (2022) indicated that health literacy positively affects self-management skills. According to Mukanoheli *et al.* (2020), higher levels of functional health literacy were found to improve self-care behaviours.

Furthermore, Reisi *et al.* (2016) discovered a significant positive correlation between self-care behaviours and communicative and critical health literacy. However, it is important to note that not all facets of self-care practices may improve with higher health literacy. Dahal and Hosseinzadeh (2020) found

that health literacy was instrumental in improving physical activity but did not significantly impact other self-care practices. On the other hand, van der Heide *et al.* (2014) revealed that inadequate self-care behaviours were linked to low health literacy.

Diabetes distress and diabetes self-management behaviours

Diabetes distress has been demonstrated to have a negative correlation with physical activity and medication adherence, vital components of diabetic self-care (Fisher *et al.*, 2010b). Downie *et al.* (2021) reported that emotional distress, a component of diabetes distress, is linked to poor self-management and glucose regulation in T1DM. Similarly, Berry *et al.* (2015) noted that diabetes distress is related to poor self-management in type 2 diabetes.

The impact of diabetes distress on self-management was further reinforced by Patra *et al.* (2021), who reported that diabetes distress was negatively associated with all self-management dimensions, including dietary control, glucose management, and healthcare use. This suggests that higher levels of diabetes distress are associated with suboptimal self-management behaviours.

Hessler *et al.* (2017) also observed a connection between distress and glycaemic control, reporting that greater distress levels were linked to higher HbA1c levels. This indicates that increased diabetes distress is associated with poorer glycaemic control. In terms of medication adherence, Gonzalez *et al.* (2016) conducted a study assessing emotional distress and its relation to diabetes medication adherence over time. Their results indicated that diabetes distress was significantly linked to reduced compliance with medication regimens.

According to a study done in Ghana, diabetes distress was shown to be negatively linked to nutritional and workout routines and positively linked with glucose levels (Amankwah-Poku *et al.*, 2020). It implies that increased diabetes distress is associated with decreased adherence to dietary and exercise recommendations, leading to poor self-management and higher glycaemic levels. Similar findings were reported by Aikens (2012), who emphasised the negative impact of diabetes-related distress on glycaemic control and medication adherence.

Diabetes distress and health functioning

Beverly *et al.* (2018) reported that psychological issues such as depression, diabetes distress, and anxiety are commonly associated with diabetes and can significantly impact health functioning. Studies have shown that psychological distress and diabetes are associated with poor glycaemic control, increased disabilities, decreased productivity, and higher mortality rates (Ascher-Svanum *et al.*, 2015; Dalsgaard *et al.*, 2014; Schmitz *et al.*, 2008). These findings suggest psychological distress may lead to poor health functioning in persons with T2DM. Specifically, diabetes distress has been found to have a negative effect on health outcomes, including health-related quality of life (HRQoL) (Kreider, 2017). Chew *et al.* (2015) found that diabetes-related distress had a detrimental impact on HRQoL in T2DM patients. Furthermore, depression tends to affect T2DM patients' overall HRQoL (Zurita-Cruz *et al.*, 2018). Therefore, depression was associated with a perception of poor overall HRQoL. These findings highlight the significant impact of diabetes distress and psychological factors on the health functioning of individuals with type 2 diabetes. It underscores the importance of addressing

and managing psychological distress, an essential component of treatment for diabetes, to improve overall health outcomes and well-being.

Self-management behaviours and health functioning

Practices of self-care are essential for preventing and treating T2DM since they raise the probability that patients will follow their treatment plans (Man *et al.*, 2019). In order to control or minimise the disease's impact on one's health and well-being and prevent the development of other diseases, individuals with diabetes must engage in frequent activities or actions known as diabetes self-management (Adu *et al.*, 2019). These include effective behavioural strategies in managing diabetes, such as physical activity and medication adherence. The impact of diabetes on a person's quality of life and functional capacity is highlighted by Khan *et al.* (2019), who state that diabetes causes morbidity and premature mortality. It is possible to achieve adequate glycaemic control through self-management behaviours like a healthy diet, blood glucose monitoring, physical activity, healthy coping, and the ability to address diabetes-related issues (Mikhael *et al.*, 2018).

Vas *et al.* (2017) argued that self-management practices improve health outcomes and positively impact healthcare management, quality of life, and related expenditures (Vas *et al.*, 2017). Luo *et al.* (2015) opined that self-management of diabetes has a substantial impact on better medical results, such as optimal glucose management, higher quality of life, and a lower incidence of sequelae. Poorly controlled diabetes can cause consequences such as peripheral neuropathy and foot ulcers, which are linked to higher rates of death and disability. Fiji, in particular, has a high amputation rate in the Western Pacific Region (Morgan, 2015). In addition, a survey conducted in Fiji identified a

significant prevalence of maculopathy or retinopathy among diabetic patients, indicating the impact of poorly managed diabetes on eye health (Bhikoo *et al.*, 2017).

In the study by Alsayed Hassan *et al.* (2022), nearly half of the patients stated deficient diabetes self-management and standard of living. Similarly, Al-Khaledi *et al.* (2018) found a direct association between diabetes self-management practices and better primary health composite and mental health composite scores. These findings suggest that diabetes self-management practices are essential to health-related outcomes and quality of life.

Diabetes self-management behaviour as a mediator

Diabetes distress has emerged as a significant factor impacting lives and has been consistently connected to adverse outcomes, i.e. poor diabetes self-management behaviours and compromised health functioning. On the other hand, engagement in diabetes self-management behaviours has been shown to improve health outcomes and overall functioning.

Numerous studies have established a direct association between diabetes distress and health functioning. For instance, Chew *et al.* (2015) found that individuals experiencing diabetes distress reported poorer health functioning. This indicates a significant and detrimental impact of diabetes distress on various dimensions of health functioning. Moreover, suboptimal diabetes self-management behaviours are influenced by diabetes distress (Patra *et al.*, 2021), further exacerbating the adverse effects on health functioning.

Engaging in diabetes self-management behaviours has consistently demonstrated positive effects on health outcomes, as indicated by Mikhael *et*

al. (2020) and Chrvala *et al.* (2016). These findings accentuate the position of individuals taking charge of their diabetes management through medication adherence, healthy lifestyle choices, and regular monitoring.

Building upon the existing literature, it can be postulated that self-management behaviours may be a mediator. When individuals experience diabetes distress, their ability to adhere to self-management behaviours may be compromised. This can result in suboptimal diabetes control, leading to poorer health functioning. Conversely, individuals who effectively employ self-care practices experience improved health outcomes, thus positively influencing their overall health functioning.

Conceptual Framework

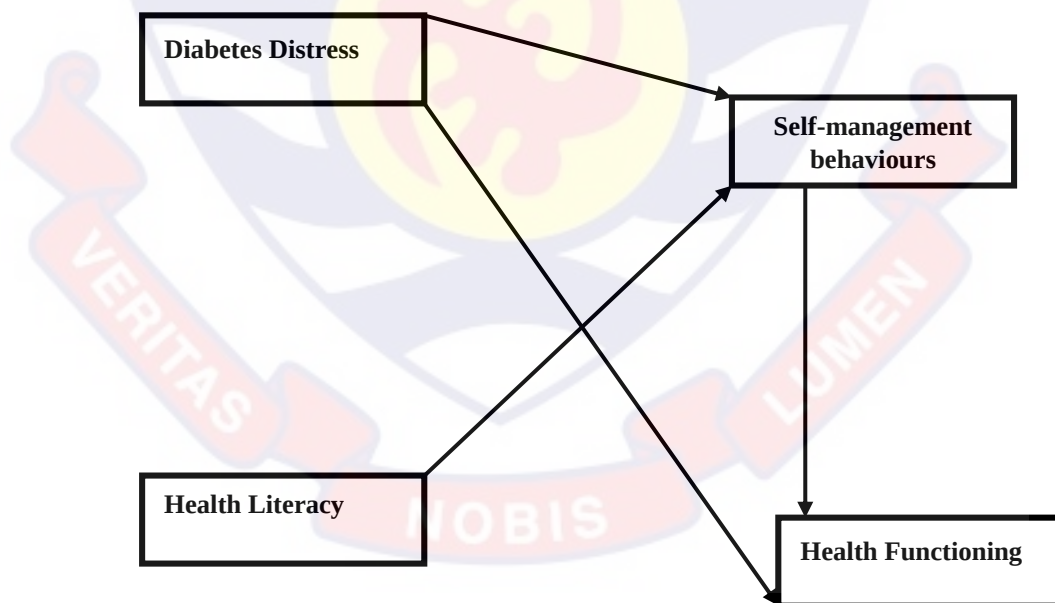


Figure 1: Hypothesised Model

Source: Field Survey (2023)

This conceptual framework was drawn based on the available literature. It was hypothesised that diabetes distress would directly affect diabetes self-management behaviours and health functioning. Diabetes distress would also have an indirect effect on health functioning via self-management behaviours; hence, self-management behaviours would mediate the effect of diabetes distress on health functioning. It was also hypothesised that health literacy would directly affect self-management. Figure 1 illustrates the relationship among the variables.

Summary of Literature Review

The literature relevant to this investigation was reviewed in this chapter, focusing on the biopsychosocial model of disability, the health literacy model and social cognitive theory. The chapter explained the research factors and their interconnections. Moreover, it presented empirical findings from global investigations. The review's findings are considered significant in addressing the outcomes of this study.

It is important to note that most of the literature reviewed in this study originated from regions outside of Ghana, particularly Asia and North America, where economic status and healthcare delivery systems differ and may be more advanced. In controlling type 2 diabetes, the significance of health literacy is stressed in various studies, revealing differing levels among populations. While some studies show high health literacy rates, others indicate a significant proportion of individuals with limited health literacy. This stresses the requirement for focused programmes to raise health literacy and guarantee that everyone can manage the condition. Type 2 diabetes self-management practises differ between people and geographical areas. While some studies report poor

self-management behaviours and suboptimal glucose control, others show better rates. According to the reviewed research, people with type 2 diabetes have a sizable incidence of disease-related discomfort. The most frequent type of distress is emotional, while the least frequent type is interpersonal.

Furthermore, the review consistently demonstrates the association between diabetes and functional disability in various domains, such as mobility, daily activities, leisure and social activities, and productivity. People with diabetes experience higher odds of disability and functional limitations, impacting their daily activities, quality of life, and workforce participation. Early detection, effective management, and targeted interventions are important in reducing the functional impact of diabetes and improving overall well-being.

Health literacy significantly influences self-management behaviours among diabetic patients. Studies consistently show a positively correlated relationship in health literacy, self-management skills, and functional health literacy. However, the impact of health literacy on specific self-management behaviours may vary. While some aspects, like physical activity, may improve with higher health literacy, others, may not be significantly affected. To improve self-management behaviours, targeted interventions and support are needed for individuals with limited health literacy.

According to the literature, self-care behaviours among people with diabetes are significantly influenced by higher health literacy. Conversely, lower health literacy contributes to poorer self-management behaviours. Diabetes distress negatively affects self-management behaviours, including physical activity, medication adherence, dietary control, and glucose management.

CHAPTER THREE

RESEARCH METHODS

Introduction

The research methodology is fully summarised in this chapter, including the design, approach, sample size, sampling technique, population, research instrumentation, ethical considerations, data processing, as well as analysis of data.

Research Approach

In conducting a study, it remains essential to select an appropriate research approach. The three main types of research methodologies are quantitative, qualitative, and mixed. In quantitative research, observable events are methodically and empirically examined using statistical, mathematical, or computer methods (Given, 2008). It collects and analyses numerical data using statistical methods to uncover patterns, relationships, and generalisable findings. Given the description given, the method of quantitative inquiry was used because the investigation produced quantitative data.

Research Design

A cross-sectional survey design was used in this study and both inferential and descriptive statistical methods was used to analyse data. This research design involves data gathering from a populace at a specific time to describe existing conditions, identify standards for comparison, or determine relationships between events (Cohen *et al.*, 2011). It allows for various levels of complexity, ranging from simple frequency counts to relational analyses.

For this study, a cross-sectional design was judged appropriate since it

made it easier to examine diabetes self-management behaviours, health literacy, diabetes distress, and health functioning. While the cross-sectional design has notable strengths, it also has limitations. For instance, participants may not always provide truthful responses, which can introduce response bias (Grimes & Schulz, 2002). However, the cross-sectional design's advantages outweigh its disadvantages, and several credible academic and social research studies have demonstrated its potency. The cross-sectional design was therefore thought to be the most suitable for this research.

Population

The target populace for this investigation was individuals with T2DM. The accessible population consisted of T2DM patients, with an expected number of 407 (Hospital's Database, 2023), receiving primary care at the Diabetes Clinic in UCC Hospital. The population comprised male and female diabetic patients who are employed or self-employed, retired, unemployed, or students. The population is also comprised of individuals with different educational backgrounds.

Sample Size

In this study, the demographic data for the patient comprised age, duration of the condition, educational attainment, gender, and job status. These variables provide important background information about the participants and help to characterise the sample. The power estimate, a-priori sample size determination process was employed. The number of observable and latent variables, the predicted effect size, the intended probability, and the statistical power level were used to establish the suitable sample size. For this study, there

are 4 latent variables and 18 observed variables. Given the probability (alpha) level of .05, anticipated effect size of .3 and the desired statistical power level of .8, the recommended sample size for this study which used the structural equation model, is 137, with a minimum sample size for model structure and to detect effect 88 and 137 respectively (Soper, 2022). A sample size of 137 was deemed to be adequate for the study. A total of 119 participants took part in the study out of the 137 estimated sample, giving a response rate of 86.86%.

Sampling Procedure

This study utilised consecutive sampling as the sampling technique. Consecutive sampling, or total enumerative sampling, involves choosing each person who satisfies the requirements for inclusion till the target sample size is obtained (Bowers *et al.*, 2011; Schuster & Powers, 2005; Sharma, 2018). It is considered a non-probability sampling method that shares similarities with convenience sampling but with a slight variation. Consecutive, convenience, and snowball sampling are commonly used in non-probability sampling approaches (Van den Broeck & Kaulfuss, 2013).

Consecutive sampling offers advantages over convenience sampling in terms of controlling sampling bias (Polit & Beck, 2020). However, researchers should exercise caution when using consecutive sampling if the variable of interest exhibits temporal or seasonal trends (Schuster & Powers, 2005). Bias can also arise in consecutive sampling if consecutive samples share similarities, such as consecutive houses on the street (Indrayan & Holt, 2016).

In summary, consecutive sampling was employed in this study, allowing for the selection of participants who met the inclusion criteria in a consecutive

manner. This sampling technique helps mitigate some of the biases associated with convenience sampling.

A consecutive sample is particularly valuable when it involves observing the entire available population over an extended duration, encompassing seasonal fluctuations or other significant temporal changes relevant to the research question. This sampling method is also beneficial for capturing the occurrence of a specific characteristic or phenomenon within a designated sample. Additionally, such studies play a crucial role in identifying connections between various phenomena. In this study, 119 participants were consecutively sampled based on established criteria. This criterion helps to ensure that the sample consists of individuals with a specific characteristic (type 2 diabetes) and excludes those who may have different treatment regimens or conditions that could potentially confound the results.

Inclusion and Exclusion Criteria

Inclusion

This study included patients diagnosed specifically with T2DM who are receiving primary care as outpatients and are twenty years of age and above. These individuals represent the primary focus of the study, as they constitute a significant portion of the diabetic population managed in outpatient settings.

Exclusion

The following were excluded from the study:

1. Type 1 diabetes mellitus patients

Excluded from the study due to distinct pathophysiological mechanisms and management strategies compared to Type 2 diabetes, ensuring specificity to Type 2 Diabetes Mellitus.

2. Patients on intensive insulin treatment for type 2 diabetes mellitus

Excluded to maintain consistency within the study population, as intensive insulin treatment often involves different clinical characteristics and treatment regimens, potentially confounding study outcomes.

3. Type 2 diabetes mellitus patients who are in-patients

Excluded to maintain the focus on the primary care context, as in-patients may have acute medical conditions or complications requiring hospitalization, which could impact their diabetes management and outcomes differently from out-patients.

4. Patients unable to provide informed consent

Excluded to ensure all participants willingly and knowingly engage in the study, safeguarding their rights and well-being, and maintaining ethical standards.

Data Collection Instrument

The questionnaire includes health literacy instruments, self-management behaviour instruments, and health functioning and diabetes distress instruments.

Self-Management Behaviours

This variable was assessed using Schmitt *et al.* (2022)'s Diabetes Self-Management Questionnaire-Revised. It is a 20-item multidimensional measure that measures areas such as Glucose monitoring, Physical activity, Eating behaviour, Medication intake and Cooperation with the diabetes team. A four-point rating system, ranging from 0 to 3, was used to score the responses. The Self-Management Questionnaire-Revised contains positively and negatively keyed items. Negatively keyed items must be reverse-scored (5, 7, 10, 11, 12,

13, 14, 15, 16, 18 and 20) so that higher values indicate more optimal self-management behaviours before summing to scale scores. For improved understanding and comparison, the raw scores were changed to a range of 0-10 by dividing the raw score by the highest possible scale total and multiplying by 10. For instance, a glucose management subscale score of 12, transformed to 8/10, indicates behaviour, with a score ≤ 5 suggesting suboptimal self-management (Schmitt *et al.*, 2022). The overall reported Cronbach $\alpha \approx .87$, and the five subdomains: Glucose monitoring = 82, Physical activity = 80, Eating behaviour = .78, Medication intake = 75 and Cooperation with the diabetes team = 67.

Health Literacy

The study utilised the Diabetes Health Literacy Scale (DHLS), which was created by Lee *et al.* in 2018, to evaluate health literacy. This instrument is specifically designed to measure health literacy related to diabetes. It consists of 14 items that participants rated on a five-point Likert type scale, ranging from 1 (never) to 5 (always). Informational, numerical and communicative are the three subscales that make up this scale.

To determine the scale score, the responses are averaged, and an average item score of 3 or above indicates an optimal level. This instrument has demonstrated strong psychometric qualities; during the initial development of the scale, the total scale Cronbach's alpha coefficient was found to be .89, as well as that of the three subscales: .85 for communicative, .85 for numeracy, and .85 for informational. In a subsequent study by Lee *et al.* in 2021, DHLS was reported as .93, indicating strong internal consistency.

Diabetes Distress

The DDS 17, a measure created in 2005 by Polonsky and associates, was used to assess the degree of distress associated with diabetes. This instrument consists of 17 items and is measured from 1 to 6. An overall diabetes distress level and four subscale scores, each measuring a distinct form of distress, are provided by the DDS 17. The 17-item scale's overall Cronbach's alpha coefficient was reported as being .93, suggesting good internal consistency. The subscales demonstrated good internal consistency as well, with alpha values of .88 for Emotional Burden (EB), .88 for Physician-related Distress (PD), .90 for Regimen-related Distress (RD), and .88 for Interpersonal Distress (ID).

Health Functioning

The WHODAS 2.0 is a global assessment tool developed by the World Health Organisation to measure disability (Üstün *et al.*, 2010). Initially designed for adults, it is now utilised for children and youth. The assessment evaluates six key life domains: Participation, Life activities, Getting along, Cognition, Self-care, and Mobility. The 12-item version of WHODAS 2.0 is a condensed form of the original 36-item version and has α of .98. the final score is scaled from 0 to 100. This tool is rated on a 5-point Likert scale (ranging from 0= no response to 4= extreme) to assess respondents' agreement with specific claims about themselves. Higher scores indicate a greater level of disability, potentially accompanied by mental health issues, while lower scores suggest minor or no impairment.

Ethical Consideration

The data collection procedure complied with ethical standards. Ethical approval from the Ethical Review Board at the College of Education Studies of UCC (CES/ERB/UCC/EDU/V6/22-149) was obtained. An informed consent form was given to participants, outlining the research's objectives and requesting their voluntary participation. They included information on data collection's benefits, drawbacks, and potential risks. Since no personal information was gathered, participant anonymity was guaranteed. Participants received assurances that their information would not be disclosed to third parties while maintaining confidentiality. The researcher safely kept the data that was gathered and intended to keep it for five years before discarding it. These measures demonstrate a commitment to ethical conduct, respecting participants' rights, privacy, and confidentiality.

Data Collection Procedures

Patients who visited the University of Cape Coast Hospital's diabetes clinic participated in the data collection, which lasted for approximately two months. Each questionnaire required 20 to 30 minutes to complete. The study was briefly described, and the survey instrument was given out to those who gave their permission to take part in the research, which was conducted solely in English. For participants who faced difficulties understanding the questionnaire, the researcher and two assistants provided explanations and interpretations as needed. Participants who were not formally educated could speak and understand Fanti as a result, the two field assistants who are indigenes translated from English into Fanti for these participants. The surveys were filled

out and then submitted to the investigator. Since the surveys did not contain identifiable details, information gathered was kept private and anonymous.

Data Processing and Analysis

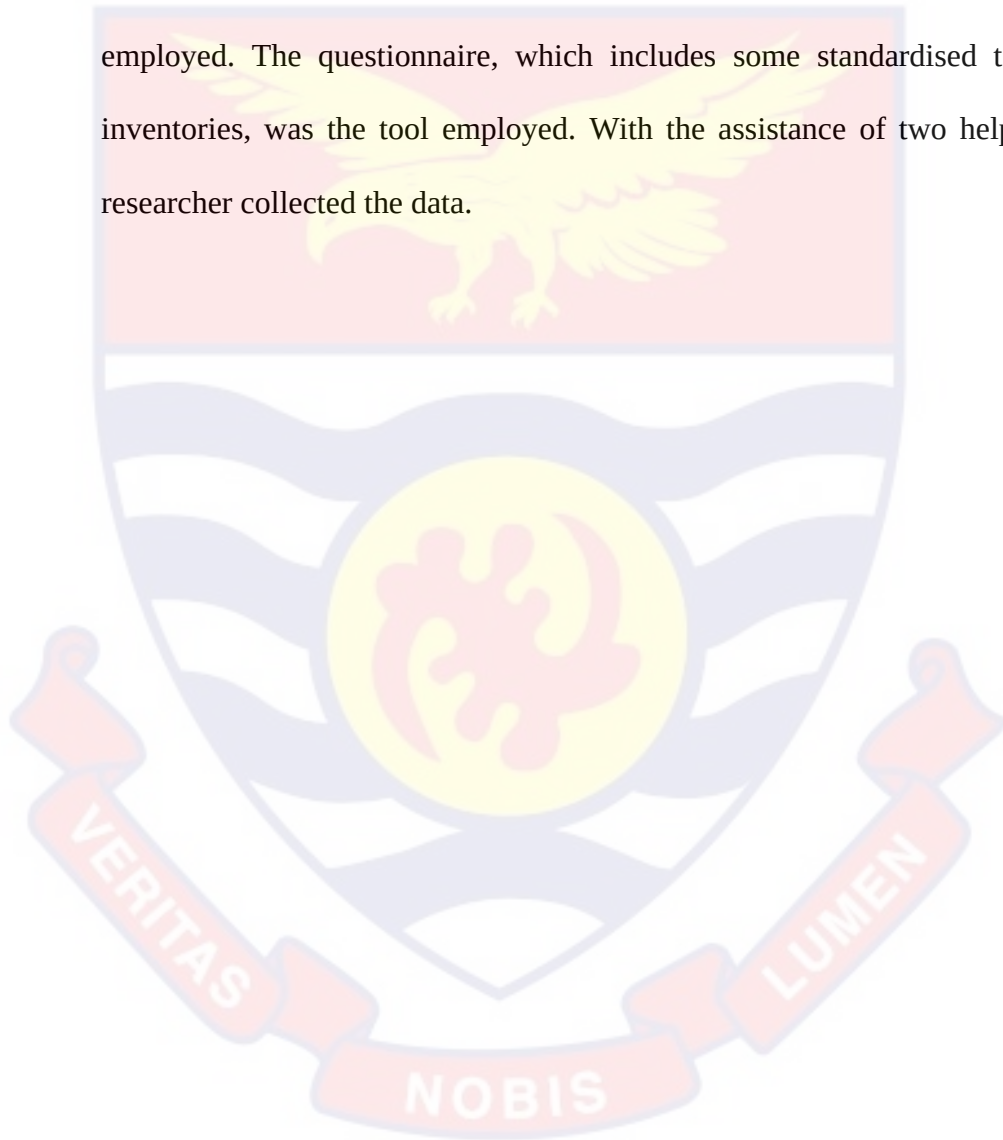
Since this study generated data that was quantitative, statistical methods were used to analyse them. IBM SPSS Statistics v.26 was used to arrange and classify the survey data. Descriptive statistics in terms of percent and frequency were used to analyse the demographic data of the patients and some aspects of the research question. *The research questions were analysed using means and standard deviation. The hypothesised model's hypotheses were tested using a partial least structural equation modelling technique (PLS-SEM).* SEM provides a comprehensive framework to assess the proposed model and evaluate its strength and significance of relationships for a better appreciation of the complex interrelationships among variables in this study. SEM involves two key components: the measurement model and the structural model. The measurement model focuses on the observed variables (indicators) and their underlying latent constructs. It establishes the relationships between the observed variables and their respective latent constructs, which are not directly measurable but inferred from the observed variables.

On the other hand, the structural model examines the relationships between the latent constructs, representing the hypothesised relationships outlined in the model. It allows the direct and indirect effects of the latent constructs on each other to be analysed. A sufficient sample size and a well-defined theoretical model are typically needed to perform SEM. The analysis involves estimating parameters, such as factor loadings, path coefficients, and error variances. By utilising SEM in this study, the relationships and hypotheses

proposed in the theoretical model were statistically tested, providing insights into the complex interplay between the variables of interest.

Chapter Summary

The study employed a cross-sectional research design, and 119 people made up the sample size. Consecutive sampling was the sampling technique employed. The questionnaire, which includes some standardised tests and inventories, was the tool employed. With the assistance of two helpers, the researcher collected the data.



CHAPTER FOUR

RESULTS AND DISCUSSION

Introduction

This chapter presents the outcomes of the analysis of the data gathered. This investigation focused on health literacy, diabetes distress, self-management behaviours, and health functioning in persons with T2DM.

Demographic Information

The demographic information of patients comprises age, duration of the condition, educational attainment, gender and employment status. Table 1 displays the findings.

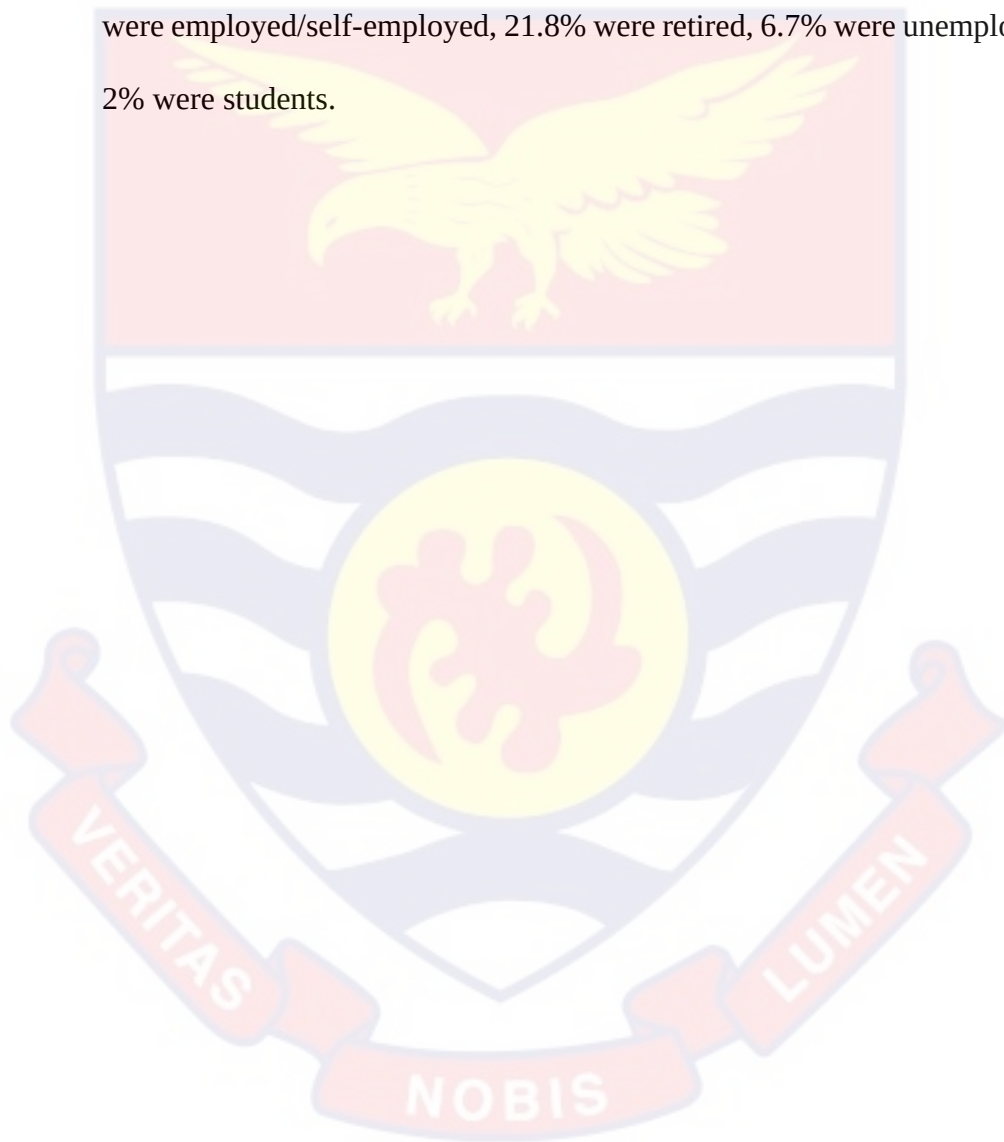
Table 1: Distribution of Demographic Information of the Participants

	M±SD	
Age	51.93±12.006	
Duration of condition	8.66±6.810	
	Frequency	Percent
Level of education		
No Formal Education	11	9.2
Primary	8	6.7
J.H.S	10	8.4
S.H.S	36	30.3
Tertiary	54	45.4
Gender		
Male	62	52.1
Female	57	47.9
Employment status		
Employed/self-employed	83	69.7
Retired	26	21.8
Unemployed	8	6.7
Student	2	1.7

Source: Field Survey (2023)

The findings, as presented in Table 1, illustrate an average age of 51.93 for the patients and the patient have been living with diabetes for an average of

8.66 years. Also 45.4% have Tertiary education, 30.3% attended Senior High School, 8.4% attended Junior High School, 6.7% attended primary school and 9.2% have no formal education. The analysis further indicates that 52.1% of the diabetic patients were males and 47.9% were females. In terms of the employment status of the patients, the results show that 69.7% of the patients were employed/self-employed, 21.8% were retired, 6.7% were unemployed and 2% were students.



Analysis of Research Questions

Research question one

This research question explored health literacy among individuals with type 2 diabetes.

Table 2: Descriptive Analysis for Diabetes Health Literacy

Diabetes Health Literacy (DHL)	<i>M</i>	<i>SD</i>
Informative Health Literacy	3.398	.858
Numeracy Health Literacy	3.386	.944
Communicative Health Literacy	3.801	1.002
DHL score	3.481	.754

Source: Field Survey (2023)

The results for the sub-dimensions and overall score for diabetes health literacy are presented in Table 2. The results show that the patients have good Informative Health Literacy ($M = 3.398$, $SD = .858$), good Numeracy Health Literacy ($M = 3.386$, $SD = .944$) and a good Communicative Health Literacy ($M = 3.801$, $SD = 1.002$). The overall diabetes health literacy score suggests good diabetes health literacy ($M = 3.481$, $SD = .754$).

Table 3: Level of Diabetes Health Literacy

	Frequency	Percent
Low HL	7	5.9
Moderate HL	59	49.6
High HL	53	44.5

Source: Field Survey (2023)

Observations reveal that 5.9% of the patients scored low in diabetes health literacy, 49.6% had a moderate score, and 44.5% scored high.

Research question two

Type 2 diabetes disease-related distress was also investigated in this study.

Table 4: Descriptive Analysis of Diabetes Distress

Diabetes Distress (DD)	Mean score	<i>M</i>	<i>SD</i>
Emotional Burden	Moderate distress or greater= mean score > 2	1.797	.902
Physician-related Distress	Moderate distress or greater= mean score > 2	1.956	.912
Regimen Distress	Moderate distress or greater= mean score > 2	1.923	.961
Interpersonal Distress	Moderate distress or greater= mean score $\geq$ 2	1.787	1.197
DD	Moderate distress or greater= mean score > 2	1.871	.906

Source: Field Survey (2023)

The results for the sub-dimensions and overall score for diabetes distress are presented in Table 4. Regarding the mean score, had low diabetes distress in all the domains of diabetes distress: Interpersonal Distress ($M = 1.787$, $SD = 1.197$), Regimen Distress ($M = 1.923$, $SD = .961$), Physician Distress ($M = 1.956$, $SD = .912$) and Emotional Burden ($M = 1.797$, $SD = .902$), and. The patients also scored low on the overall score of diabetes distress ($M = 1.871$, $SD = .906$). The results were further categorised into two levels (low distress and moderate to severe distress).

Table 5: Level of Diabetes Distress

	Frequency	Percent
Low distress (< 2)	79	66.4
Moderate to severe distress (> 2)	40	33.6

Source: Field Survey (2023)

The outcome indicates that 66.4% patients scored a low level of distress, and 33.6% scored a moderate to severe level of distress.

Research question three

This research question explored the level of self-management behaviours among individuals with type 2 diabetes.

Table 6: Descriptive Analysis for Diabetes Self-management Behaviours

Diabetes Self-Management Behaviour (DSMB)	Range	<i>M</i>	<i>SD</i>
	(5 as cut off point)		
Eating Behaviour	0-10	6.199	1.758
Medication taking	0-10	6.316	2.828
Glucose monitoring	0-10	6.956	2.219
Physical activity	0-10	5.509	2.431
Cooperation with diabetes team	0-10	7.535	1.747
DSMB score	0-10	6.599	1.514

Source: Field Survey (2023)

The results indicate that the patients had a score over the earmarked cut-off point in all the sub-domains of diabetes self-management behaviours. This indicates that the participants have optimum self-management in terms of their Eating Behaviour ($M = 6.199$, $SD = 1.758$), Medication taking ($M = 6.316$, $SD = 2.828$), Glucose monitoring ($M = 6.956$, $SD = 2.219$), Physical activity ($M = 5.509$, $SD = 2.431$) and Cooperation with diabetes team ($M = 7.535$, $SD = 1.747$). The overall self-management behaviour among the patients was optimum ($M = 6.599$, $SD = 1.514$).

Research question four

The fourth question assesses the health functioning of persons with type 2 diabetes.

Table 7: Descriptive Analysis for Health Functioning

Health Functioning (HF)	Range	M	SD
Mobility	0-100	24.895	28.723
Life Activities	0-100	18.802	23.743
Cognition	0-100	17.542	24.589
Participation	0-100	24.159	27.508
Self-Care	0-100	15.651	26.150
Getting Along	0-100	14.601	24.100
HF score	0-100	19.275	23.362

Source: Field Survey (2023)

The findings were scaled from 0 to 100, with 100 representing total impairment and 0 representing complete functioning or no disability. The outcomes demonstrate that the patients function at their best in the following domains: Getting Along ($M = 14.601$, $SD = 24.100$), Self-Care ($M = 15.651$, $SD = 26.150$), Cognition ($M = 17.542$, $SD = 24.589$) and Life Activities ($M = 18.802$, $SD = 23.743$). The overall health functioning score suggests full functioning ($M = 19.275$, $SD = 23.362$).

Research Hypotheses Testing

PLS-SEM was used to achieve the goal of inferential statistics, which is to make generalisations about a population based on the study's hypotheses. This was accomplished by first analysing the measurement instrument and then the structural model. The Partial Least Squares Structural Equation Modelling (PLS-SEM) is an analytical procedure used to analyse relationships between variables in research. It involves two main steps: the measurement model and the structural model. The measurement model examines the relationships between latent variables (unobservable constructs) and their indicators (measurable variables). PLS-SEM evaluates the strength and significance of these relationships, allowing researchers to understand how well the indicators represent the underlying constructs.

Assessment of the measurement model

The evaluation of measuring models includes determining the validity and reliability of construct measurements. This assessment utilises some measurement contingent upon whether a conceptual framework is examined formatively or reflectively; consequently, the latter is utilised based on the conceptual framework of this study. As a result, in reflective measurement, the examination of validity (i.e., discriminant validity and convergent) and reliability (i.e., internal consistency reliability and indicator reliability) is necessary.

Indicator reliability

The item outer loadings are primarily used in PLS-SEM to examine the reliability of the measuring items of a specified construct. Thus, to guarantee

the indicator reliability of a concept, the indicator outer loadings must be greater than .7. Nonetheless, outer loadings with relatively weaker indicators are retained in some cases due to their influence (Hair *et al.*, 2021). Figure 1 shows that all measuring items loaded above the acceptable threshold set by the various authors for the application and evaluation of PLS-SEM results in research (Hair *et al.*, 2019), with a minimum loading of .647 and .957 as the maximum loading. As a result, the ultimate model provided below (Figure 3) represents the base for further examination of the structural model.

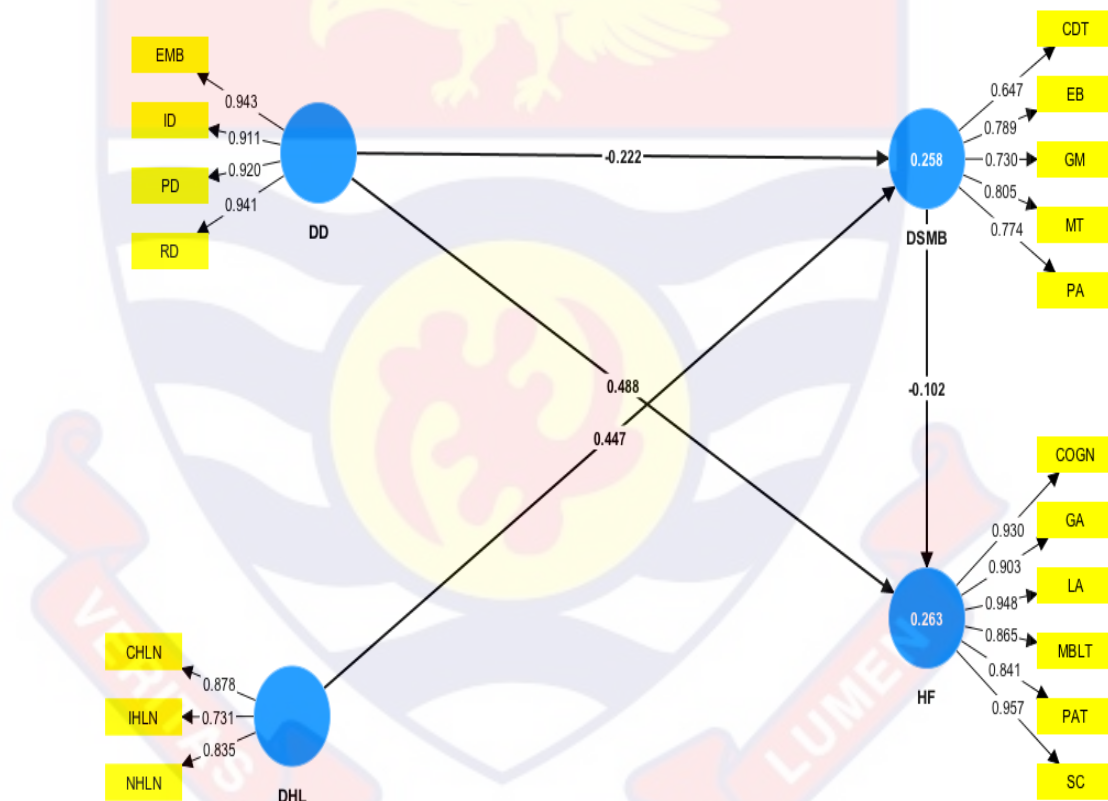


Figure 2: Indicator outer Model Assessment Output

Source: Field Survey (2023)

*Reliability and validity measure***Table 8: Reliability and Validity Output of Indicators**

Variables	Outer Loadings	α	rho_c	AVE
Diabetes Health Literacy (DHL)		.757	.856	.667
Communicative Health Literacy (CHL)	.878			
Informative Health Literacy (IHL)	.731			
Numeracy Health Literacy (NHL)	.835			
Diabetes Distress (DD)		.947	.962	.863
Emotional Burden (EMB)	.943			
Interpersonal Distress (ID)	.911			
Physician-related Distress (PD)	.920			
Regimen Distress (RD)	.941			
Diabetes Self-Management Behaviours (DSMB)		.805	.866	.564
Cooperation with diabetes team	.647			
Eating Behaviour (EB)	.789			
Glucose Monitoring (GM)	.730			
Medication Taking (MT)	.805			
Physical Activity (PA)	.774			
Health Functioning (HF)		.957	.966	.825
Cognition (COGN)	.930			
Getting Along (GA)	.908			
Life Activities (LA)	.948			
Mobility (MBLT)	.865			
Participation (PAT)	.941			
Self-care (SC)	.957			

Source: Field Survey (2023)

Internal consistency reliability

This is primarily a metric premised on the correlations between separate test items (Hair *et al.*, 2019). Cronbach's alpha (α), composite reliability (rho_c), and the item outer loadings are used to assess the construct's reliability.

The rule of thumb for all the reliability criteria must be greater than .70 (Sarstedt *et al.*, 2022). Because indicators are not all evenly reliable, weighted composite reliability is more accurate than unweighted Cronbach alpha, and thus rho_c is assessed and reported accordingly in Table 8:. As presented in the Table, the majority of the items used to measure the various constructs loaded above .70 (i.e., .647 as the minimum indicator loading and .957 as the highest outer loadings of all the measurement items), thus meeting the first criterion for internal consistency reliability.

Again, the α and rho_c total scores are represented as the second and third metrics in determining the reliability of the measurement items of this study, respectively. As shown in Table 8, the α scores for DHL=.757, DD= .947, DSMB= .805 and HF= .957, all of which are greater than the .70 threshold established by Hair *et al.* (2014). The final and most important criterion for internal reliability assessment was the rho_c, which was (DHL=.856, DSMB=.870, DD=.962, HF .966), as shown in Table 8.

Convergent validity

This refers to how two metrics of concepts that should be related philosophically are related (Taherdoost, 2016). In PLS-SEM, convergent validity is frequently assessed using the Average Variance Extracted (AVE). The AVE is calculated by averaging a construct's indicator reliabilities. This metric analyses the average variance shared by the concept and its measurements. The criterion for AVE is that the value must be 0.5 in numerical terms or 50% in proportionate terms or greater (Fornell & Larcker, 1981; Sarstedt *et al.*, 2019). The AVE values in Table 8 show no convergent validity problem because all constructs scored an AVE score greater than the Fornell

and Larcker (1981) criterion .5. (i.e., DD=.863, DHL= .667, DSMB= .564 and HF= .825).

Discriminant validity

Whenever the amount of variance inside a construct (AVE) surpasses the shared variance between the constructs, discriminant validity is proven. The Heterotrait-monotrait (HTMT) causal connection ratio is the technique used to evaluate discriminant validity (Henseler *et al.*, 2015). Discriminant validity (DV) measures a construct's uniqueness. Many researchers (e.g., Bossman & Agyei, 2022; Hair *et al.*, 2020) tested their HTMT results using cut-off numbers such as .85 and .90.

Table 9: Heterotrait-Monotrait Ratio (HTMT) Output

	DD	DHL	DSMB	HF
DD				
DHL	.120			
DSMB	.282	.563		
HF	.525	.062	.242	

Source: Field Survey (2023)

The outcome indicates that all causal links met the required values of less than .85 or .90, hence a distinctness from one another.

Assessment of the structural model

The study used Smart PLS 4.0 to evaluate the hypotheses proposed after adopting a satisfactory measurement model. For the path model, 5000 replications were used for bootstrapping analyses. According to Hair *et al.* (2016), the resulting test statistic, that is, effect size (f^2), coefficient of determination (R^2) and the variance inflation factor (VIF), reports the model's

collinearity, path coefficient, and significance, were evaluated to supplement the merit of the research's objectives examined.

Assessment of common method variance (CMV)

Common method variance refers to comorbidity between metrics of different constructs generated by identical measurement modalities instead of the constructs themselves (Brannick *et al.*, 2010). This study employed the VIF in testing for every measure's error probability. Table 10 shows the lateral collinearity test results for the four constructs used in this study.

Table 10: Collinearity Statistics (VIF)

	VIF
DD → DSMB	1.012
DD → HF	1.078
DHL → DSMB	1.012
DSMB → HF	1.078

Source: Field Survey (2023)

The outcome for collinearity in all constructs is less than 3, that is, VIF scores of 1.012, 1.078, 1.012 and 1.078 for DD → DSMB, DD → HFDHL → DSMB and DSMB → HF respectively, implying that multicollinearity among constructs is not an issue in this study (Kock, 2014).

Path coefficient (β)

The path coefficients (β) inside the measurement models are normalised values ranging from 0 to .10, .11 to .30, .30 to .50, and >.50 are indicative of weak,

modest, moderate, and strong effect sizes, respectively (Hair *et al.*, 2021; Hair & Almer, 2022).

Table 11: Path Coefficient

	DD	DHL	DSMB	HF
DD			-.222	.488
DHL			.447	
DSMB				-.102
HF				

Source: Field Survey (2023)

The outcomes are shown in Table 11 and Fig. 2, the β value for DD $\rightarrow$ DSMB = -.222 (modest effect), DD $\rightarrow$ HF = .488 (moderate effect), DHL $\rightarrow$ DSMB = .447 (moderate effect) and DSMB $\rightarrow$ HF = -.102 (weak effect). As a result, all of the theorised paths outlined in the predictor constructs are statistically considerable.

Table 12: Output of the Structural Model Analysis

IV $\rightarrow$ DV	R ²	Adjusted R ²	f ²	Q ²
DD $\rightarrow$ DSMB	.270	.258	.067	.227
DD $\rightarrow$ HF	.275	.263	.304	.240
DHL $\rightarrow$ DSMB	.270	.258	.272	.227
DSMB $\rightarrow$ HF	.275	.263	.013	.240

Source: Field Survey (2023)

Coefficient of determination (R²)

After ensuring that the model lacks collinearity concerns and that the connections are significant, the following process evaluates the R² significance

in the result (Hair & Alamer, 2022). This forecast represents the variance described by the exogenous constructs in the output. Hair *et al.* (2019) established that R^2 values between 0 to .10, .11 to .30, .30 to .50, and $> .50$ are indicative of weak, modest, moderate, and strong explanatory power, respectively. The R^2 values shown in Table 11 demonstrate that DD, as a predictor construct, has a modest descriptive value of .270 or 27% over DSMB in the relationship between DD and DSMB. Again, as displayed in the Table, DD as a predictor construct had a modest (.275 or 27.5%) interpretative power over HF in the DD $\rightarrow$ HF relationship and DSMB as a predictor construct also had a modest (.275 or 27.5%) interpretative power over HF in the DSMB $\rightarrow$ HF relationship. Finally, the R^2 score for the relationship between DHL and DSMB showed that DHL had a modest explanatory influence over DSMB [$R^2 = .270$ (27%)].

Effect size (f^2)

The effect size (f^2) component of SEM analysis assesses the effect of the causative concept on the intrinsic one (Cohen, 1988). The f^2 is used in this study to determine whether the prescribed causative latent factors significantly influence the consequent variables (Tolliver *et al.*, 2020). Cohen (1988) suggested the preceding rough guidelines: A score less than .02 indicates no effect, .02 - .15 indicates a small effect size, .15 - .35 indicates a medium-sized effect and greater than .35 indicates a large effect size.

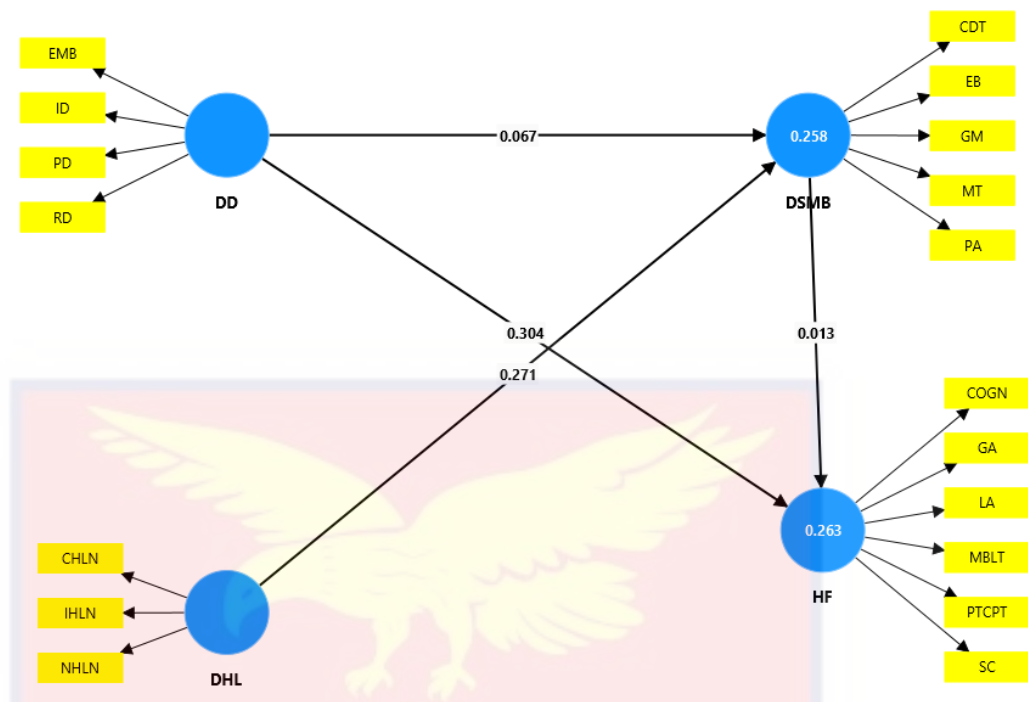


Figure 3: Effect Size

Source: Field Survey (2023)

The f^2 scores presented in Table 12 and Figure 3 range from $f^2 = .013$ for $DSMB \rightarrow HF$, $f^2 = .067$ for $DD \rightarrow DSMB$, $f^2 = .271$ for $DHL \rightarrow DSMB$ and $f^2 = .304$ for $DD \rightarrow HF$, depicting no effect, small effect size and medium-sized effect respectively (Hair *et al.*, 2016).

Predictive relevance (Q^2)

The Q^2 indicates the data sets of reflective metrics exogenously in models, allowing the prognostic significance of a specified latent variable endogenously to be assessed (Russo & Stol, 2021). Predictive precision can be low ($Q^2 < 0$), medium ($Q^2 > .25$), or strong ($Q^2 > .50$) (Hair *et al.*, 2019). Table 8 shows the Q^2 prediction outcomes: $Q^2 = .227$ for the relationship between DD and DSMB, $Q^2 = .240$ for the relationship between DD and HF, $Q^2 = .24$ for the relationship between DSMB and HF, and $Q^2 = .227$ for the relationship between

DHL and DSMB indicating low and acceptable predictive relevance (Henseler *et al.*, 2009).

Results of evaluation of structural model

The structural model indicates the causal relationships between the latent variables.

Significance of the structural model

After confirming the model's predictive and explanatory strength, the last step is to evaluate the statistical importance and applicability of the coefficients of the suggested structural paths in the model (Hair *et al.*, 2018).

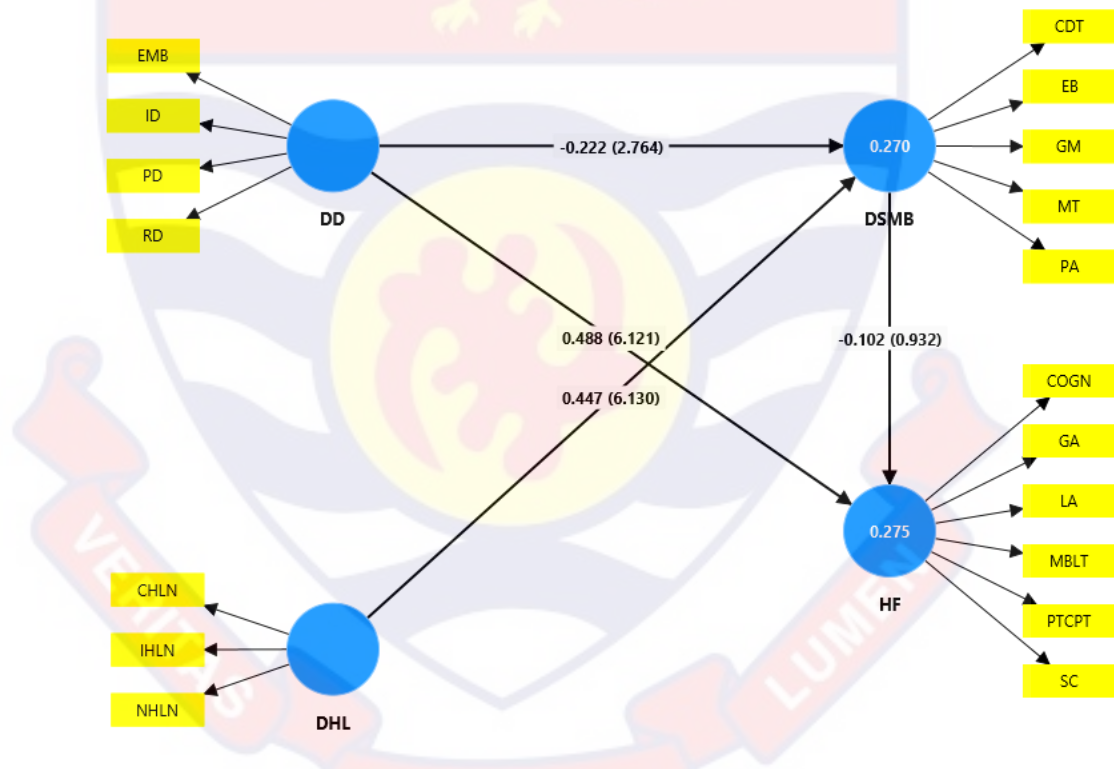


Figure 4: Significance level

Source: Field Survey (2023)

According to the t-statistic and p-values, all of the variables considered for this study, only three (3) were statistically significant. *The t-statistic values recommended by Hair et al. (2014) were used to report the results.* They indicated that t-stat values greater than 1.96 has a significant coefficient at a

certain significant level. In addition, the path coefficients were outlined using Cohen's (1988) criteria. He proposed that a correlation coefficient (R) of .10 indicates a weak or small correlation, a correlation coefficient of 0.30 indicates a moderate correlation and a correlation coefficient of 0.50 indicates a large or strong correlation.

Table 13: Significance and Size of Structural Model Coefficient

	β	<i>SD</i>	<i>T</i>	<i>p</i>	Remarks
DD → DSMB	-.222	.080	2.764	0.006	Supported
DD → HF	.488	.080	6.121	0.000	Supported
DHL → DSMB	.447	.073	6.130	0.000	Supported
DSMB → HF	-.102	.109	.932	0.351	Not supported
DD → DSMB → HF	.023	.029	.785	0.433	Not supported

Source: Field Survey (2023)

Hypothesis one

The first hypothesis assumed that: diabetes health literacy will influence diabetes self-management behaviour. The result, as presented in Table 13 showed that the effect of diabetes health literacy (DHL) on diabetes self-management behaviour (DSMB) ($\beta = .447$, $p < .001$) was significant. This means that hypothesis one was supported. The findings indicate that persons with type 2 diabetes may exhibit better self-management behaviours if they possess a high level of diabetic health literacy.

Hypothesis two

The second hypothesis postulated that diabetes distress will influence a) diabetes self-management behaviours and b) health functioning. The result

showed that the effects of diabetes distress (DD) on both diabetes self-management behaviours (DSMB) ($\beta = -.222, p = .006$) and health functioning (HF) ($\beta = .488, p < .001$) were significant. This means that hypotheses 2(a) and 2(b) were both supported. The results show that an increase in diabetes distress will impair or deteriorate diabetic self-care and increase impairment in persons with type 2 diabetes.

Hypothesis three

The third hypothesis assumed that: diabetes self-management behaviour will influence health functioning. The result as presented in Table 13 showed that the effect of diabetes self-management behaviour (DSMB) on health functioning (HF) ($\beta = -.102, p = .351$) was not significant. This means that hypothesis 3 was not supported.

Hypothesis four

The fourth hypothesis assumed that diabetes self-management behaviours will mediate the relationship between diabetes distress and the health functioning of people with T2DM. The findings revealed that the indirect effect of diabetes distress on the health functioning of people with type 2 diabetes was not significant ($\beta = .023, p = .433$). This indicates that diabetes self-management behaviours is not a significant mediator. Although the hypothesis is not supported, it can be termed Direct-only non-mediation. This is because the direct effect is significant ($\beta = .488, p < .001$), but not the indirect effect ($\beta = .023, p = .433$) (Hair *et al.*, 2021).

Discussion of Findings

Diabetes health literacy

A key determinant of the standard of care provided to individuals with chronic illnesses like diabetes is health literacy. To treat these illnesses effectively, patients must be committed to patient-centred care and can understand health information to engage in treatment actively. The study found that participants exhibit optimal health literacy across various domains of diabetes health literacy (informative, numeracy and communicative). Moreover, a substantial majority of participants demonstrated adequate diabetes health literacy, with only a small proportion exhibiting low levels of health literacy. These findings align with those of Singsalasang *et al.* (2022) and Tefera *et al.* (2022), who indicated that a majority of participants possessed sufficient health literacy pertaining to diabetes.

Conversely, the present study's findings differ from those reported by Azreena *et al.* (2016), who found that most individuals with type 2 diabetes had limited health literacy. Likewise, Souza *et al.* (2014) revealed that many type 2 diabetic patients exhibited functional health literacy below the adequate level. The contrasting results between the present research and those reported by Azreena *et al.* (2016) and Souza *et al.* (2014) could be attributed to differences in data collection instruments. In the present study, a diabetes-specific instrument tailored for assessing diabetes health literacy was employed. Conversely, Azreena *et al.* (2016) and Souza *et al.* (2014) employed a more general health literacy instrument for the broader population.

Diabetes distress

Living with diabetes can present significant challenges and demands, predisposing individuals to experience emotional burdens associated with managing the condition. This investigate wanted to determine the degree of diabetes distress felt by individuals with diabetes.

On average, participants reported low levels of diabetes distress across all domains examined, including Emotional Burden, Physician Distress, Regimen Distress, and Interpersonal Distress. Furthermore, the overall score of diabetes distress was also relatively low on average. This suggests that, as a whole, the participants did not experience high levels of distress related to their diabetes. Analysing the data further, the study found that most patients (66.4%) reported low levels of distress, indicating they were coping relatively well with the emotional challenges of managing their diabetes. However, it is important to indicate that a notable portion of patients (33.6%) reported moderate to severe levels of distress, highlighting the presence of significant emotional burdens in a subgroup of individuals.

Similar outcomes were stated by Aljuaid *et al.* (2018), who revealed that 25% of patients experienced moderate to high levels of distress, while the majority exhibited lower levels. Similarly, Al-Otaibi *et al.* (2021) reported a prevalence of 35.6% for moderate to severe distress in their sample of diabetic patients. These findings suggest that a substantial number of individuals with diabetes experience emotional challenges related to their condition, but a majority still manage to maintain lower levels of distress.

Alternatively, the results of the current study diverge from those reported by Hu *et al.* (2020), who observed severe diabetes distress across the

various domains among patients. It is important to note that Hu *et al.* (2020) included participants who were on hospital admission, which may account for the higher levels of distress observed. Additionally, Bhaskara *et al.* (2022) reported that the majority of their diabetic patients, 90.81%, experienced diabetes-related distress. However, Bhaskara *et al.* (2022) had a larger sample size compared to the present study and included patients who were undergoing intensive insulin treatment, which might contribute to the differences in distress levels observed.

Diabetes self-management behaviours

In diabetes treatment, self-management is vital in minimising the risk of developing complications. It has been demonstrated to enhance glycaemic control and prevent the emergence of complications, making it a fundamental component of diabetes care (Shrivastava *et al.*, 2013). The objective of the present study was to assess the level of self-management behaviours among patients with type 2 diabetes.

The findings of the study indicated that the patients demonstrated an optimal level of diabetes self-management across all subdomains. This means that the diabetic patients exhibited effective self-management behaviours regarding their eating habits, medication adherence, glucose monitoring, physical activity, and cooperation with the diabetes healthcare team.

These outcomes are in line with the published results by Huang *et al.* (2014), who noticed excellent selfcare practices in clients with T2DM in China. However, the current study's findings are not consistent with several other reports. For instance, Paudel *et al.* (2022) reported a low prevalence of self-care behaviours among individuals with type 2 diabetes in South Asia. About half of

patients with diabetes in Ethiopia exhibited suboptimal self-management, according to Habebo *et al.* (2020). Similarly, Ji *et al.* (2014) suggested that self-management behaviours and glycaemic control among individuals with type 2 diabetes were poor.

The discrepancy in findings across studies may be ascribed to methodological approach variations. For instance, Habebo *et al.* (2020) and Paudel *et al.* (2022) conducted meta-analyses and systematic reviews that drew findings from a considerable number of studies, allowing for a broader perspective on self-management behaviours. In contrast, the present study focused on a specific cohort of patients; this could have caused the variations in the results.

Health functioning

Diabetes substantially influences a person's everyday life, social connections, psychological well-being, and physiological well-being (Hu *et al.*, 2010). To provide complete treatment, it is essential to comprehend the degree of health functioning in persons with T2DM. Thus, this research investigated the extent of health functioning in these persons.

The investigation revealed a surprising outcome—patients with T2DM reported low levels of impairment in the overall score, indicating a relatively good level of health functioning. This means that, on average, these patients were able to maintain a satisfactory level of functioning across multiple domains. Notably, they displayed particularly strong functioning in areas such as interpersonal interactions (getting along with others), self-care activities (including hygiene, dressing, and eating), cognitive abilities (such as

understanding and communicating), and life activities (such as managing domestic responsibilities).

These findings contradict a substantial body of empirical evidence suggesting that individuals with diabetes often experience significant impairments in their overall health functioning. For instance, Wong *et al.* (2013) findings demonstrated that diabetic patients will experience mobility limitations, experience difficulties with core activities, and face challenges in performing daily tasks. Similarly, Sinclair *et al.* (2008) found a clear impairment in the physical function of individuals with diabetes. Furthermore, Breton *et al.* (2013) investigated the impact of diabetes on workforce productivity and observed a higher likelihood of early retirement among those with diabetes.

The discrepancies between the present study and existing evidence may stem from differences in research methodology. Wong *et al.* (2013) employed a systematic review, which aggregates data from multiple studies, possibly contributing to the inconsistencies. Additionally, assessing the physical function of diabetic patients was the primary concentration of Sinclair *et al.* (2008) and Breton *et al.* (2013). In contrast, this research took a broader perspective by examining health functioning across multiple domains.

Health literacy and self-management behaviours

Effective management of illnesses like diabetes relies heavily on health literacy. When it comes to diabetes, comprehending and applying crucial health information, such as medication dosages and dietary recommendations, is crucial for successful disease management. The present study investigated the relationship between diabetes health literacy and diabetes self-management

behaviour. The findings supported the hypothesis, revealing a direct positive effect of diabetes health literacy on diabetes self-management behaviour.

These findings are in line with those of Rachmawati *et al.* (2019) and ALSharit and Alhalal (2022), who also reported a positive association. This suggests that individuals with optimal diabetes health literacy are more likely to exhibit improved glucose control, enhanced medication adherence, appropriate dietary behaviour, adaptive physical activity, and better cooperation with their healthcare providers.

These results have significant ramifications for diabetes patients' general health and well-being. When individuals possess a high level of health literacy, they are better equipped to understand and implement the necessary self-management behaviours, leading to improved health outcomes. Individuals can better control their blood glucose levels and minimise the risk of complications by actively engaging in selfcare practices, i.e. adhering to regimens, following nutritional guidelines, as well as maintaining an active lifestyle.

Both the SCT and the HLM provide complementary explanations for the positive impact. They highlight the importance of knowledge acquisition, observational learning, self-efficacy, access to information, effective communication, and empowerment in facilitating and sustaining self-management behaviours in diabetes care. For instance, the HLM posits that health literacy influences a person's capability to communicate effectively with healthcare providers. Individuals with higher health literacy are more likely to actively participate in discussions, ask relevant questions, and seek clarification regarding their diabetes management. This proactive engagement facilitates the

exchange of information, shared decision-making, and collaborative goal-setting, all of which contribute to improved self-management behaviours.

Diabetes distress on diabetes self-management behaviours and the health functioning

The current study sought to determine how diabetes distress affected these patients' health functioning and diabetes self-management behaviours. It was revealed that diabetes distress had a negative impact on diabetes self-management behaviours, while it positively influenced the health functioning of individuals with type 2 diabetes. These results indicate that diabetes distress may hinder engagement in self-management behaviours and contribute to increased health impairment among individuals with diabetes. To elaborate on how diabetes distress positively influences health impairment, it means that as levels of diabetes distress increase, so does the impairment in health functioning.

The findings suggesting that diabetes distress impact self-management behaviours and health functioning can be attributed to various factors. Firstly, diabetes distress may lead to feelings of overwhelm and frustration, hindering motivation and effective engagement in self-management tasks (Abbas *et al.*, 2023; Viertiö *et al.*, 2021). Additionally, high distress levels can impair cognitive function, affecting decision-making and adherence to self-care behaviors (Klier & Buratto, 2020; Kulshreshtha *et al.*, 2023). Moreover, chronic stress from diabetes distress may exacerbate physiological symptoms, worsening overall health functioning and impairing self-management capabilities (Morris *et al.*, 2011; Ting *et al.*, 2011). These factors collectively

highlight the multifaceted impact of diabetes distress on individuals' ability to effectively manage their condition and maintain optimal health.

The negative effect aligns with previous findings reported by Amankwah-Poku *et al.* (2020), Gonzalez *et al.* (2016), and Patra *et al.* (2021). Similarly, the increased level of health impairment or disability, indicative of adverse health outcomes, is consistent with the findings of Ascher-Svanum *et al.* (2015), Dalsgaard *et al.* (2014), Chew *et al.* (2015), Kreider (2017) and Schmitz *et al.* (2008). These findings have significant health implications, as diabetes distress can negatively impact an individual's ability to manage their diabetes effectively. This can lead to difficulty adhering to self-care practices. Consequently, compromised self-management behaviours can contribute to long-term problems associated with diabetes (Van Smoorenburg *et al.*, 2019), further affecting overall health. Moreover, individuals experiencing diabetes distress may face challenges in participating in social activities and maintaining effective communication. They may also struggle with self-care and performing basic functional activities, such as dressing or bathing.

The Social Cognitive Theory (SCT) offers a useful paradigm for comprehending how diabetic distress negatively affects self-management practises in people with type 2 diabetes. According to this theory, people's behaviours are influenced by a combination of personal factors, environmental factors, and cognitive processes. The theory suggests that individuals' cognitive processes, including their self-efficacy beliefs, are influenced by their emotions, thoughts, and environmental factors (Bandura, 1977). When diabetes distress is present, it can disrupt these cognitive processes and undermine individuals' confidence in their capacity for efficient self-management.

Self-management behaviours and health functioning

This hypothesis examined the effect of diabetes self-management behaviours on the health functioning of individuals with T2DM. This hypothesis was based on studies conducted by Alsayed Hassan *et al.* (2022), Mikhael *et al.* (2018), and Morgan (2015), which suggested that engaging in self-management behaviours could potentially reduce health impairments or disabilities among these individuals. However, contrary to the initial hypothesis, the study's findings did not support this notion. The results revealed a non-significant negative effect. These findings provide evidence that challenges the assumption that self-management behaviours have a direct positive impact on health functioning in this specific population.

It is essential to recognise that the comparatively limited sample size in the current investigation might have influenced these non-significant findings. The limited sample size could have restricted the statistical power and the ability to detect any potential influence of self-management behaviours on the health functioning of individuals with type 2 diabetes. Therefore, caution should be exercised when generalising these results to a larger population.

However, it is worth noting that these results do not necessarily imply that self-management behaviours are ineffective or irrelevant to the health functioning of individuals with type 2 diabetes. Instead, these findings underscore the need for further research with larger and more diverse samples to better understand the complex relationship between diabetes self-management behaviours and health functioning among individuals with type 2 diabetes. Additionally, there may be other factors not considered in the current

study that could contribute to health functioning outcomes, highlighting the importance of exploring these variables in future investigations.

In the event that the study had identified a significant relationship, the Biopsychosocial Theory could have provided valuable insights and explanations for the findings. In the context of the Biopsychosocial Theory, a significant relationship would align perfectly with the theory's emphasis on the dynamic interaction between biological, psychological, and social factors (Engel, 1977). By engaging in effective self-management behaviours, individuals can positively influence biological processes relevant to diabetes management, such as blood sugar control, medication adherence, and lifestyle modifications. From a psychological standpoint, individuals who effectively manage their diabetes may experience a range of benefits, including reduced stress levels, improved self-perception, and a heightened sense of control over their condition. These psychological improvements can have a direct impact on their overall health functioning.

Moreover, the social aspect plays a significant role as well. Having a supportive social network, access to adequate healthcare resources, and positive interactions with healthcare providers can further enhance self-management behaviours' effectiveness and improve health functioning outcomes. However, it is essential to acknowledge that non-significant findings in the study may indicate that the complex interplay of these biological, psychological, and social factors influences this association. The absence of a significant relationship between self-management behaviours and health functioning suggests that other factors within the biopsychosocial model may exert a stronger influence on health outcomes for this population. These may include additional biological

processes, psychological variables, or social dynamics that were not thoroughly examined in the study.

Mediation effect of diabetes self-management behaviour

Existing literature suggests that diabetic self-care practices could potentially act as a mediating factor between diabetes distress and health functioning. Therefore, in this study, we hypothesised that diabetes self-management behaviours would mediate the connection between diabetes distress and health functioning. However, after analysing the data, the study's findings did not support this hypothesis. Contrary to these expectations, a significant mediating effect was not observed. Although previous research had hinted at the potential role of self-management behaviour in mitigating the adverse effects of diabetes distress on health outcomes, the present study failed to find substantial evidence to substantiate this claim within the specific population under investigation. These unexpected findings prompt further examination and consideration of alternative explanations. Other factors which were unaccounted for in this investigation might play a more influential part in shaping the association.

Additionally, individual differences could contribute to our study's lack of significant mediation. While this study did not reveal a mediating effect, it is crucial to highlight that this does not discount the importance and benefit of self-management behaviours in treating diabetes. Maintaining optimal well-being and health for those with type 2 diabetes depends on effective self-management habits. Further research is warranted to explore additional factors and potential mediators. By gaining a deeper understanding of the complexities underlying these associations, future studies can contribute to developing more

comprehensive interventions and support strategies tailored to the specific needs of individuals with type 2 diabetes, ultimately improving their overall health outcomes.

The Biopsychosocial Theory offers insights into the study's findings despite not supporting the hypothesised mediation. The theory acknowledges the importance of controlling physiological factors like blood sugar and medication adherence in managing diabetes effectively. However, the lack of a significant mediating effect suggests that self-management behaviours may not directly alleviate diabetes distress or its psychological consequences. Psychological factors, such as social support and coping mechanisms, might also impact the association of diabetes distress and health functioning. Future research could explore other social factors, such as social networks or healthcare provider interactions, to better understand their impact on health functioning outcomes.

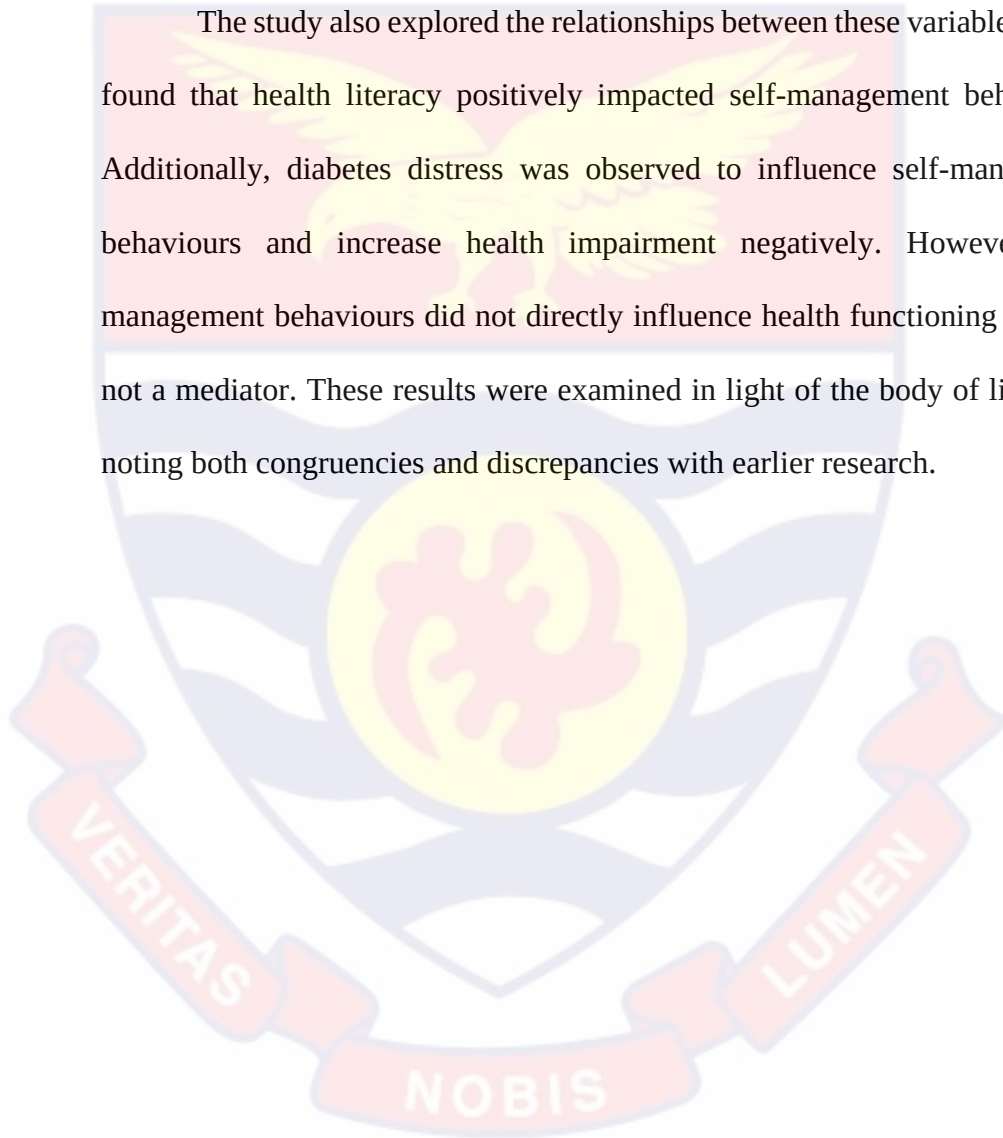
Chapter Summary

Several significant results emerged from the study, shedding light on various aspects of diabetes management. Firstly, the participants demonstrated high health literacy, demonstrating their capacity to comprehend and utilise information related to their health. Secondly, the study revealed that the participants exhibited optimum self-management behaviours. This implies they actively engaged in medication adherence, dietary control, cooperation with their healthcare team, physical activity and glucose monitoring.

Additionally, the findings indicated that the participants reported low levels of diabetes distress, suggesting they experienced minimal emotional burdens related to managing their condition. This is an encouraging result, as

high levels of diabetes distress can hinder self-management efforts and overall well-being. Furthermore, the participants demonstrated good health functioning across various domains, including social interactions, self-care, cognition, and daily life activities. This suggests that their diabetes management did not significantly impair their overall health functioning.

The study also explored the relationships between these variables. It was found that health literacy positively impacted self-management behaviours. Additionally, diabetes distress was observed to influence self-management behaviours and increase health impairment negatively. However, self-management behaviours did not directly influence health functioning and was not a mediator. These results were examined in light of the body of literature, noting both congruencies and discrepancies with earlier research.



CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

The research examined the predictive relationship between health literacy, self-management behaviours, diabetes distress, and health functioning in individuals with type 2 diabetes. This study specifically investigated:

1. Level of health literacy, diabetes distress, self-management behaviours and health functioning
2. Influence of health literacy on their self-management behaviours
3. Influence of diabetes distress on their a) self-management behaviours and b) health functioning
4. Influence of self-management behaviours on their health functioning
5. Mediating effect of self-management behaviours on the influence of diabetes distress on their health functioning

The study's approach was entirely quantitative and used a cross-sectional survey methodology. Consecutive sampling was the method of choice, selecting 119 people with type 2 diabetes. These individuals were asked to complete a 63-item questionnaire that evaluated four variables: diabetes self-management behaviour, diabetes distress, diabetes health literacy, and health functioning.

Summary of Major Findings

Determining the diabetes health literacy level was one of the aims of this study. Diabetes health literacy was found to be optimum among type 2 diabetic patients and was observed in all domains. In relation to diabetes distress, the study's findings indicate that most of the patients recorded low levels of diabetes

distress. On average, patients had low diabetes distress in all the domains of diabetes distress.

The findings indicated that the patients have an optimum level of diabetes self-management behaviours. This suggests that type 2 diabetic patients have an optimum level of self-management regarding their dietary habits, compliance with medications, monitoring of their blood sugar, physical exercise, and collaboration with the diabetes team.

This investigation also sought to evaluate the health functioning of type 2 diabetic patients. The patients had low levels of impairment in all domains of health as well as their overall health functioning. The patient functioned best in the following: getting along, i.e., interacting with other people; self-care, i.e., hygiene, dressing and eating; cognition, i.e., understanding and communicating; and life activities, i.e., domestic responsibilities. Diabetes health literacy was found to influence diabetes self-management behaviours positively. This finding suggests that optimum health literacy in these patients will improve their self-management behaviours.

This study postulated that diabetes distress would influence diabetes self-management behaviours and the health functioning of individuals with type 2 diabetes. The results revealed that diabetes distress had a negative influence on diabetes self-management behaviours and a positive influence the health functioning. This indicates that when diabetic patients have high disease-related distress, they tend to have poor or suboptimal self-management behaviours and increase the likelihood of health impairment. Regarding the influence of diabetes self-management behaviours on the health functioning of individuals with type 2 diabetes, the findings showed a non-significant negative effect. This

means that diabetes self-management behaviours do not influence their health functioning.

Finally, the study also postulated that diabetes self-management behaviour will mediate the relationship between diabetes distress and health functioning. The results indicated that diabetes self-management behaviours did not mediate the effect of diabetes distress on health functioning.

Conclusions

Most people with T2DM appear to possess adequate health literacy, manage diabetes-related distress reasonably well, demonstrate effective self-management behaviours and have good health functioning. The conclusions drawn from these findings suggest that optimising health literacy can enhance self-care practices in persons with T2DM. Additionally, addressing and reducing diabetes distress is crucial for improving health functioning and overall health outcomes in this patient population. While self-management behaviours are important, they may not directly impact health functioning and do not act as a mediator between diabetes distress and overall health outcomes among type 2 diabetic patients. These conclusions indicate the multifaceted nature of diabetes care and the importance of tailored interventions addressing both educational and emotional aspects of the disease management process.

Contributions to knowledge and practice

Knowledge contribution

This study provides a beneficial understanding of health literacy, diabetes distress, health functioning and self-management behaviours in individuals with T2DM. By demonstrating that the majority of these individuals

possess adequate health literacy and manage diabetes-related distress reasonably well, the study adds to our understanding of the strengths and challenges within this population. Additionally, the findings highlight the interconnectedness of these factors, suggesting that optimizing health literacy can enhance self-management behaviours, which in turn can positively influence health functioning. This contributes to the existing body of knowledge on diabetes care by emphasising the importance of addressing both educational and emotional aspects of the disease management process.

Practice implications

The conclusions drawn from this study have significant implications for clinical practice. Healthcare providers can utilise this knowledge to tailor interventions that focus on enhancing these patient's knowledge about illness, reducing distress. By doing so, practitioners can empower patients to better manage their condition and improve their overall health functioning. Moreover, the recognition that self-management behaviours may not directly impact health functioning underscores the importance of comprehensive care approaches that go beyond simply promoting adherence to treatment regimens. Practitioners can integrate strategies aimed at addressing emotional well-being alongside educational efforts to provide more holistic and effective diabetes care.

Recommendations

1. The existing protocols at the UCC Hospital, which the Diabetes Clinic has applied, should be further enhanced to optimise health literacy and self-management behaviours. Additionally, the diabetologist, medical

officers, and nurses in the Diabetes Clinic should strengthen efforts to reduce diabetes distress and health impairment.

2. Although there is optimal health literacy and self-management behaviours and low-level diabetes distress and health impairment among type 2 diabetic patients, it is recommended that the University of Cape

Coast Health Directorate should sanction a periodic screening to identify a) patients with suboptimal health literacy, b) patients who are struggling with their self-management behaviours, c) patients with moderate to severe diabetes distress and d) patients with poor health functioning.

3. To promote optimal diabetes self-management, healthcare providers should prioritise health literacy education and support for individuals with diabetes. This may involve providing clear and accessible health information, utilising visual aids and plain language, and offering tailored educational programs. By empowering individuals with diabetes to improve their health literacy, healthcare professionals can facilitate better self-management practices.

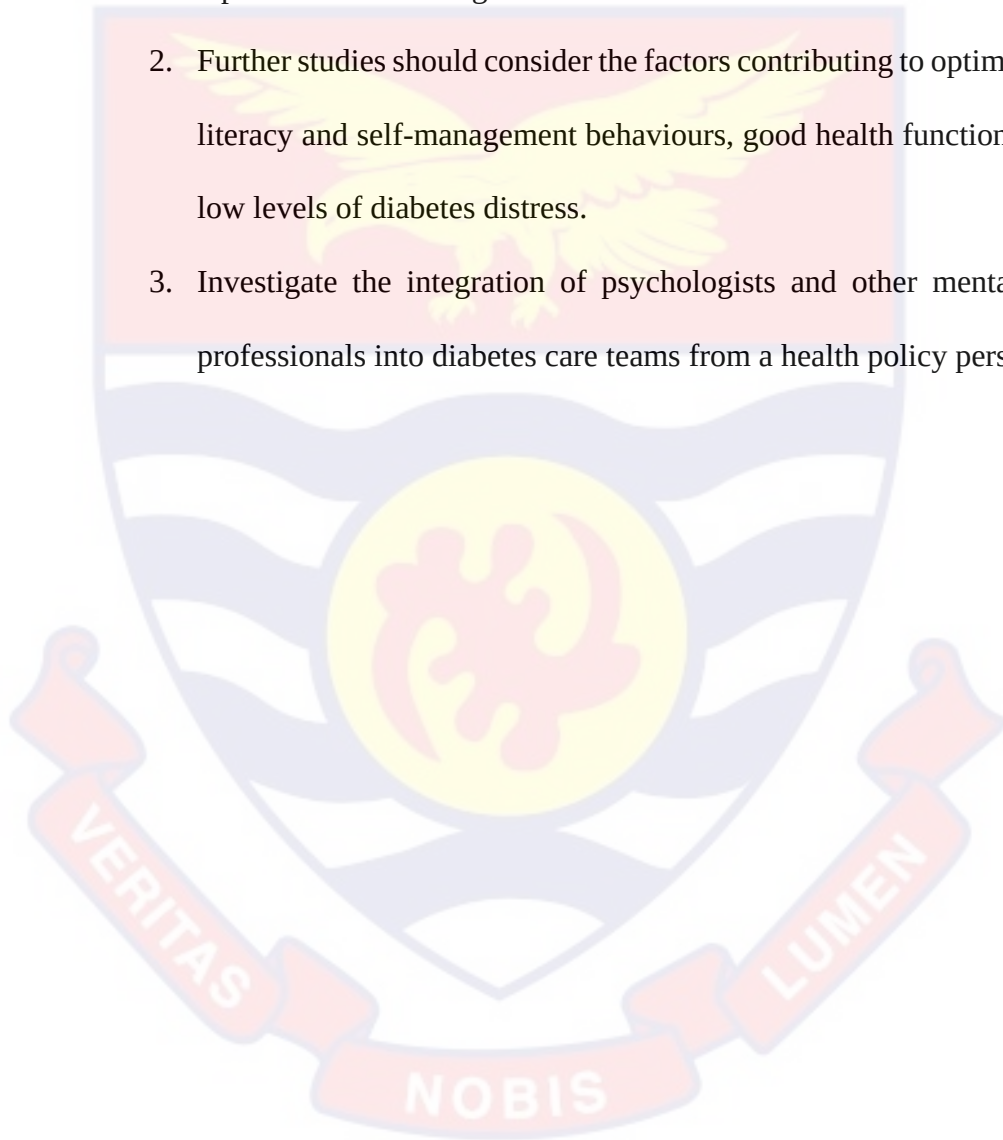
4. It is recommended that Public Health Departments or Units consistently provide health education on diabetes care and management, as this will enhance patients' health literacy and subsequently improve their self-management behaviours.

5. Finally, to provide a holistic health care delivery, it is recommended that psychologists such as Clinical/Health Psychologists be part of the Diabetes team to aid clients deal with disease-related distress. These practitioners should also help patients with adherence issues. It is

suggested that psychologists help the patient cope with living with the condition.

Suggestion for Further Research

1. To facilitate national generalisation, this investigation should be reproduced in other regions of the nation.
2. Further studies should consider the factors contributing to optimal health literacy and self-management behaviours, good health functioning, and low levels of diabetes distress.
3. Investigate the integration of psychologists and other mental health professionals into diabetes care teams from a health policy perspective.



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APPENDICES

APPENDIX A: INSTRUMENT

UNIVERSITY OF CAPE COAST

COLLEGE OF EDUCATION STUDIES

FACULTY OF EDUCATIONAL FOUNDATIONS

DEPARTMENT OF EDUCATION AND PSYCHOLOGY

**RESEARCH QUESTIONNAIRE FOR INDIVIDUALS WITH TYPE 2
DIABETES**

Dear Respondent,

I am **Gilbert Promise Atimu**, from the Institution mentioned above, reading **M.Phil. Clinical Health Psychology**. This questionnaire seeks to gather information on **health literacy, diabetes distress, diabetes self-management behaviours and health functioning among type 2 diabetes**. If you could, please try to provide me as many unbiased responses as you can.

Thank you.

SECTION A: SOCIODEMOGRAPHIC INFORMATION

1. **What is your age?** -----years.
2. **What is the duration of the condition?** ----- Years.
3. **Level of education:** No formal education [☐] Primary [☐] JHS [☐]
SHS [☐] Tertiary [☐]
4. **What is your employment status?** Retired [☐] Unemployed [☐]
Employed/Self-employed [☐] Student [☐]
5. **What is your gender?** Female [☐] Male [☐]

SECTION B: SELF-MANAGEMENT BEHAVIOURS

Please indicate the degree that you believe each item is applicable to you.

Note: Does not apply to me =0, applies to me to some degree=1, applies to me to a considerable degree=2 and applies to me very much=3

Statements	Rating			
	0	1	2	3
I check my blood sugar levels with care and attention.				
The foods I choose to eat make it easy for me to achieve good blood sugar levels.				
I regularly see the doctor regarding my diabetes.				
I take my diabetes medication as prescribed/agreed.				
Occasionally I eat lots of sweets or other foods rich in carbohydrates.				
I keep records of my blood sugar values to better manage my diabetes.				
I tend to avoid seeing the doctor regarding my diabetes.				
I am regularly physically active to improve my diabetes/my health.				
I follow the relevant dietary recommendations for people with diabetes.				
I do not check my blood sugar levels frequently enough for achieving good glucose control.				
I avoid physical activity although it would be good for my diabetes/my health.				
I tend to forget or skip my diabetes medication.				
Sometimes I have real 'food binges.				
Regarding my diabetes, I should see my doctor more often.				
I am less physically active than would be optimal for my diabetes/my health.				
I could improve my diabetes self-care considerably.				
I estimate the carbohydrate content of my meals (for achieving better glucose control).				
I eat without regard to my diabetes.				
I check/discuss my diabetes treatment with the doctor regularly.				
My diabetes self-care is poor.				

SECTION C: HEALTH LITERACY

Please review the items and select the appropriate checkbox that corresponds to your situation. Please answer all questions.

Note: 1=strongly disagree, 2=disagree, 3=neutral, 4=agree and 5=strongly agree

Statements	Rating				
	1	2	3	4	5
Read and understand educational materials and booklets					
Understand the written information provided at the appointment					
Comprehend the information I sought on diabetes					
Understand the information on diabetes management from the health-care provider					
Judge if diabetes-related information is reliable					
Get my prescription from the healthcare provider					
Alter the appointment date or time for a medical check-up					
Calculate the next time to take diabetes medication					
Determine the carbohydrate content per serving from the nutrition label					
Interpret if my blood-glucose level is within the normal range					
Understand information on diabetes presented as probabilities, ratios, or on graphs					
Ask health professionals a question					
Explain my diabetes condition to a healthcare provider					
Convey the reason why I should have a diabetic diet					

SECTION D: DIABETES DISTRESS

Please indicate the degree that you believe each item is applicable to you.

Note: 1=not a problem, 2=slight problem, 3=moderate problem, 4=somewhat serious problem, 5=serious problem and 6=very serious problem

Statements	Rating					
	1	2	3	4	5	6
Feeling that diabetes is taking up too much of my mental and physical energy every day						
Feeling that my doctor doesn't know enough about diabetes and diabetes care						
Feeling angry, scared, and/or depressed when I think about living with diabetes.						
Feeling that my doctor doesn't give me clear enough directions on how to manage my diabetes						
Feeling that I am not testing my blood sugars frequently enough.						
Feeling that I am often failing with my diabetes routine.						
Feeling that friends or family are not supportive enough of self-care efforts.						
Feeling that diabetes controls my life.						
Feeling that my doctor doesn't take my concerns seriously enough.						
Not feeling confident in my day-to-day ability to manage diabetes.						
Feeling that I will end up with serious long-term complications, no matter what I do.						
Feeling that I am not sticking closely enough to a good meal plan.						
Feeling that friends or family don't appreciate how difficult living with diabetes can be.						
Feeling overwhelmed by the demands of living with diabetes.						
Feeling that I don't have a doctor who I can see regularly enough about my diabetes.						
Not feeling motivated to keep up my diabetes self-management.						
Feeling that friends or family don't give me the emotional support that I would like.						

SECTION E: HEALTH FUNCTIONING

For each question, please tick only one response.

Note: 0 = No Difficulty, 1 = Mild Difficulty, 2 = Moderate Difficulty, 3 = Severe Difficulty, 4 = Extreme Difficulty or Cannot Do

Statement	Rating				
	0	1	2	3	4
Standing for long periods such as 30 minutes?					
Taking care of your household responsibilities?					
Learning a new task, for example, learning how to get to a new place?					
How much of a problem did you have in joining in community activities in the same way as anyone else can?					
How much have you been emotionally affected by your health problems?					
Concentrating on doing something for ten minutes?					
Walking a long distance such as a kilometre?					
Washing your whole body?					
Getting dressed?					
Dealing with people you do not know?					
Maintaining a friendship?					
Your day-to-day work/school?					

APPENDIX B: ETHICAL CLEARANCE

UNIVERSITY OF CAPE COAST
COLLEGE OF EDUCATION STUDIES
ETHICAL REVIEW BOARD

Our Ref: CES/ERB/ucce/edu/149  Date: 11th November, 2022

Your Ref:



Dear Sir/Madam,

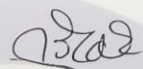
ETHICAL REQUIREMENTS CLEARANCE FOR RESEARCH STUDY

The bearer, Gilbert P Atiny, Reg. No. EF/CHP/20/0018 is a
M.Phil. / Ph.D. student in the Department of Education
and Psychology in the College of Education Studies
University of Cape Coast, Cape Coast, Ghana. He / She wishes to
undertake a research study on the topic:
Health literacy, diabetes distress, health
functioning and self-management
behaviors among Ghanaians living with type
2 diabetes.

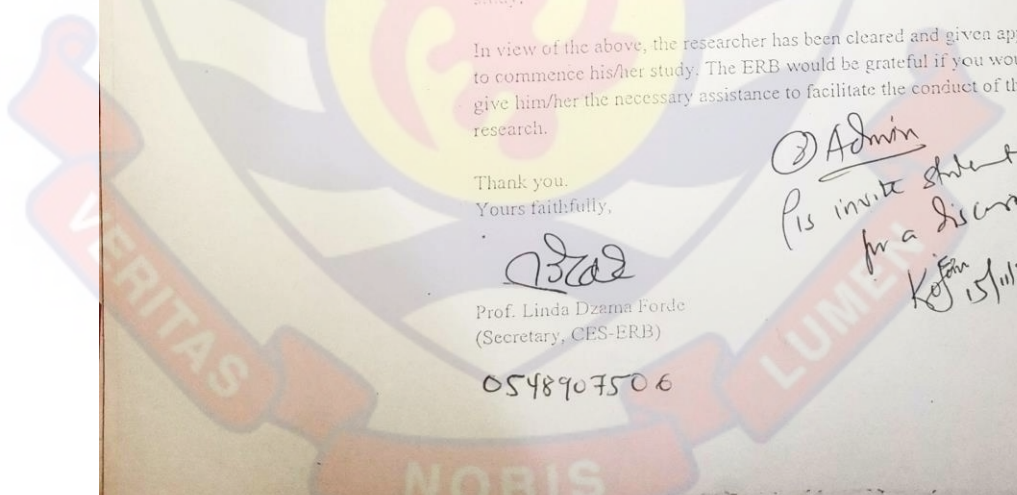
The Ethical Review Board (ERB) of the College of Education Studies
(CES) has assessed his/her proposal and confirm that the proposal
satisfies the College's ethical requirements for the conduct of the
study.

In view of the above, the researcher has been cleared and given approval
to commence his/her study. The ERB would be grateful if you would
give him/her the necessary assistance to facilitate the conduct of the said
research.

Thank you.
Yours faithfully,


Prof. Linda Dzama Forde
(Secretary, CES-ERB)

0548907506



Admin
Pis invite student
for a seminar
Kofor 15/11/22