Islamic Spiritual Well-being as a Social Determinant of Diabetes Physical and Psychological Health Outcomes

by

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Abstract

A holistic health approach includes the physical, psychological, and social/spiritual aspects. Usually, an intervention for chronic illnesses like diabetes involves physical aspects such as medication and behavioral aspects like compliance issues. However, due to the limited training of health care providers and the novelty of the deeper spiritual layer, it has not effectively been addressed as an effective part of individuals' well-being. As such, there is a great concern for how spiritual health is addressed for Muslim Americans. Data were collected from 100 Muslim diabetic individuals. Bivariate correlations and mediation analysis were run to examine the relationship between diabetes' physical and psychological aspects and Islamic spiritual well-being. No significant relationship between Islamic spiritual well-being and diabetes physical outcome was found, but a significant negative relationship between Islamic spiritual health and diabetes distress was found. A positive significant relationship was found between Islamic spiritual well-being measures and diabetes psychological well-being, diabetes compliance, and diabetes balanced locus of control. The mediation of diabetes psychological health outcomes between Islamic spiritual well-being measures and diabetes physical outcomes was insignificant. Thus, it was concluded that Islamic spiritual well-being has a significant effect on diabetes psychological health outcomes. To better understand the weight of this deeper layer on the physical outcome of chronically ill individuals, further larger sample-sized investigation is recommended.

Keywords: Islamic spiritual well-being, diabetes, psychological well-being, physical health outcomes, Glycated hemoglobin (HbA1c%) level, diabetes distress, compliance, locus of control, correlation, mediation

Chapter One

Introduction

Holistic Health

Health has been defined as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (World Health Organization, n.d.). This definition refers to three major determinants of health: physical, psychological, and social. This suggests that to maintain a complete state of health, a holistic approach involving these three determinants needs to be adopted to either treat illnesses or prevent them (Woods, 2019). Historically, a holistic approach to health was adopted when dealing with illness or disease (Berliner & Salmon, 1980). However, as the understanding of health and medicine evolved, more reductionist approaches have been adopted and implemented. Instead of collectively addressing all of these determinants, there has been an emphasis on the biological determinants as part of the medical model of healthcare. As a result, a high mental illness rate among people with chronic physical illness has been reported (RTI Health Advance, 2022). For example, Naylor et al. (2016) reported that symptoms that cannot be medically explained are poorly managed or even left untreated. Moreover, due to poor physical health management, this reductionist approach has resulted in a reduced life expectancy for severely mentally ill people. Religion or spirituality as a social determinant is one of the neglected yet critical aspects of

physical and mental health (Baetz and Toews, 2009; Lucchetti et al., 2021; *Social Determinants of Health Series: Promoting Healthy Behaviors* 2020; Koslander et al., 2009).

Since its inception, psychology has included the study of a human's soul, but at various levels (Rassool, 2021) and more recently the field of psychology is slowly coming back to include and examine how the soul or the spiritual aspect affects the human being's psychological experience (*Society for the psychology of religion and spirituality*, n.d.). This trend investigates the behavioral, cognitive, emotional, and spiritual aspects of patients' psychological experiences as interrelated rather than distinct aspects. Although the mechanism of the relationship between spirituality and psychological well-being needs further study, solid evidence has shown promising results for several mental illnesses like depression, suicidality, substance use, post-traumatic stress disorder, psychosis, and anxiety (Lucchetti et al., 2021). According to Weber and Pargament (2014), due to the religious or belief system differences between patients and health professionals and the need to raise awareness of religious matters in the field of psychology, spirituality can promote or damage mental health. Therefore, mental health practitioners should be aware of their client's spiritual beliefs and how to utilize them for effective treatment and promotion of their mental health.

According to Baetz and Toews (2009), "Mental illness is a time when personal resources are challenged, and [religion or spirituality] may be a clinically significant positive or negative source of coping" (p. 292). The influential role of religion on well-being comes from its followers' equipment with coping tools to manage stressful and challenging experiences, courage to deal with unpleasant and out-of-control situations, and the wisdom to make the right behavioral and moral decisions. One of the factors of mental illness development is the lack of

such preparations to deal with stressful experiences and uncertainties. Therefore, religious beliefs and rituals can stabilize personal resources to prevent the development of mental disorders.

Data show that recent health movements focus on a mind-body-spirit holism (McGuire, 1993; *Society for the psychology of religion and spirituality*, n.d.). While biomedical approaches deviate from the mind-body-spirit holism, contemporary movements (like spirituality) are returning to include the mind, body, and soul. Human beings are social creatures, and their well-being is greatly influenced by their environments and surrounding routines. Their behaviors, the people around them, and their general social system have an 80% influence on their well-being compared to only 20% health care influence on it (*Social Determinants of Health Series: Promoting Healthy Behaviors,* 2020). Therefore, solely focusing on the mechanism of wellness and eliminating the mind and spirit has caused a gap in health care. Instead of adopting a biomedical approach that is concerned with physical well-being only, it is more logical and effective to adopt a holistic approach that promotes balanced attention to the body, mind, and spirit well-being of individuals.

While spirituality may have no direct influence on physical health, several studies have supported its critical preventive role. According to Powell and colleagues (2003), after controlling for confounding variables, spirituality reduces 25% mortality risk in the American public. Other studies have shown that spirituality has a significant positive correlation between improved health outcomes for people with chronic illnesses like cardiovascular disease and the ability to cope with them (Rowe et al., 2004). That is because individuals who practice religions or are involved in some types of spirituality tend to have instrumental coping tools to deal with chronic illness-related stress and are good at managing stressful situations (Koenig, 2012). For example, they engage in daily prayers, adhere to religious diet and hygienic recommendations,

meditate, and recite religious scriptures which help them develop good psychological well-being and positively influence their physical health.

Therefore, it is critical to utilize spirituality as a social treatment tool and preventive resource to manage mental and physical illnesses. However, the Western focus on biomedical remedies has limited the consideration of social factors which could be the only way for some patients to regain their well-being (Koslander et al., 2009). Consequently, the healthcare system has been struggling with expensive and less effective care, impacting the treatment of people with chronic diseases such as diabetes.

Diabetes

Diabetes Definition and Types

According to the World Health Organization (2023), "Diabetes is a chronic disease that occurs either when the pancreas does not produce enough insulin or when the body cannot effectively use the insulin it produces". Egan and Dinneen (2014), also highlight the potential societal (e.g., economic, morbidity, and mortality burden) as well as the changes that an individual must make (e.g., life-long diet management, lifestyle changes, medicine administration, doctor visits) when trying to define diabetes as an illness.

During the last 20 years, diabetes cases have more than doubled and are expected to double in the future (Centers for Disease Control and Prevention, 2023). According to Bastaki (2005), diabetes is the most common endocrine disorder and by the year 2025, it is estimated that more than 300 million people worldwide will have the disease. Other studies have shown that "In 2018, 463 million people experienced [diabetes], which is projected in 2030 to reach 578 million, and in 2045 to 700 million" (Juanamasta et al., 2021, p. 1). Moreover, according to the

Centers for Disease Control and Prevention (2023), 1 in 5 of 37 million US adults do not know that they have diabetes; diabetes is the 8th leading cause of death and the number 1 cause of kidney failure, lower limb amputations, and blindness.

Prediabetes is "a serious health condition where blood sugar levels are higher than normal, but not high enough yet to be diagnosed as type 2 diabetes" (Centers for Disease Control and Prevention, 2023). In prediabetes, the malfunction is in the body cells that do not respond normally to insulin. The pancreas makes more insulin to get a response from the cell leading to pancreas damage, increased blood sugar, and a higher risk for type II diabetes. According to the Centers for Disease Control and Prevention (2023), 80% of 96 million United States adults have prediabetes without knowing about it putting them at higher risk for type 2 diabetes, heart disease, and stroke. Symptoms of prediabetes may not show for years until the individual develops type II diabetes or other serious health issues. Risk factors of this type of diabetes include being overweight, being 45 years or older, having a family history of type II diabetes, and being physically inactive (Centers for Disease Control and Prevention, 2023).

In type I diabetes the pancreatic B-cells are destroyed due to autoimmune inflammatory mechanisms which leads to insulin deficiency (Egan & Dinneen, 2014). In other words, the pancreas does not make or make very little insulin affecting cells' use of energy. According to the Centers for Disease Control and Prevention, CDC, (2023), insulin deficiency blocks blood sugar from getting into the cells causing it to build up in the bloodstream. That leads to body damage, diabetes symptoms, and complications. While it can happen at any age, type I diabetes is also known as insulin-dependent or Juvenile diabetes because it mostly develops in younger people with a prevalence rate of 5-10 % among diabetic people in general. Type I diabetes risk factors are not as clear as other types, but family history and age are two of the known risk

factors (Centers for Disease Control and Prevention, 2023). In the United States, this type is more prevalent in white people than in other ethnic groups. It is unknown how to prevent this type of diabetes and its symptoms can take months or years to show.

Type II diabetes is the most prevalent type of diabetes. Patients who have this type suffer from B-cell dysfunction, insulin resistance, and postprandial glucagon suppression (Egan & Dinneen, 2014). According to the Centers for Disease Control and Prevention (2023), 90-95 % of the 37 million diabetic American adults have type II diabetes. It develops mostly in people over 45 years old but more young adults, children and teens are being diagnosed with type II diabetes in recent years. In this type, the malfunction, like prediabetes, is in the body cells that do not respond normally to insulin. Unlike type I diabetes, which is insulin dysfunction, type II is insulin resistance where the pancreas makes a lot of insulin to get a response from the cell. That leads to pancreas damage, increased blood sugar, heart disease, vision loss, and kidney disease (Centers for Disease Control and Prevention, 2023). People at higher risk of developing Type II diabetes include those who have been identified as having pre-diabetes, are overweight, 45 years or older, have a parent or sibling with type II diabetes, are physically inactive, take certain medications, and have had gestational diabetes. These individuals are often African American, Hispanic or Latino, American Indian, Alaska Native person, Pacific Islanders, and Asian American (Centers for Disease Control and Prevention, 2023). Unlike type I, type II diabetes can be prevented by losing weight, eating a healthy diet, and staying physically active. But, like type I, while its symptoms may take a long time to show, symptoms can be managed by patients and with the support of health care providers.

Gestational Diabetes (GD) “occurs when your body can’t make enough insulin during your pregnancy” (Centers for Disease Control and Prevention, 2023). Due to pregnancy

hormones and weight changes, body cells use insulin less effectively and cause insulin resistance increasing the body's need for insulin. According to the Centers for Disease Control and Prevention (2023), 2-10% of United States pregnant women develop gestational diabetes. Risk factors for GD include having GD during a previous pregnancy, giving birth to a baby weighing over 9 pounds, being overweight, older than 25 years, family history of type II diabetes, and being African American, Hispanic or Latino, American Indian, Alaska Native, Native Hawaiian, or Pacific Islander person. As the name suggests, this type occurs during pregnancy and often ends when giving birth. However, it may increase the risk of developing type II diabetes later in life. GD symptoms may be mild or mistaken for pregnancy symptoms. So, a test is needed to diagnose it and risk factors that may indicate its development. This type can be prevented before pregnancy by losing weight and being active. It can also be managed by checking blood sugar, eating healthy food, being active, and monitoring the baby (Centers for Disease Control and Prevention, 2023).

Diabetes and Alternative Medicine

While types of diabetes have somewhat different underlying causes or mechanisms, they can be treated following similar treatment plans. According to Bastaki (2005), diabetes treatment involves either drugs to alleviate its symptoms or risk factor elimination to prevent its long-term complications. Diabetes pharmacological treatments include different types of insulin-like long and short-action insulin, rapid-acting insulin, and combination insulins and other medications like alpha-glucosidase inhibitors, biguanides, meglitinides, Sulfonylureas, and thiazolidinediones (Cherney, 2023). Unlike other health conditions, diabetes can mostly be managed by following a non-pharmacological/alternative treatment. Alternative treatment can include making healthy food choices, being physically active, managing weight, changing lifestyles, controlling blood

pressure and cholesterol, and managing stress (Centers for Disease Control and Prevention, 2023).

According to Juanamasta et al. (2021, p. 1), "Holistic nursing is an aspect of overall human experience and condition, both physically, emotionally, socially, culturally, and spiritually on the response and effects of the disease experienced by individuals, families, groups, communities, and populations". Ilhan et al. (2016) conducted a study investigating the use of alternative medicine and related products. There was a total of 301 diabetic patients who were recruited from an outpatient diabetes clinic in Turkey. Patients were asked about alternative medicine products and how they use them. Patients who stated that they used alternative medicine products were then compared to patients who did not use them. The results of the study showed that 26.9% of patients had tried alternative medicine, and 16.6% continued to use some form of its product. 14.3% used the products every day, and 8% used the products for up to 6 months. The results also showed that "Glycated hemoglobin (HbA1c) levels were significantly decreased in patients using alternative medicine products compared to the remainder of patients in the study (p=0.017)" (Ilhan et al., 2016, p. 34).

According to Fang and colleagues (2021), between 1999 and 2010 there has been a decline in diabetes medicinal control in the United States. After that, during 2011-2014, the use of glucose-lowering medications has leveled off suggesting a shift toward more conservative diabetes treatment. This indicates a diabetes treatment trend that is moving towards less use of medication and more of alternative medicine, which also emphasizes the reliance on patient self-management through compliance and lifestyle factors. Lifestyle and behavioral changes can reduce the diabetes complications responsible for 70-80% of deaths among diabetic individuals (Bastaki, 2005). Therefore, a diabetes treatment plan considering non-pharmacological-related

factors such as patients' psychological and social well-being, adherence issues, diabetes distress, and locus of control is critical.

Psychological Well-Being. As a chronic illness, diabetes has been associated with several psychological issues like distress, low self-care/ adherence, depression, and anxiety. Schmitt et al. (2013, p. 2) reported that "It has often been suggested that important psycho-social factors such as depression and emotional distress can interfere with self-care behaviors and therefore negatively impact glycaemic control." So, if diabetic patients are psychologically well, they will have less diabetes-related distress which will positively influence their self-care and disease treatment adherence. On the other hand, poor self-care and adherence may lead to negative glycemic outcomes and elevated Hemoglobin A1c (HbA1c) level which is a 3-month average blood sugar level or percentage of red cells that have sugar-coated hemoglobin (Centers for Disease Control and Prevention, 2022). In addition, diabetes-related conflict with loved ones and healthcare providers has been shown to impair motivation for self-care (Polonsky et al., 2005). Thus, to deal with this issue, patients must have psychological coping tools and management to enhance their perceived self-efficacy and self-management of their disease. Patients need to feel empowered to make appropriate daily decisions about their diets, physical activity, blood sugar monitoring, and management of stress consistent with the life that they wish to lead. To successfully do that, they must involve their families, friends, and employers for psychological support (Anderson et al., 2000).

Compliance. Treatment compliance is one of the predictors of successful diabetes management. As 95% of diabetes care depends on patients, healthcare professionals' common concern is patients' noncompliance with prescribed treatment plans (Funnell & Anderson, 2000). Noncompliance can be due to the complicated process affected by patients' characteristics,

patient-physician relationships, the healthcare system, and patient's personal, spiritual, behavioral, and religious beliefs (Alvarez et al., 2016; Javanmardifard et al., 2020). For example, Mirzazadeh-Qashqaei and colleagues (2023) investigated the relationship between self-care, spiritual well-being, and coping strategies in type II diabetes patients. The study results showed a significant relationship between self-care, problem-focused coping strategy and spiritual well-being. So, this study supports the influential relationship between diabetic patients' spiritual well-being, self-care, and coping strategies which may positively impact their illness management.

Diabetes Distress. According to Kreider (2017, p.1), "Diabetes distress refers to an emotional state where people experience feelings such as stress, guilt, or denial that arise from living with diabetes and the burden of self-management." Therefore, based on this definition, diabetes distress impacts both patients and their caregivers such as parents, spouses, and professional caregivers. Patients may experience distress because they are unable to manage their illness, they feel that they are a burden on others, they have no support, or their caregivers are also unable to support them. So, they end up with high levels of stress which results in elevated blood pressure and sugar levels (Gugun et al., 2021). Gugun et al. (2021) also reported that, unlike the biomedical approach, the holistic approach has been proven to have a positive influence on diabetes distress. An example of integrative treatment that could help with stressful experiences is spiritual well-being therapy offering patients and their caregivers coping tools like praying and meditation (Aghajani et al., 2022).

Diabetes Locus of Control. According to Rotter (2019), individual locus of control refers to patients perceived control over their life events by themselves or other external factors. Thus, to better adhere to the diabetes treatment plan, positively deal with diabetes distress, and

maintain positive psychological and physical well-being, patients need to feel that their illness is under control by themselves and other external factors. As discussed before, diabetes is a chronic illness that can largely be managed by patients' long-term care of themselves. However, historically, the burden of illness-related decision-making has shifted from health care providers' responsibility to patients' responsibility (Ferraro et al., 1987). On the other hand, external factors like social support and spirituality may help them make better decisions and maintain better health outcomes (Gore et al., 2016). Patients' perceived locus of control can influence their decision-making and self-care. Hence, it is critical to address the patient's locus of control when assessing patients' ability to manage their illness.

In short, although alternative medicine for diabetes may not have a direct influence on its treatment, it has a critical role in preventing related risk factors and enhancing its symptoms. Implementing biopsychosocial approaches in the treatment and prevention of diabetes will ensure the management of its direct and indirect risk factors and mechanisms. Therefore, this study aims to examine whether Islamic spiritual well-being may serve as a social determinant of diabetes psychological and physical health outcomes, distress, locus of control, and treatment adherence in Muslim populations.

Health Care for Muslim Americans

As a growing minority group in the United States, Muslim Americans' belief system has a huge impact on their health aspect of life. For them, it is critical to consider their belief system or the spiritual aspect of their social life when aiming to provide holistic health care. According to Mohamed (2018), "Pew Research Center estimates that there were about 3.45 million Muslims of all ages living in the U.S. in 2017, and that Muslims made up about 1.1% of the total U.S. population . . . by 2050, the U.S. Muslim population is projected to reach 8.1 million, or

2.1% of the nation's total population." That indicates a crucial need to consider this group's social differences and use customized holistic healthcare as their religion is a way of life for them. Their religious teachings involve every aspect of their life whether it is as general as political affairs or as personal as hygienic recommendations. Thus, healthcare delivery considering this religious/social background is effective and appreciated by Muslim Americans who reported that provider-patient relationships can greatly impact their health outcomes (Alfar, 2023). For instance, having an appreciation for the preference for a same-gender provider could impact someone's willingness to engage in healthcare, and if this need is not met, their illnesses can go untreated leading to accumulated health issues and disparities. So, it is beneficial to patients, care providers, and healthcare systems to consider these social differences (Khorashadizadeh et al., 2016).

Moreover, adult Arab Americans who are predominantly Muslim suffer from extremely high prevalence of diabetes and are in urgent need for a community-based program to intervene (Linda et al., 2003). For example, an implication of a resilience-based Islamic program resulted in positive outcomes for diabetes fatigue, health-related quality of life, and associated biomarkers (Kusnanto et al., 2022). That is because Islam is a belief system that encourages a healthy lifestyle and a holistic approach to treatment. According to Islamic teachings, if the two external aspects (physical or psychological) are addressed without the other deeper (spiritual) aspect, there will be an imbalance in the whole system leading to diseases/worsening of symptoms and vice versa (Rothman & Coyle, 2020).

Despite that, the Muslim healthcare needs in the West are rarely recognized. According to Laird et al. (2007), "Literature addressing health concerns among minority populations rarely provides data specific to Muslims." Health care literature does not recognize the prevalent needs

of Muslim Americans for health professionals' guidance concordant with their religious backgrounds and practices. As Laird et al. (2007) reported, the spiritual aspect of chronically ill Muslim Americans needs to be addressed by healthcare providers to better manage their diets and medication regimen during Ramadan (month of fasting), for example. Unfortunately, due to limited training and skills, such considerations are rarely attended to by healthcare providers, leaving the decision to the patient's limited medical knowledge. Thus, to bridge the literature gap in Muslim American health concerns and address the dilemma of diabetes among them, Islamic spiritual well-being as a social determinant of chronic illnesses' health outcomes needs to be examined.

Islamic Spiritual Well-being

Islamic spiritual well-being is part of the current health research movement focusing on the biopsychospiritual aspect of health and well-being (McGuire, 1993). While social/spiritual remedies may be criticized for being theoretical or philosophical, Islamic health provides concepts to theoretically and empirically examine health such as balanced health, the Islamic paradigm of healing, and the Islamic model of the soul. It has rich sources of knowledge like the Quran (Islamic holy book), Sunnah (Prophet Mohammad's teachings), and the work of early and current Muslim scholars. These sources provide a holistic paradigm of health that looks at four different aspects which are behavioral/physical, cognitive, emotional, and spiritual. It also maps out the structure of the spiritual realm and a detailed understanding of the soul and how it influences and is influenced by the whole system of human health.

Definition of Islamic Spiritual Health

While Islamic spiritual health conceptualizations are consistent with current well-being perceptions, they also have unique contributions and insights. According to Rassool (2021), while the World Health Organization's definition of health addresses the holistic nature (biopsychosocial) of health, it fails to address other health factors such as social, economic, and political. Also, it is unrealistic to maintain complete health as described in this definition. Thus, Rassool (2021) proposed an alternative definition of health. He stated that "From an Islamic perspective, health is referred to as a state of balance between physical, psychological, social, and spiritual wellbeing" (p.368). This definition emphasizes the aim for balanced health instead of unrealistic complete health. Unlike the WHO definition of health, Rasssool's definition addresses wellness where health is the norm and diseases are the imbalance. Moreover, this definition views health positively instead of understanding it as the absence of disease.

An example of balanced health (Rassool's definition) is the concept of health locus of control. As discussed earlier, this concept examines a person's beliefs of how much control they have over their health. They either perceive full control (internal locus of control) or they feel a lack of control (external locus of control) over certain issues. Rasool (2021) talked about the third locus of control tendency which is the spiritual locus of control. While the recognized locus of control concept only attributes things to external or internal factors, the spiritual locus of control balances both. Spiritual locus of control suggests that people should balance and use both internal and external attributions of events and issues. It suggests that while God knows and controls a person's life, that person still has the freedom to choose and control things in their life. Therefore, while current health standards apply psychological and/or medical theories to understand the human experience of health and disease, balanced health applies

biopsychospiritual theories to holistically understand the human experience of health and diseases.

Aims of the Study

Based on the principles and empirical evidence discussed above and the need for holistic healthcare approaches, this study investigates the impact of integrating the physical, psychological, and social/spiritual aspects of health as it relates to chronic illness like diabetes. To bridge the literature gap and provide insight for future investigation of diabetes dilemma among Muslim Americans, this study examines the influence of Islamic spiritual well-being beliefs on diabetes health outcomes. In other words, this study examines the influence of the Islamic doctrine of well-being on diabetic individuals' physical health outcomes and general psychological health outcomes, adherence, distress, and locus of control.

Hypotheses

1. Islamic spiritual well-being (Islamic Spiritual Health Scale and the Multidimensional Measure of Islamic Spirituality) will have a negative relationship with diabetes' physical health outcome (HbA1c level) and Diabetes Distress Scale.
2. Islamic spiritual well-being will have a positive relationship with diabetes' general psychological well-being (Well-being Questionnaire), diabetes compliance (Diabetes Self-Management Questionnaire), and a balanced diabetes locus of control (Diabetes Locus of Control Scale).
3. Diabetes general psychological well-being will mediate the relationship between Islamic spiritual well-being and diabetes physical health outcomes.

Chapter Two

Methods

Participants

Initially, Muslim adults diagnosed with diabetes were recruited through the Arab Community Center for Economic and Social Services (ACCESS) and the Islamic Center of Detroit (ICD) located in Dearborn, Michigan. After having a low response rate with local recruitment, participants were then recruited globally online through the Prolific platform. ACCESS and ICD informed participants about the study by posting it on their platforms and distributing flyers. The participants were requested to complete an online survey that assesses the relationship between Islamic spiritual well-being and diabetes physical and psychological health outcomes. The final sample size was 100 participants. Participants who were 18 years and older, Muslim, and diagnosed with diabetes were included in the study. Participants who were under 18 years of age, non-Muslim, and not diagnosed with diabetes were excluded. Because there is no interest in a specific type of diabetes, this study focused on diabetic (not pre-diabetic) patients in general.

Procedures

Participants were recruited at ACCESS, ICD, and Prolific. The survey was provided only electronically for both in person and online recruitment. Because one of the largest Muslim

populations is Arabic speaking, the measures were provided in both the English and Arabic languages. It was completed through the University of Michigan Qualtrics platform. Prior to any data collection participants were presented with the consent form. If they consented to participate, they moved to complete their demographic characteristics, their diabetes diagnosis and their HbA1c level. After that, participants completed a total of 6 measures assessing Islamic spiritual well-being and diabetes physical and psychological health outcomes.

Upon completion of the survey, participants were debriefed and compensated. Due to recruitment difficulties, the compensation amount was adjusted form $8.00 to $10.00 to $20.00. The debrief at the end of the survey was a brief message thanking them and providing them with psychological resources if they needed them. To mail them the compensation, once the survey is completed, ACCESS and ICD participants were asked for their names and addresses electronically through a separate link. This information was in a separate Qualtrics file from the survey and was not connected to the data. The Prolific participants were compensated through the platform payment system.

Measures

Measures are available on request.

Demographics

First, participants were asked questions about their religion, age, race/ethnicity, gender, education, income level, diabetes diagnosis and estimated HbA1c level. They were asked about their best estimate of Glycated hemoglobin (HbA1c%) level. That is based on the HbA1c range of normal: below 5.7%, prediabetes: 5.7% to 6.4%, and diabetes: 6.5% or above (Centers for

Disease Control and Prevention, 2022). Participants were also asked to answer a total of 6 made-up attention check questions (one question before each of the following main scale).

Islamic Spiritual Health Scale/ISHS

The Islamic Spiritual Health Scale assessed attributes associated with the possession of the essence of spiritual health (Khorashadizadeh et al., 2016). It consists of 32 items and three subscales: sacred love (17 items), sacred act (10 items), and sacred science (5 items). The answers to the 32 items were on a 4-point Likert-type scale (*Strongly disagree*= 1, *disagree*= 2, *agree*= 3, and *strongly agree*= 4). The scale has strong reliability with a 0.94 Cronbach's alpha for internal consistency. This scale was translated into the Arabic language by a certified translator at the University of Michigan-Dearborn.

Multidimensional Measure of Islamic Spirituality/MMoIS

Measure of Islamic Spirituality measured eight dimensions of Islamic spirituality: Self-Discipline (items: 1-12), Quest and Search for Divinity (Items: 13-24), Anger and Expansive Behavior (items: 25-33), Self-Aggrandizement (items: 34-43), Feeling of Connectedness with Allah (items: 44-55), Meanness-Generosity (items: 56-64), Tolerance-Intolerance 65-71), and Islamic Practices (items: 72-75) (Dasti & Sitwat, 2014). This is a 75-item scale. Its scoring is based on a five-point Likert scale (5= high level of spirituality and 1= low level of spirituality). The scale has a high (.84) internal consistency but low convergent validity with ISHS ($r\ (98) = .14$, p=.15). This scale was translated into the Arabic language by a certified translator at the University of Michigan-Dearborn.

Well-Being Questionnaire/WBQ

The Well-Being Questionnaire measured depressed mood, anxiety, and other aspects of the positive well-being of people with diabetes (Bradley, 1994). This scale includes 22 items with four subscales: depression (items: 1-6), anxiety (items: 7-12), energy (items: 13-16), and positive well-being (items: 17-22). The scoring is based on a 0 to 3 Likert scale (*not at all*= 0 and *all the time* =3) and scores of 1 and 2 indicate a level between the two extremes. The scale has a satisfactory Cronbach's alpha (0.70) for internal consistency. This scale was translated into the Arabic language by a certified translator at the University of Michigan-Dearborn.

Diabetes Self-management Questionnaire/DSMQ

The Diabetes Self-Management Questionnaire is a 16-item scale with four subscales: Glucose Management (items 1, 4, 6, 10, 12), Dietary Control (items 2, 5, 9, 13), Physical Activity (items 8, 11, 15), and Health-Care Use (items 3, 7, 14). It measured participants' self-care activities or their compliance level (Schmitt et al., 2013). The response includes 4 options (*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). The scale has a good internal consistency with Cronbach's alpha of 0.60. The Arabic version of the scale was obtained from a previous study of the Arabic version of the diabetes self-management questionnaire in Tunisia (Kaddech et al., 2022).

Diabetes Distress Scale/DDS

Diabetes Distress Scale assessed depressive symptoms, emotional burden, and regimen distress (Polonsky et al., 2005). It is a 17-item scale with four subscales: emotional burden (5 items), physician-related distress (4 items), regimen distress (5 items), and diabetes-related

interpersonal distress (3 items). The scoring is based on a 5-point Likert scale (1= *Strongly disagree* and 5= *Strongly agree*). The overall scale has a significant internal consistency with Cronbach's alpha of 0.94. The Arabic version of the scale was obtained from a previous study of diabetes distress (Darawad et al., 2017).

Diabetes Locus of Control Scale/DLoCS

The Diabetes Locus of Control Scale measured the extent to which diabetic individuals feel that their life events are under their (internal) control or related to other external factors (Ferraro et al., 1987). It is an 18-item scale with three subscales: internal locus of control (6 items), powerful other (6 items), and chance (6 items). Responses include 6 Likert points (1= *strongly disagree* and 6= *strongly agree*). Internal consistency Cronbach's alpha for the Internal subscale was 0.87, 0.82 for the Powerful Others subscale, and 0.71 for the Chance subscale. This scale was translated into the Arabic language by a certified translator at the University of Michigan-Dearborn.

Data Analysis Plan

The analyses of this study were performed using IBM Statistical Package for Social Sciences (SPSS; Version 29). Negative items were reversed coded and missing data in all scales were replaced using series means, an SPSS estimation method to replace missing values. After scoring all measures, a descriptive statistical analysis of participants' demographic information, attention check questions, and main measures were performed. After that, to test the first and second hypotheses, bivariate correlational analyses were performed. Finally, to test the third hypothesis, mediation analysis was performed.

Chapter Three

Results

Before data analysis, missing data of questionnaires' items was taken care of using series mean. For the main scales, out of 17,400 data points, there was a total of 96 missing values. While 76 missing data points were missing from the Diabetes Self-Management Questionnaire, 20 data points were missing from random items among the remaining five scales. The 76 DSMQ missing data were for items asking about checking and recording blood sugar level and taking medications. For the demographic data, there were only 3 missing points; 1 missing point was forming the ethnicity question and 2 were from the income question. A total of 2 values were missing from the attention check questions. Descriptive statistics of all measures, attention questions, and participants' demographic information were performed. Table 1 shows the frequencies and percentages of participants' demographic characteristics. The 6 attention questions result showed that most (92-98%) of the participants were paying attention. The spirituality and diabetes measures' mean and standard deviation are presented in Table 2.

Table 3 shows the results of the Pearson bivariate correlations. There was no significant relationship between ISHS and diabetes' HbA1c level. A significant negative relationship between ISHS and DDS was found while a positive relationship was found between ISHS and WBQ. Both the DILoC and DPOLoC variables significantly correlated with ISHS. However, the correlation between DSMQ and ISHS was not significant. In addition, there was no significant

relationship between MMoIS and diabetes' HbA1c level. A significant positive relationship between MMoIS and DDS and a negative relationship between MMoIS and WBQ were found. Both the DCLoC and DPOLoC variables significantly correlated with MMoIS. However, a positive significant correlation between DSMQ and MMoIS was found

The mediation analysis results (performed by the PROCESS SPSS macro, Hayes, 2022) did not support the hypothesis that diabetes general psychological well-being will mediate the relationship between Islamic spiritual well-being and diabetes physical outcomes. For the first Islamic spiritual well-being measure, as shown in Table 4 and Figure 1, Islamic Spiritual health/ ISHS was significantly associated with general psychological well-being/WBQ (α=.510), but WBQ was not significantly associated with diabetes physical outcome/HbA1c (b=-.004). Based on 1,000 bootstrap resamples, the bootstrap confidence interval for the indirect effect was not above zero (-.007 to .011). Thus, WBQ did not mediate the relationship between ISHS and HbA1c.

For the second measure of Islamic spiritual well-being, as shown in Table 5 and Figure 2, general psychological well-being (WBQ) was negatively associated with the Multidimensional Measure of Islamic Spirituality/MMoIS (α=-.127) and was not significantly associated with the diabetes physical outcome (HbA1c) (b=.004). Based on 1,000 bootstrap resamples, the bootstrap confidence interval for this indirect effect was also under zero (-.003 to .001). Thus, WBQ also did not mediate the relationship between MMoIS and HbA1c.

Chapter Four

Discussion

The current health system focuses on the physical and psychological aspects of managing and treating diabetes. So, physicians and psychotherapists lack the training and skills to go beyond the body mechanism to address the deeper social layer of health such as spirituality. Thus, such reductionistic and imbalanced healthcare system has been struggling to effectively address chronic illness factors and provide across cultural preventive measures (Bastaki, 2005; Naylor et al., 2016; Weber & Pargament 2014). Therefore, this study attempted to address this issue by exploring an alternative holistic approach to diabetic patients' management of their illness which is a medical, economic, morbidity and mortality burden on them and their societies (Centers for Disease Control and Prevention, 2023; Egan & Dinneen, 2014).

If not directly related to physical aspects of chronic illness, spirituality provides its followers with coping tools to overcome mental challenges and stress which have been proven to have a significant influence on body functioning and managing physical illness (Baetz & Toews, 2009). However, while the population of Muslim Americans is increasing, their unique medical needs are rarely met or even discussed in the literature (Alfar, 2023; Laird et al., 2007; Mohamed, 2018). Thus, to bridge the literature gap and provide insight for future investigation of diabetes dilemma among Muslim Americans, this study investigated the influence of the Islamic doctrine of well-being on diabetic individuals' physical and psychological health outcomes.

The Islamic Holistic Paradigm of Healing

A holistic paradigm of healing means understanding the observable (physical/medical, social, cultural) and the unobservable (psychological and spiritual) aspects of patients and their diseases (Rothman, 2019). The spiritual aspect has a greater impact on health than what it is usually credited for. So, there is a need to understand and incorporate the spiritual aspect of human beings and how much it influences their environment, health, and the mechanism of diseases (Rothman, 2019). Moreover, in Islam, it is understood that the body is the housing of the soul. So, based on these beliefs, they should be discussed as one integrated entity, not as a spiritual reality versus a physical reality. Physical reality is the manifestation of a spiritual or unseen reality. Therefore, the Islamic paradigm is a holistic model focusing on the balances and imbalances between these two realities and how they integrally influence each other rather than looking at them separately. This view has been conceptualized as an iceberg where behaviors, thoughts, emotions, and spiritual states correspond to four equivalent Islamic concepts: Nafs (lower self), the Aql (Intellect), the Qalb (heart), and the Ruh (spirit) (Rothman & Coyle, 2020).

According to Rothman (2019), the Islamic process of healing or treatment includes five steps: Inkishaf (self-awareness), Muhasaba (self-reflection), Tawba (turning to God), Ibadah (worship or establishment of a connection with God), and Tafakur/Muraqaba (contemplation), which is refers to consistent thinking about the person's connection with God. This last step concept is similar to Buddhist mindfulness. However, because of the heart's central position in this model, it is called heartfulness. According to Al-Bukhari (n.d.), prophet Mohammed stated that the heart is the center of the body, soul, and the whole health system. If it is sound the whole system will be sound and balanced, and if it is corrupt the whole system will be corrupt and

imbalanced. Thus, healthcare providers can provide a higher level of care if they include both the observable and unobservable aspects of well-being.

However, due to the precise required efforts to address observable aspects and the limited training on how to address the unobservable aspects of health, physicians may not have the time and skills to go beyond the body mechanism, first layer. But, because they are specifically trained in addressing behaviors, emotions, and cognition, psychologists may be able to go deeper than physicians when examining symptoms of diseases, second layer. They may be able to make a connection between medical and psychological symptoms. Thus, psychologists' picture of what is internally and externally influencing health may enhance the physicians' surface understanding and ultimately speak to the need for integrated care. However, due to limited training and time, the deeper layer of human nature (spiritual states) is extraordinary for both physicians and psychologists. Understanding how spiritual states affect health and connect to the above layers is rarely addressed as an aspect of the healing process. Spirituality expert/clergy knowledge of the deeper layer's influence on well-being may help physicians and psychologists understand the role of spirituality on their patients' health. Thus, this holistic paradigm of healing requires the mutual involvement of physicians, psychologist and clergies to address the three layers of well-being and their influential role on each other.

Islamic Spiritual Behaviors and Health

While religious health-related guidelines are criticized for being more theoretical than practical, Islamic health-related guidance incorporates detailed theoretical and practical recommendations/tools. Examples of these practices include lifestyle behaviors: eating and nutrition, use of Miswak (tooth stick), alcohol and drug use, tobacco use, physical activity, social relationships, and sleep. They also include rituals like daily prayers, ablution, Quran recitation,

and fasting (VonDras & Amer, 2017). Similarly, Liu et al. (2016) reported that smoking, physical activity, consuming alcohol, maintaining normal body weight, and obtaining sufficient sleep are five key health-related behaviors for chronic disease prevention.

In Islam, oneself is entrusted to the person, and he or she is responsible for keeping a healthy and decent life. So, Islam encourages moderation in eating and maintaining a normal body weight (VonDras & Amer, 2017). For example, it instructs its followers to avoid filling the stomach with food and recommends filling one-third of it with food, one-third with drinks, and leaving the last third for breathing. That is because overeating is related to physical and psychological health (Adams et al., 2019). Other examples of Islamic lifestyle behaviors are the use of Miswaks and physical activities. Miswaks, or tooth sticks, are obtained from the Salvadora persica plant. According to VonDras and Amer (2017), as recommended by the prophet Mohammed, Muslims around the world are using Miswaks at least once before each of the five daily prayers. That is because this tooth stick contains fluoride and other substances that help reduce plaque, gingivitis, and tooth decay. In addition, in Islam, physical activity is promoted for both men and women. Due to their critical health benefits (Liu et al., 2016), the prophet Mohammed's teachings and the Quran recommended physically active lifestyles like walking fast, fencing, hunting, horseback riding, running, and swimming.

Moreover, the Quran and Sunnah directly prohibit the use of alcohol and explain how its disadvantages outweigh its benefits. For example, it impairs people's cognitive processes leading to unconscious decisions and wrong personal and interpersonal behaviors. Although no direct text in the Quran and Sunnah forbids tobacco use, it is discouraged by the majority of Islamic scholars as an illness preventive measure. VonDras and Amer (2017) reported that family relations, marriage, and friendship are examples of Islamic honorable and valued social

relationships. As key resources for coping and resilience, kindness, tolerance, and healthy interactions are highly encouraged to keep these relationships. On the other hand, prejudice, racism, gossip, and intergroup conflict are strictly prohibited. Quran and prophet Mohammed also highlighted the importance of sleep by prioritizing it over continuing worship if the person is tired. They are also encouraged to sleep on the right side of the body, which has been proven to benefit the heart (Leung et al., 2003).

Praying is one example of an Islamic ritual associated with better health outcomes. According to VonDras and Amer (2017), "the five daily prayers have physical, mental, emotional, spiritual, and social benefits, some of which are similar to the documented benefits of yoga and meditation." Islamic prayers include physical exercises like standing, bowing, sitting, and prostrating. According to Aghajani et al. (2022, p. 487), "Namaz [Islamic prayers] plays an influential role in the peace of mind and body via modulation of stress response even at the gene expression level". Before performing the prayers, Wudu (ablution) must be conducted. Wudu includes hand washing to remove germs, gargling to remove food particles, washing the nostrils to remove dust and allergens, feet washing to prevent fungal infection, and washing the face and neck to relax (VonDras & Amer, 2017). Quran recitation is an essential Islamic ritual behavior. An experimental study by Asmawati et al. (2021) found a significant effect of Spiritual Qur'anic Emotional Freedom Technique (SQEFT) therapy on reducing anxiety values and blood cortisol levels in NAPZA (Narcotics, Psychotropic, Other Addictive Substances) residents undergoing rehabilitation. A final example of Islamic rituals associated with better health outcomes is fasting. According to VonDras and Amer (2017), more than a thousand publications have addressed fasting effects on body functions. It promotes healthier blood pressure and cholesterol

levels, low blood sugar, weight loss, healthy digestive functions, psychological well-being, and cognitive functions (Ansari, 2023).

First and Second Hypotheses

The first hypothesis tested the relationship between Islamic spiritual well-being and the physical health outcome of diabetes and diabetes distress. Unlike what was expected, Islamic spiritual well-being did not significantly correlate with the HbA1c level. That could be due to the self-report of blood sugar level. While it is a 3-month average blood sugar level, in this study, participants were asked to self-report the level of their Hemoglobin A1c (HbA1c) once. Also, 76/96 missing data were from DSMQ's items asking about checking and recording blood sugar level and taking medications. Thus, it is possible that participants provided inaccurate information about their blood sugar level. In addition, while the attention check questions showed that most of the participants paid attention when answering the survey, some of them were not paying attention and might have provided inaccurate information.

Unexpectedly, the Multidimensional Measure of Islamic Spirituality correlated positively with the Diabetes Distress Scale and negatively with the diabetes Well-being Questionnaire. However, as expected and consistent with current literature (Asmawati et al., 2021; Satrianegara & Mallongi, 2020), the results of this study showed that the Islamic Spiritual Health Scale had a significant negative relationship with the Diabetes Distress Scale. Thus, that may indicate that the higher the level of spirituality, the lower the level of diabetes distress or vice versa. Such correlation could be due to the coping tools, the behaviors and rituals discussed above, that Islamic spirituality provides them with. Supporting the holistic approach to health discussed earlier, it seems that these tools help diabetic patients eliminate their illness distress by seeking

help from God and other people around them to deal with a physical chronic condition that requires management.

The second hypothesis tested the relationship between Islamic Spiritual well-being and several diabetes psychological health outcomes (diabetes Well-being Questionnaire, Self-Management Questionnaire, and Locus of Control Scale). As expected, the results showed a significant positive correlation between the Islamic Spiritual Health Scale and Well-being Questionnaire. That may imply that the higher the level of spirituality, the higher the level of general psychological well-being or vice versa. It appears that the spiritual coping tools, discussed above, helped diabetic patients elevate their psychological well-being, which positively influences the way they deal with their illness. Thus, consistent with the literature, this finding support the holistic approach to health and well-being.

As expected, the results showed a significant positive correlation between the Islamic Spiritual Health Scale and diabetes Internal and Powerful-other (balanced) Locus of Control scales. It appears that the higher the ISHS level, the higher their balanced locus of control; or alternatively, the higher their balanced locus of control, the higher their ISHS level. While DILoC and DPOLoC measure two opposing concepts, their positive correlation with ISHS supports the notion of a balanced spiritual locus of control (Rasool, 2021). In other words, the results showed that diabetic patients with higher levels of both the internal and powerful-other locus of control may be said to have a higher balanced spiritual locus of control. They are possibly equally depending on their internal and other external means to manage their illness.

However, for the Multidimensional Measure of Islamic Spirituality, the results showed a significant positive correlation with diabetes chance and Powerful-other (unbalanced) locus of control. That indicates a greater reliance on external and chance resources than individual

internal resources to control the disease. The results of this hypothesis also showed a significant positive relationship between the diabetes Self-Management Questionnaire and the Multidimensional Measure of Islamic Spirituality, but a nonsignificant relationship with Islamic Spiritual Health Scale. That could be because the Multidimensional Measure of Islamic Spirituality (unlike ISHS) and diabetes Self-management mostly assess patients' compliance behaviors like diets, well-being habits, and medication regimes (external factors). That could also be due to the social desirability effect which may have resulted in response bias and low validity of the scale items (Dasti & Sitwat, 2014). The Authors of the scale, Dasti and Sitwat (2014) also stated that they did not examine the scale convergent and divergent validity and left it for future investigations. Thus, its low convergent validity with ISHS in this study could also explain its unexpected results with diabetes psychological measures like DDS, WBQ, and DLoCS

Third Hypothesis

The third hypothesis tested the mediation effect of diabetes general psychological well-being between Islamic spiritual well-being and diabetes physical health outcomes. Consistent with the literature (Asmawati et al., 2021; Satrianegara & Mallongi, 2020), diabetes Islamic spiritual well-being significantly predicted general psychological well-being. However, unlike what was expected, general psychological well-being did not significantly mediate the relationship between Islamic spiritual well-being and diabetes physical outcome. This could be due to self-report on this study's measures. They reported their HbA1c one time while it is a 3-month average blood sugar level. Also, the data showed that most of the missing values were on the Diabetes Self-Management Questionnaire assessing regular monitoring of sugar level and

taking medication. So, it is possible that they do not regularly monitor their sugar level and just put a hypothetical number not their actual level of HbA1c.

However, based on the literature on the psychological influence on physical health outcomes (Centers for Disease Control and Prevention, 2022; Gugun et al., 2021; Schmitt et al., 2013), this significant prediction of general psychological well-being by Islamic spirituality, and the previous significant correlations with the other diabetes psychological health outcomes may still suggest a significant indirect relationship between diabetes' physical outcome and Islamic spirituality. That could be confirmed by investigating a larger sample size or longitudinally implementing randomized trials to repeatedly collect and manipulate participants' data over a long period of time. Moreover, this study did not focus on a specific type of diabetes which could be related to the unexpected results. Thus, future studies may focus on one type of diabetes with the consideration of their differences and how to best examine their behavioral/social determinants. In other words, further focused investigation of Islamic spirituality and diabetes physical outcomes may reveal significant findings. Supporting a holistic approach to health, this hypothesis finding provides evidence on the significant relationship between the psychological and spiritual aspects of chronic illnesses and insight into future examinations of the relationship between these two aspects and the physical one.

There are several strengths to this study. First, it is a unique study that offers unique findings to address a global chronic illness dilemma like diabetes. It provides insights to address the urgent need to intervene with the high prevalence of diabetes among Muslim Americans. It attempted to bridge the literature gap on Muslim Americans well-being data. It supports the significant relationship between chronic illnesses' psychological and spiritual well-being. It recruited people locally and globally, allowing a higher chance for generalizability. In addition,

the study had a diverse population (diverse age groups, ethnicities, genders, educational levels, and economic statuses). Also, while it targets the Muslim population, it can be replicated with other populations with different spiritual backgrounds. Finally, it provides future investigations insight into the advantages of a holistic health approach and the impact of the deeper social/spiritual layer, not only on diabetes but also on other chronic illnesses like hypertension and cardiovascular diseases.

The study has several limitations as well. There were some unexpected recruitment issues like the months of waiting time for ACCESS and ICD approval, limited information/means on how to reach participants in these organizations, and, consequently, low response rate. Thus, the sample size ended up being less than was aimed for (250), making it hard to generalize the significant findings. The study shifted from local in-person sampling to online global sampling which may make it challenging to replicate this study. Also, the self-reported measures may have resulted in the nonsignificant mediation analysis. The aim was to target Muslim Americans, but the sample included participants from other countries. While both spirituality scales have shown significant internal consistency, they had low convergent validity. Thus, to some degree, the study results differed based on each one of these measures emphasizing the importance of ensuring significant convergent validity in future investigations. Furthermore, confounding variables like diabetes type, age and gender were not controlled for. Thus, future studies may consider that for significant findings.

This study investigated the impact of the holistic health approach on chronically ill populations. It examined the relationship between Islamic spiritual well-being as the deeper layer of health and diabetes physical and psychological health outcomes as the first two common layers of health. While a significant relationship between Islamic spiritual well-being and

diabetes psychological health outcomes was found, further investigations are needed to support such a relationship. Moreover, further investigation is also recommended to examine the mediation of diabetes general psychological health outcomes between Islamic spiritual well-being and diabetes physical health outcome.

Tables

Table 1:

Demographic Characteristics of Participants

	Frequency (%)
HbA1c%	
7-7.90	56 (56%)
8-8.90	27 (27%)
9-9.90	12 (12%)
10.00	5 (5%)
Gender	
Male	44 (44%)
Female	56 (56%)
Age	
18-24	16 (16%)
25-34	27 (27%)
35-44	18 (18%)
45-54	18 (18%)
55-64	13 (13%)
65-74	7 (7%)
75 or more	1 (1%)
Ethnicity/Race	
African American	19 (19%)
Asian	32 (32%)
Hispanic	2 (2%)
Indian American	1 (1%)
Middle East or North Africa	34 (34%)
White	11 (11%)
Education	
Less than a high school diploma	11 (11%)
High school diploma	15 (15%)
Some college education	15 (15%)
Bachelor's degree	34 (34%)
Higher education degree	25 (25%)
Household Income	
$0.00-$24,999.00	35 (35%)
$25,000.00-$49,999.00	26 (26%)
$50,000.00-$74,999.00	16 (16%)
$75,000.00-$99,999.00	15 (15%)
$100,000.00-$149,999.00	2 (2%)
$150,000.00 or more	4 (4%)

Table 2:

Measures Descriptive statistics

	Mean	Standard Deviation
Glycated Hemoglobin (HbA1c%) Level	8.0	.87
Islamic Spiritual Health Scale	50.06	13.03
Multidimensional Measure of Islamic Spirituality	207.22	20.96
Well-Being Questionnaire	28.92	12.70
Diabetes Self-management Questionnaire	9.30	1.07
Diabetes Distress Scale	3.46	0.86
Diabetes Locus of Control:		
Internal Locus of Control	11.64	4.31
Powerful Other Locus of Control	18.66	5.76
Chance Locus of Control	22.40	5.09

Table 3:
Correlations between Islamic Spiritual Well-being and Diabetes Measures

		Islamic Spiritual Health Scale/ISHS	Multidimensional Measure of Islamic Spirituality/MMoIS
Well-Being Questionnaire /WBQ	*r*	**.524****	**-.209***
	Sig.	**<.001**	**.037**
Diabetes Self-Management Questionnaire /DSMQ	*r*	-.014	**.221***
	Sig.	.886	**.027**
Diabetes Distress Scale /DDS	*r*	**-.372****	**.319****
	Sig.	**<.001**	**.001**
Diabetes Internal Locus of Control/DILoC	*r*	**.376****	-.168
	Sig.	**<.001**	.094
Diabetes Powerful others Locus of Control/DPOLoC	*r*	**.263****	**.224***
	Sig.	**.008**	**.025**
Diabetes Chance Locus of Control/DCLoC	*r*	.073	**.415****
	Sig.	.473	**<.001**
Glycated Hemoglobin (HbA1c%) level	*r*	-.016	.005
	Sig.	.871	.963

*Notes. **. Correlation is significant at the 0.01 level (2-tailed).*

**. Correlation is significant at the 0.05 level (2-tailed).*

Table 4:

ISHS Mediation Results

		M (WBQ)					Y(HbA1c)			
Antecedent		*B*	*SE*	*p*	*β*		*B*	*SE*	*p*	*β*
X (ISHS)	*α*	.510	.084	.000	.524	*c'*	-.004	.008	.633	-.057
M (WBQ)		-	-	-		*b*	.005	.008	.517	.077
		R^2 = .524					R^2 = .068			
		F (1,98) = 37.020, *p=.000*					*F* (2,97) = .225, *p=.799*			

Table 5:

MMoIS Mediation Results

		M (WBQ)					Y(HbA1c)			
Antecedent		*B*	*SE*	*p*	*β*		*B*	*SE*	*p*	*β*
X (*MMoIS*)	*α*	-.127	.060	.037	-.209	*c'*	.006	.004	.883	.015
M (WBQ)		-	-	-		*b*	.004	.007	.625	.051
		R^2 = .209					R^2 = .050			
		F (1,98) = 4.491, *p=.037*					*F* (2,97) = .121, *p=.886*			

Figures

Figure 1:

Model of WBQ Mediation Between ISH and HbA1c

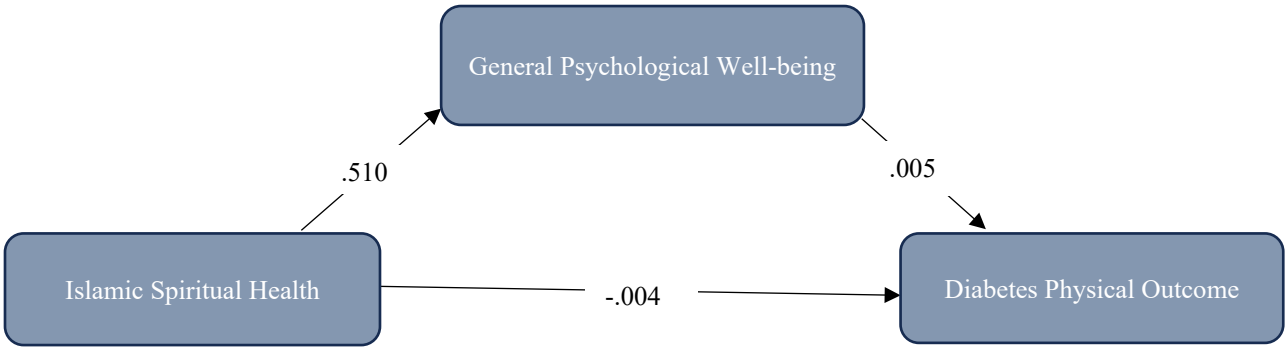
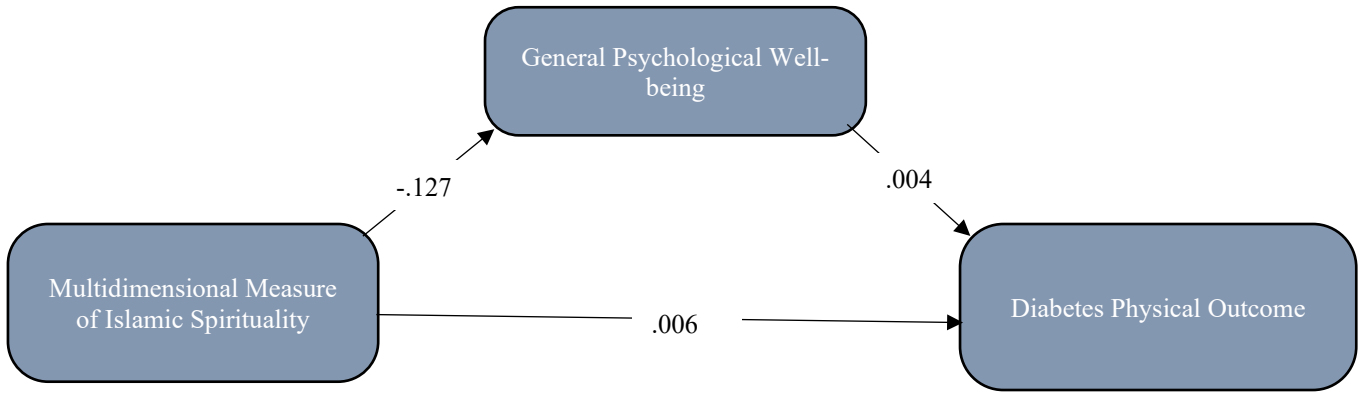


Figure 2:

Model of WBQ Mediation Between MMoIS and HbA1c



Appendices

Appendix A: Consent Form

UNIVERSITY OF MICHIGAN CONSENT TO BE PART OF A RESEARCH STUDY

Welcome!
Purpose of the study: The purpose of this study is to assess people's spiritual health and how it affects their psychological and physical well-being. Specifically, this study will examine the relationship between Islamic spiritual health and diabetic individual's psychological and physical well-being.

Description of Subject Involvement: The study should take you around 30 minutes to complete. Your participation in this research study is completely voluntary. You have the right to withdraw at any point during the study.

Eligibility Requirements:
- 18 years of age or older
- Identify as Muslim
- Diagnosed with Diabetes

Benefits: You may not receive any personal benefits from being in this study. However, others may benefit from the knowledge gained from this study as it may contribute to the research on experiences and knowledge of impact spiritual health on the overall well-being among the Muslim population.

Risks and Discomforts: The risks of participating in this study are minimal and do not exceed any risks that occur in everyday life. You may experience discomfort from asking personal questions regarding medical decisions. To alleviate any discomfort all participants will be given a link to psychological resources at the end of the study.

Compensation: If you complete the full questionnaire and give us your contact information, you will receive a compensation of $8.00 gift card. If you have completed the survey and do not wish to receive compensation, do not provide your contact information.

Confidentiality: To protect your information, you will not be asked to identify yourself on the survey. Furthermore, Qualtrics will remove your IP address from your data file, so that your identity remains anonymous.

Voluntary Nature of the Study: Participating in this study is completely voluntary. Even if you decide to participate now, you may change your mind and stop at any time.

Contact Information: Please contact the researchers listed below to:
• Obtain more information about the study
• Ask a question about the study procedures
• Express a concern about the study

Principal Investigator: Wafa Askar, M. S. Email: waskar@umich.edu
Faculty Advisor: Dr. Nancy Wrobel Email: nwrobel@umich.edu Phone: (313)-593-5520

If you have questions about your rights as a research participant, or wish to obtain information, ask questions or discuss any concerns about this study with someone other than the researcher(s), please contact the following:

- University of Michigan Health Sciences and Behavioral Sciences Institutional Review Board (IRB-HSBS) 2800 Plymouth Road Building 520, Room 1169Ann Arbor, MI 48109-2800 Telephone: 734-936-0933 or toll free (866) 936-0933 Fax: 734-936-1852 E-mail: irbhsbs@umich.edu
- You can also contact the University of Michigan Compliance Hotline at 1-866-990-0111

This study (HUM00241265) has been determined to be exempt from IRB oversight by the Health Sciences and Behavioral Sciences Institutional Review Board.

Please note that there will be attention check questions throughout the survey. In order to receive compensation, please read and respond to all items carefully.

By continuing with the study, you acknowledge that your participation in the study is voluntary, you meet all the eligibility requirements above, and that you are aware that you may choose to terminate your participation in the study at any time and for any reason.

Appendix B: English Flyer

UNIVERSITY OF MICHIGAN-DEARBORN

STUDY OF DIABETES AND SPIRITUAL HEALTH IN MUSLIM AMERICANS

GET $20.00!

REQUIREMENTS

COMPLETE ~30 MINUTES SURVEY.

ELIGIBILITY REQUIREMENTS

18 YEARS OF AGE OR OLDER
IDENTIFY AS MUSLIM
DIAGNOSED WITH DIABETES
RESIDES THE UNITED STATES

TO COMPLETETHE SURVEY PLEASE USE THE LINK BELOW OR SCANN THIS QR CODE BY PHONE CAMERA:

HTTPS://UMICH.QUALTRICS.COM/JFE/FORM/SV_EPOSMFIKRQQMIOO

RESEARCHERS:

WAFA ASKAR: UNIVERSITY OF MICHIGAN DEARBORN M.S. STUDENT.

NANCY WROBEL: UNIVERSITY OF MICHIGAN DEARBORN PSYCHOLOGY PROFESSOR.

EMAIL:RESEARCHSTUDIES24@GMAIL.COM

Appendix C: Arabic Flyer

UNIVERSITY OF MICHIGAN-DEARBORN

دراسة مرض السكري والصحة الروحية لدى الأمريكيين المسلمين

احصل على: 20$

المتطلبات:

إكمال إستبيان قد يستغرق ~ ٣٠دقيقة.

الأهلية:

١٨سنة من العمر أو أكثر
مسلم
يعاني من مرض السكري
يسكن الولايات المتحدة

لإكمال الاستبيان، يرجى إستخدام الرابط أدناه أو رمز الاستجابة السريعة باستخدام كامرة التلفون

https://umich.qualtrics.com/jfe/form/SV_ePOsmFIKRqQMiOO

الباحثون:

وفاء عسكر: طالبة ماجستير في جامعة ميشيغان ديربورن.
نانسي وروبل: أستاذة علم النفس بجامعة ميشيغان ديربورن.
البريد الإلكتروني:
researchstudies24@gmail.com

Appendix I: Debriefing Messages

For Prolific Participants:

We greatly appreciate your participation!

If you are feeling any distress from the questions please use the links below for psychological resources:
Michigan Psychological
Association: https://www.michiganpsychologicalassociation.org/
Behavioral Health Arab at the Community Center for Economic and Social Services (ACCESS): https://www.accesscommunity.org/health-wellness/behavioral-health

Please note that once you are done with this survey, you will be redirected to Prolific platform.

For Local Participants:

We greatly appreciate your participation!

If you wish to enter your contact information to be compensated, please continue to the next page. If you do not wish to be compensated, please skip the next page to the end of the survey.

If you are feeling any distress from the questions, please use the links below for psychological resources:
Michigan Psychological
Association: https://www.michiganpsychologicalassociation.org/
Behavioral Health Arab at the Community Center for Economic and Social Services (ACCESS): https://www.accesscommunity.org/health-wellness/behavioral-health

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