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INFLUENCE OF HEALTH BELIEFS ON DIABETES SELF-CARE IN SAUDI ADULTS

by

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A Dissertation Submitted in

Partial Fulfillment of the

Requirements for the Degree of

Doctor of Philosophy

in Nursing

at

The University of Wisconsin-Milwaukee

May 2017

ABSTRACT

INFLUENCE OF HEALTH BELIEFS ON DIABETES SELF-CARE IN SAUDI ADULTS

by

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The University of Wisconsin-Milwaukee, 2017
Under the Supervision of Professor Julia Snethen

The prevalence of Diabetes Mellitus Type 2 (DMT2) has increased among the adult population in Saudi Arabia. Many Saudi adults with DMT2 fail to follow the recommended daily self-care activities, increasing their risk for diabetes-related complications. Findings in the literature show that people's health beliefs influence their self-care behaviors. However, limited studies were found to examine the association between the health beliefs of Saudi adults with DMT2 and their diabetes self-care. Therefore, the aim of this dissertation study was to examine the relationship between the health beliefs of adults in Saudi Arabia with DMT2 and their reported adherence to their self-care activities to manage their diabetes. Additionally, the study was conducted to explore Saudi perceptions of threats to their health due to having DMT2. The Health Belief Model was the conceptual framework for this study, and a descriptive, correlational design was used. Data was collected using self-reported questionnaires, and 202 Saudi adults with DMT2 were recruited from diabetes clinics in Riyadh, Saudi Arabia. The findings of the study showed that self-efficacy, internal health locus of control, and perceived benefits of doing self-care were the significant predictors of whether the participants followed their self-care activities to manage their diabetes. Therefore, health care providers are encouraged to assess the health beliefs of persons with DMT2 in order to maintain and improve the patients' adherence to self-care activities.

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ADA	American Diabetes Association
DFU	Diabetic Foot Ulcer
DMT1	Diabetes Mellitus Type 1
DMT2	Diabetes Mellitus Type 2
HbA1c	Glycated Hemoglobin
HBM	Health Belif Model
HLoC	Health Locus of Control
IDF	International Diabetes Federation
MDRC	Michigan Diabetes Research Center
MDSMS	Multidisciplinary Self-Management and Support
MOH	Ministry of Health
MP	Major Professor
NIH	National Institutes of Health
PHC	Primary Health Care
PI	Principle Investigator
SAGIA	Saudi Arabian General Investment Authority
SD	Standard Deviation
WHO	World Health Organization

ACKNOWLEDGMENTS

Chapter One: Introduction to the Inquiry

Diabetes Mellitus Type 2 (DMT2) is a worldwide problem that is becoming more prevalent due to unhealthy lifestyles and increasing obesity rates (World Health Organization [WHO], 2016). The Middle East and North Africa countries have a high rate of diabetes cases (type 1 and 2) because of the modification of the lifestyle to westernized patterns, especially for wealthy oil-producing countries. Since the discovery of oil in 1938 in Saudi Arabia, the society, culture, and economics of the country has changed enormously to a more modernist approach (Mufti, 2000). Most of the diabetes cases in the Middle East and North Africa countries are due to DMT2 (International Diabetes Federation [IDF], 2015). In 2014, Saudi Arabia had a high diabetes prevalence, including both types 1 and 2, for adults aged 20 to 79, with 25.527 (adult population in 1000s) deaths due to diabetes per year to Saudi adults within that age range (IDF, 2014).

In 2013, a study was conducted to examine the diabetes epidemic in 13 regions in Saudi Arabia with participants aged 15 years and older (El Bcheraoui et al., 2014). A total of 1,745,532 out of 10,735,000 of the participants were found to have diabetes, and 979,953 were pre-diabetic. Out of 5,590 participants who had a glycated hemoglobin (HbA1c) level drawn, 44% of them were found to have previously undiagnosed diabetes. A majority of the participants with diabetes (67%) reported to be diagnosed with DMT2, 13% of them had Diabetes Mellitus Type 1 (DMT1), and 20% did not know their type (El Bcheraoui et al., 2014). In 2015, there were 3.4 million cases of diabetes (type 1 and 2) in Saudi Arabia (IDF, 2015).

The prevalence of the disease is expected to increase significantly in upcoming years as the rate of obesity continues to rise (Al-Quwaidhi, Pearce, Sobngwi, Critchley, & O'Flaherty, 2013). In a recent review by Alzaman and Ali (2016), the prevalence of obesity has increased in

Arab countries, including Saudi Arabia due to many factors such as cultural norms, sedentary lifestyle, and lack of physical activity. Furthermore, Saudi people who were obese or overweight were found to have uncontrolled diabetes. Of particular concern to the healthcare community is that uncontrolled diabetes in patients can lead to microvascular or macrovascular complications (Deshpande, Harris-Hayes, & Schootman, 2008). Microvascular complications secondary to diabetes mellitus includes damage to the eye, nervous system, and renal system, with macrovascular complications placing persons at risk for peripheral and cardiovascular disease and stroke. Additionally, people with diabetes can suffer from other complications such as dental problems and limited immunity to infections (Deshpande et al., 2008). Data from the Saudi National Diabetes Registry database was used in a cross-sectional study to provide information about the prevalence of diabetic retinopathy for 50,464 Saudis with DMT2 (Al-Rubeaan et al., 2015). The Saudi National Diabetes Registry database provided information about the presence of retinopathy, neuropathy, nephropathy, coronary and cardiovascular disease, and vascular and peripheral vascular problems. Additionally, it contained information about additional comorbidities, including hyperlipidemia, hypertension, and thyroid problems. Al-Rubeaan et al. (2015) found that 11% of the participants had nephropathy, 18% had vascular problems, 39% had hyperlipidemia, and 51% had hypertension. Twenty percent of the participants had diabetic retinopathy, and the prevalence of retinopathy was significantly higher in males (22%) than females (17%; $p < 0.001$).

Likewise, a cross-sectional study examined the prevalence of foot problems and its risk factors in 62,681 Saudi adults with diabetes (aged 25 years and older; Al-Rubeaan et al., 2015). The results showed that 2,071 (3%) participants had diabetic foot problems, and 62% of them had a foot ulcer (61% current and 39% had a history of ulcer). The remaining participants had

developed gangrene (n = 119) or had a lower extremity amputation (n = 667). People with

diabetes who develop foot ulcers secondary to diabetes were found to have a low quality of life

and suffer from psychological problems (Navicharern, 2012; Siersma et al., 2014). Additionally,

having a foot problem, such as an ulcer, affects the person self-care activities and decreases their

mobility (Rieger, Schnepp, & Herber, 2007; Siersma et al., 2014).

Diabetes Health Care System in Saudi Arabia

       Overview. The Ministry of Health (MOH) is the primary governmental agency that

regulates the health care system in Saudi Arabia, and supervises and plans healthcare services in

private and public health sectors. Additionally, the MOH sets healthcare policies in the

Kingdom, and account for 60% of the total healthcare services in the country (Almalki,

Fitzgerald, & Clark, 2011). Although the MOH has some control over the activities of other

governmental agencies and the private sector, it mostly focuses on its services (Mufti, 2000).

Other major governmental organizations also provide healthcare services to people beside the

MOH such as the National Guards Health Affairs, Saudi Red Crescent Society, Medical Services

Division of Ministry of Defense and Aviation, Ministry of Interior (Mufti, 2000), and other

governmental hospitals (Almalki et al., 2011).

       The Saudi healthcare system has gone through many developmental changes to improve

the healthcare services in the country. In 1926, organized medical care was established in

particular cities in Saudi Arabia such as Makkah, Madinah, Jeddah, and Taif (all located in the

west region of the Kingdom). After 1964, a rapid change in the Saudi healthcare system

happened and by 1950, more hospitals and clinics were opened in multiple cities in the Kingdom

(Mufti, 2000). In 1951, the MOH was developed and since then, it went through several

developmental changes (WHO, 2006), though the healthcare services were curative and mostly

provided at hospitals. Little emphasis was placed on Primary Health Care (PHC), until the 1980s when the WHO emphasized the need for implementing the *Health for All* movement in Saudi Arabia. The *Health for All* movement highlighted the importance of PHC services to health and disease management (WHO, 2006), for example, for a chronic illness such as diabetes. In 2014, there were 453 hospitals in Saudi Arabia in general, 270 hospitals run by the MOH, and 42 other governmental hospitals. The number of general and specialized private polyclinics in 2014 was 2,412. Additionally, in 2014, there were 2281 PHC clinics run by the MOH, and each clinic provided care to an average number of 13,490 persons (MOH, 2014).

In 2014, there were only 21 diabetes centers run by the MOH (MOH, 2014); no data are available about the number of diabetes centers at other governmental hospitals or the number of diabetes educators. In some cities, there were two diabetes centers run by MOH such as Makkah, Qaseem, Northern, and Jazan. However, in the Capital City Riyadh, only one diabetes center was open as well as in other cities such as Jeddah, Madinah, Eastern, Al-Ahsa, Hafr Al-Baten, Aseer, Bishah, Najran, Al Bahah, Al-Jouf, Qurayyat, and Qunfudah (MOH, 2014). However, the MOH plans to open eight additional diabetes centers in the future to increase the capacity of services to people with diabetes and to provide high-quality health and educational services (MOH, 2013).

In 2011, the MOH opened the diabetes center at Prince Salman Bin Abdul-Aziz hospital in Riyadh city. Twenty nurses, 22 diabetic specialists and consultants, and other administrative and technical staff were hired to work at the center. The center included two diabetic clinics as well as other 20 specialized clinics that focused on the diabetic foot, gestational diabetes, health and nutrition education, eye problems, kidney problems, and other health conditions. The center provides several services to people with diabetes that focus on improving treatment and

management. Additionally, the center provides educational activities to healthcare providers as well as people about diabetes (MOH, 2011).

Access to care. In part 5 of the Basic Law of Saudi Arabia Rights of the Saudi Citizen, Article 27th stated that "The State shall guarantee the right of the citizen and his family in emergencies, sickness, disability, and old age" (Saudi Arabian General Investment Authority [SAGIA], 1992, p. 5). Additionally, Article 31 stated, "The State shall be responsible for the care of public health, and shall provide health care to every citizen" (SAGIA, 1992, p. 6). In 2002, a royal announcement was issued to emphases that healthcare services should be provided to people in Saudi Arabia in an organized, affordable, and equitable way (WHO, 2006).

People who work in the public sectors receive full and free access to all public healthcare services (Almalki et al., 2011). In 2014, the total patients' visit to all public health sectors (47% MOH; 17% other governmental hospitals) and private health sectors (36%) was 537,062 visits/day. The Total number of visits in 2014 to PHC was 51.26 million, and 90% of them were by Saudi people (MOH, 2014). Additionally, 62% visits were reported for general outpatient clinics, and most of them were in Riyadh City (15.7%). The total MOH hospital visits for diabetes in 2014 was 477,211, and in Riyadh City alone, it was 96,651. The total number of amputation cases in medical rehabilitation centers caused by diabetic gangrene was 1,353 cases (MOH, 2014).

The government of Saudi Arabia is facing challenges in the healthcare system related to cost, as they are escalating, and the government sponsors the total expenditure for public health services, which are free of charge. Additionally, the rapid growth of the population in the country has contributed to the increases in the healthcare burden on the government (Almalki et al., 2011). The life expectancy in Saudi Arabia was 74.2 years in 2014, which was higher than the

regional average by six years and higher than the global average by four years. The size of MOH budget in 2014 was $15, 987782.35, and accounted for 7% of the total governmental budget, higher than the budget for 2013 by 0.41% (MOH, 2014). Additionally, the cost of diabetes per Saudi person was $1,067.3 (IDF, 2014). Therefore, the Council for Cooperative Health Insurance was established and applied for non-Saudi and Saudis who work in the private sector to decrease the costs of healthcare to the government. The Council for Cooperative Health Insurance controls and supervises the health care insurance plan for Saudi healthcare market. The public healthcare system does not offer free services to people who work in the private sector, except for emergency care (Almalki et al., 2011). For instance, the MOH hospitals emergency visits because of diabetes for Saudis were 662,069 visits and for non-Saudi were 75,160 visits (MOH, 2014). Additionally, Saudi with DMT2 (N = 4705) who are not eligible to receive free governmental health services their health insurance covers only 2% of the total medical services at public hospitals (Al-Rubeaan et al., 2015).

Diabetes guidelines and services. The MOH developed clinical guidelines for diabetes management to standardize patient care at diabetes centers. The guidelines were developed based on international standards for diabetes care (MOH, 2013), such as the ADA recommendations for medical care in diabetes. The MOH, however, has not updated the guidelines since 2013. For the purpose of this study, the ADA (2017) guidelines will also be used to exemplify the ideal standards of diabetes management since it is updated annually and used by a member of health care centers worldwide including Saudi Arabia. In this section however, the services offered to people with diabetes (DMT1 or DMT2) in Saudi Arabia will be discussed.

Follow-up and screening. According to the ADA guidelines, people with diabetes should have regular follow-up counseling with their health care providers (ADA, 2017). Regular follow-

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up with healthcare providers is important to help people with diabetes detect and treat problems early (Shrivastava, Shrivastava, & Ramasamy, 2013). According to the Saudi National Plan of Diabetes Control for the year 2010 to 2020, DMT2 and its complications should be detected early in order to implement evidence-based treatments soon as possible (MOH, 2013). Therefore, the MOH emphasizes that people with DMT2 should have an annual ophthalmologic examination, nephrology screening, and diabetic peripheral neuropathy assessment. Additionally, people with diabetes should have a continuous evaluation for their general and psychosocial health and assessment of comorbidities (MOH, 2013).

Glycemic control. For people with diabetes, the standards of glycemic control set by ADA (2017) is HbA1c level less than 7%. The HbA1c test should be performed at least two times per year for people who have a good glycemic control (< 7%). The HbA1c test should be performed 4 times per year for people with diabetes who did not meet the glycemic control standards (> 7%). People with diabetes who did not meet the glycemic control standards are encouraged to check their blood sugar level daily (ADA, 2017).

Medication. The ADA emphasizes that people should adhere to their medication regimes in order to have a successful diabetes management (ADA, 2017). Additionally, medication such as metformin could be given to people with DMT2 to help them manage the disease. If the person with DMT2 fail to meet the HbA1c standards (< 7%) for three or 6 months, then another oral hypoglycemic agent can be given or insulin therapy should be considered (MOH, 2014).

Blood glucose monitoring. People with diabetes who are one insulin therapy are encouraged to check their blood sugar level before meals, exercise, driving, and at bedtime (ADA, 2017). Additionally, they are encouraged to check their blood sugar when they suspect hypoglycemia. Additionally, the ADA emphasizes that people with diabetes should receive

individualized education about self-monitoring of blood glucose since it is helpful to guide the treatment decision for individuals on insulin or noninsulin therapy (ADA, 2017; MOH, 2013).

Lifestyle modifications. The ADA encourages people with diabetes to make lifestyle modifications, which include being active and following a healthy diet. Additionally, the ADA emphasizes that health care providers should advice people with diabetes to modify their diet. However, the dietary modifications should be personalized to meet the patient's needs. People with DMT2 are advised to avoid food that is high in carbohydrate and high in protein to treat hypoglycemia since it only increases the insulin response without elevating the plasma glucose level (ADA, 2017). The ADA additionally emphasizes that people with diabetes are encouraged to engage in moderate-intensity exercises for at least 150 minutes per week and to practice vigorous -intensity exercises for at least 75 minutes per week. Moreover, people with DMT2 are encouraged to move every 30 minutes and to decrease the amount of time they spend in doing inactive behaviors such as watching TV, working on computers, etc. (ADA, 2017).

Foot care. The ADA (2017) and the MOH (2013) emphasize the importance of having a continuous and comprehensive foot examination for people with diabetes at every visit. Additionally, people with diabetes should be assessed for their risk of developing foot problems and they should be educated about foot care that include nail and skin care and assessment and proper footwear selection. The MOH (2013) additionally emphases that a multidisciplinary approach should be use for people with diabetes who have a high risk for foot problems or who develop an ulcer.

Education and other services. The ADA and the MOH emphasize that people with diabetes should receive self-management education. Additionally, all people with diabetes should receive preventative and healthcare services needed to manage the disease and prevent

complications (ADA, 2017; MOH, 2013). Accordingly, the MOH specified that some of the responsibilities of the podiatrists at the diabetic center include treating foot problems, prescribing physical therapy, and providing foot care education. The diabetes nurse educator is recommended to be a Saudi nurse, and if not, the educator should be an Arabic speaker to help the people with diabetes benefit from the educations. The diabetic nurse educator should have at least three months training that includes: performing an assessment of the patient with diabetes, developing individualized educational plans that focuses on promoting diabetes self-care, and provide health and diabetes education. The diabetic dietitian is also responsible for developing and planning healthy eating practices for people with diabetes who are attending the diabetic center (MOH, 2013).

Statement of the Problem

  Self-care of diabetes mellitus type 2. DMT2 is a chronic disease that can be managed if the person adheres to their treatment (Shrivastava et al., 2013). Providing ongoing education to persons' with diabetes can help them achieve their treatment goals (Haas et al., 2013); however, they also need to perform their daily self-care activities in order to manage the disease. Healthcare providers emphasize the need for persons with diabetes to carry out self-care activities to reduce their risk of developing secondary health problems (Shrivastava et al., 2013). The recommended daily self-care activities a person with diabetes should perform include: Eating a healthy diet, taking prescribed medication, performing foot care, exercising regularly, and monitoring their blood glucose (ADA, 2017; MOH, 2013; Shrivastava et al., 2013; Toobert, Hampson, Glasgow, 2000). Additionally, good metabolic control can help prevent or delay the development of diabetes complications (Shrivastava et al., 2013).

Performing diabetes self-care activities and incorporating them into people's daily life can be challenging. Diabetes self-care mandates that the person to make several lifestyle and dietary modifications (Shrivastava et al., 2013), which could be difficult for some people with DMT2. For instance, a study included 210 Saudi adults with DMT2 to examine their self-care activities (Al Johani, Kendall, & Snider, 2015). The results showed that although 87% of the participants reported that their health care providers advised them to exercise daily such as walking, 47% of them did not follow their healthcare providers' advice. Additionally, 97% of them indicated that their health care provider advised them to test their blood glucose, yet 85% of them did not check it regularly. The majority of the participants did not check their feet daily (59%) and did not follow a healthy eating plan (71%). Another study found that Saudi adults with diabetes (N = 386) took their medications (95%); however, they had a lower adherence to blood glucose testing (22%), exercise (41%), and following a specific diabetic diet (42%). (Sabbah & Shehri, 2014).

Culture and diabetes self-care. Culture can affect the way people with diabetes integrate self-care activities into their daily routine (Shrivastava et al., 2013). In Saudi Arabia, culture plays a huge role in how people behave and it can interfere with their self-care behaviors and thus effective diabetes management. Saudi people may struggle to make the necessary changes to manage their diabetes because of limited opportunities to exercise that also pair with unhealthy diet (Asiri, 2015). A study was conducted which included 2,023 Saudi people with diabetes from eight PHCs (Bani, 2015). The investigator found that 65% of the participants were unhappy about making dietary changes (65%) to lose weight, and to exercise (61%). Additionally, 19% of the participants perceived that alternative medicine such as weeds and plants could treat diabetes (Bani, 2015). Similarly, Sabra, Taha, Al-Zubier, and Al-Kurashi

(2010) conducted a study with 1,030 Saudi males with diabetes from PHCs (n = 8) in the Eastern region of Saudi Arabia. The findings revealed that 25% of the participants perceived that treatment could be discontinued if diabetes was well controlled for a month. Additionally, 46% of the participants indicated that warming the feet near the fire was an acceptable practice in cold weather, and 21% of them stated that following a diet was not important as long as they took their medication. Participants also reported that black seed (52%) and garlic (48%) could help treat diabetes (Sabra et al., 2010).

Self-efficacy. People's self-efficacy have been found to influence their health behavior, with increasing self-efficacy related to increased confidence in the ability to manage DMT2 and engage in healthy behaviors (Sharoni & Wu, 2012). In a study of 277 participants with diabetes and peripheral neuropathy, self-efficacy was found to be a significant factor positively influencing the participants' daily foot care (p-value < 0.001) (Chin, Huang, & Hsu, 2013). People with DMT2, who had high self-efficacy, had more adaptive diabetes self-care management, especially in their diet, exercise, medication, and blood glucose monitoring (Al-Khawaldeh, Al-Hassan, & Froelicher, 2012). Additionally, Saudi adults with DMT2 (N = 30) who reported having a high self-efficacy were found to have good adherence to exercise and foot care (Albargawi, Snethen, Al Gannass, Kelber, 2016). People with DMT2 (N = 309) who do not believe that they have the ability to stick to their diet plan without cheating, were found to consume a large amount of food in a short period of time. Conversely, those who believe that they have the ability to check their blood glucose level, select healthy food choices and test ketones in the urine, where found to monitor their blood sugar frequently (Aljasem, Peyrot, Wissow & Rubin, 2001).

Health locus of control. People with DMT2, who perceive to have a strong internal locus of control and can effectively manage their own health, have increased rates of adherence to diabetes treatment than those who perceive that their health is externally controlled (Morowatisharifabad, Mahmoodabad, Baghianimoghadam, & Tonekaboni, 2010). Additionally, people with a strong external locus of control beliefs had more depressive symptoms and poor glycemic control (Aberle et al., 2009). People with DMT2, who exercise have been found to have stronger internal control beliefs than external and seem to have higher self-esteem (Fuscaldi, Balsanelli, & Grossi, 2011). Some Saudi adults who believe they are in control of their diabetes have better adherence to their diet. However, others who believe that God controls their health condition, whether it will improve or get worse, were found to not adhere well to their diet (Albargawi et al., 2016). Persons with DMT2 who have an external locus of control belief tend to rely more on their doctors to manage the disease rather than on themselves (Kacerovsky-Bielesz et al., 2009).

Perceived benefit and barriers to self-care. How people with DMT2 view the benefits of diabetes treatment has been found to affect their performance of self-care behaviors. People with DMT2 who perceive they benefit from self-care and following their treatment, are more likely to engage in self-care behaviors. Additionally, people with diabetes who perceive that treatment benefits are higher than barriers tend to lower their sugar intake and body weight (Mohebi, Azadbakht, Feizi, Sharifirad, & Kargar, 2013). For instance, people with diabetes who perceived that adhering to their dietary plan is beneficial to their health were more likely to report that the diet will help them control their blood sugar level, enjoy eating, prevent complications, and decrease disease cost (Mohebi et al., 2013). People with DMT2, who perceive that adhering to their treatment is important to manage the disease, yet struggle to

perform the self-care activities, were found to blame themselves, feel depressed, and direct their dissatisfaction internally through self-deprecation (Beverly et al., 2012).

Peoples with diabetes perception of barriers to self-care was found to influence their health behaviors, and as the perceptions of barriers increased, the amount of self-care behaviors decreased. Perceptions of barriers to self-care could be based on psychological factors such as self-efficacy and social support, lack of access, and a poor understanding of self-care (Mohebi et al., 2013). It has been suggested that in Saudi Arabia, lack of social support, healthy environment, and education could be some of the barriers to diabetes self-care (Alneami & Coleman, 2016). Additionally, limited access to health care services can influence a person's self-care behavior, (Almalki et al., 2011), such as the unavailability of a diabetes center for care. Services that have a long waiting list may limit a patient's healthcare access, as in rural areas or distant and border regions (Almalki et al., 2011). In a study that included 506 Saudi adults with DMT2, it was found that the prevalence of the DMT2 complications was higher in people from urban areas (77%) than those in rural areas (70%; p = 0.035). However, people who lived in rural areas had multiple complications (17%) compared to adults in urban areas (12%), who generally had only one or two secondary health problems (p = 0.00; Khan et al., 2014).

Perceived threats (susceptibility and severity of diabetes). It has been suggested that people with diabetes become motivated to perform self-care activities when they perceived threats to their health due to potential diabetic complications (Harvey & Lawson, 2009). According to Harvey and Lawson, the motivation to change health behaviors increased when the complications from diabetes affected a person's daily quality of life. Additionally, self-care strategies were incorporated into the participants' lives when they perceived that changing health behaviors helped manage the disease. However, not all patients perceive that changing health

behaviors will lower their risk of developing complications due to diabetes, as evidenced by skipping appointments with dieticians, as they were deemed unnecessary (Spikmans et al., 2003). Similarly, Gale, Vedhara, Searle, Kemple, and Campbell (2008) reported that some people with DMT2 did not perform their foot care because they were focusing on other self-care activities such as diet and lowering their cholesterol level. However, as people with DMT2 observe someone they know with DMT2 developing a diabetic foot ulcer (DFU) and subsequent amputation, they report feeling concerned that they too could develop a DFU. Other people DMT2 perceived that foot care is important; however, they did not perceive that DFU is a serious condition, reporting that it can be cured fast (Gale et al., 2008).

Family and friends support. Social support was found to significantly influence the self-care behaviors of persons with DMT2, as family members can promote or inhibit persons with diabetes effectively managing their disease (Alneami & Coleman, 2016). Family members were found to influence the person with DMT2 self-care behaviors by interfering with their food choices (Mayberry & Osborn, 2012) which directly impacted the person with DMT2 blood sugar levels. Social support also influences the person with DMT2 psychosocial well-being, as eating a healthy diet was found to decrease people with DMT2 risk for depression; whereas, eating unhealthy food increases their risk for depression (Dipnall et al., 2015). Unsupportive family behavior was also found to negatively influence persons with DMT2 adherence to medication, and failure to follow their medication regimen lead to an increase in their HbA1c levels. Families who are very supportive (high social support) were found to positively promote a persons effective self-care of their DMT2 (Mayberry & Osborn, 2012). In Saudi Arabia, a lack of social support influences persons with DMT2 self-care, and is considered one of the barriers to changing health behaviors for Saudi with DMT2 (Alneami & Coleman, 2016). Adults in Saudi

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Arabia might become motivated to change their health behaviors to care for their DMT2 if their family members encourage or support those changes. Therefore, healthcare providers should include family support persons in the patient plan of care, especially when providing education (Asiri, 2015) regarding DMT2 self-care.

Significance of the Study

Saudis with DMT2 have high rates of complications due to the failure to perform DMT2 self-care activities (Al Johani et al., 2015; Sabbah & Shehri, 2014). People with DMT2 who struggle to perform their daily self-care activities have a lower quality of life (Saleh, Mumu, Ara, Hafez, & Ali, 2014) and a high risk of developing complications such as DFU (Saurabh et al., 2014). The development of DFU increases the rates of lower extremity amputations, and the mortality rate following the amputation (Margolis et al., 2011). Patients post lower extremity amputations report suffering from pain (Callaghan et al., 2011), decreased mobility, poorer quality of sleep (Ko & Cha, 2012), and report symptoms of depression (Coelho, Zantut-Wittmann & Parisi, 2014). Costs of DFU treatment are high, as the length of hospital stay has been reported to range from 1 to 118 days, with a cost ranging from $516.27 to $145,068.84, and the highest median fee was for people who had a major amputation, which exceeded $1000 per patient per day (Alzahrani, 2013).

The reported health beliefs of Saudi adults with DMT2 related to their diabetes self-care provides some insight into their challenges in changing health behaviors to effectively manage their DMT2. Examining the association between the health beliefs of adults with DMT2 and changing their health behaviors is important. Findings from this study can provide health care providers with greater insight into how the health beliefs of persons with DMT2 influence their self-care activities. Knowledge of the relationship between health beliefs and self-care activities

would allow the healthcare providers to adapt patient education to effectively address any misperceptions the patients might have related to their DMT2 self-care activities. It is hoped that as health care providers customize appropriate health information, patients with DMT2 will have greater understanding of the necessity of following their self-care activities, thereby decreasing DMT2 complications, healthcare costs and improving quality of life.

Saudis with DMT2 need to be knowledgeable about their condition, how to accurately and consistently perform self-care activities, and thus effectively manage their DMT2 (Asiri, 2015). Data in the literature emphasized the need to assess factors that affect people's behavior to improve their diabetes self-care (Haas et al., 2014). In a study that included 260 Saudi people with diabetes, 80% of the participants reported understanding the health care providers' instructions; yet only 55% reporting actualy following the instructions (Al-Arfaj, 2010). The findings from this study might be instrumental in the development of a policy that ensures health care providers assess people's beliefs and barriers to self-care at each health care visit in order to develop interventions to improve each patient's diabetes self-care.

Additionally, the finding from this study can support the implementation of interventions to promote healthy behaviors in persons with DMT2. Critchley, Hardie, and Moore (2012) implemented a healthy living course group-based lifestyle program for people with DMT2. Participants received education about diabetes, diet, exercise, psychosocial issues, support, and strategies for effective health behavior changes. The program was found to increase participants' healthy behaviors, self-efficacy, and knowledge (Critchley et al., 2012). Obtaining greater insight into the health beliefs of Saudi adults with DMT2 would allow for designing a similar program to improve self-care by focusing on persons' health beliefs and barriers to self-care, which could help Saudi adults with DMT2 manage the disease better and avoid complications.

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Purpose of the Study

The purpose of this dissertation study was to recognize the health beliefs of people with DMT2 in order to keep them healthy and free from complications. People with diabetes are expected to adhere to their self-care regimens 7 days per week. When they perform self-care management regimens less than 7 days per week, this indicate that they have a low level of adherence to diabetes self-care activities (Toobert et al., 2000). The primary aim of this dissertation study was to examine the relationship between the health beliefs of adults in Saudi Arabia with DMT2 and their reported adherence to their self-care activities to manage their diabetes. The health beliefs that were examined in this dissertation study were: (a) self-efficacy, (b) health locus of control, (c) perceived threats of diabetes, (d) perceived barriers to and benefits of self-care, and (e) perceived family and friends support. A secondary aim was to explore participants' perceptions of threats to their health due to having DMT2.

Health Belief Model

The Health Belief Model (HBM) was used as the conceptual framework for this study, as it has been used in health promotion and education research (Hayden, 2009). The underlying concept of the HBM is that persons' health behavior is based on their beliefs about their disease (Becker, 1974, Hayden, 2009). The assumption of the HBM is that when people perceive their condition is threatening their health status, which can have undesirable health outcomes, the people will be motivated to take health-related action (Becker, 1974). Person's perception of threats involves recognizing the seriousness of the health condition and their risk for developing negative health outcomes. When people believe that the benefits of performing healthy behaviors outweigh the risk of getting a disease or developing secondary health problems, they engage in

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healthier behavior. People, however, need to have a strong perception of their ability to perform and maintain the healthy behaviors (Hayden, 2009).

The HBM had four main concepts: perceived seriousness, perceived susceptibility, perceived benefits, and perceived barriers. Each one of these four concepts (independently or in combination) can provide insight into a person's health behavior (Hayden, 2009). The concepts of perceived seriousness and perceived susceptibility are subsumed under the umbrella concept of perceived threats (Becker, 1974). Modifying factors in the model that alter peoples' health behaviors are cues to action, self-efficacy (Hayden, 2009), and health locus of control (Aalto & Uutela, 1997) and modifying factors that influence a person's perception of those constructs include age, gender, level of education, culture, and personal characteristics (Strecher, Champion, & Rosenstock, 1997).

Research Questions

1. What is the level of adherence to diabetes self-care activities in Saudi adults with DMT2?

2. What is the overall glycemic control of Saudi adults with DMT2?

3. Is there an association between the level of adherence to diabetes self-care activities for Saudi patients with DMT2 who have had and who have not had a diabetic foot ulcer?

4. How does a person's diabetes self-care activities vary based on demographic characteristics?

5. How do patients with DMT2 perceive that diabetes has impacted their health?

6. Controlling for demographic characteristics, do health beliefs (self-efficacy, health locus of control, perceived threats of diabetes, perceived barriers to and benefits of self-care, and perceived family and friends support) predict a significant amount of variance in the reported diabetes self-care activities in Saudi adults with DMT2?

Hypotheses

1. Saudi adults with DMT2 will report a low level of adherence (< 7 days/week) to diabetes self-care activities that is less than 7 days per week.

2. Saudi adults with DMT2 have poor glycemic control that is higher than the ADA (2017) standards of glycemic control (HbA1c $>7\%$).

3. Persons with a DFU would report that there were more likely to perform diabetes self-care activities than persons without a DFU.

4. The person's level of adherence to diabetes self-care activities will vary based on demographic characteristics.

5. The greater the Saudi adults with DMT2 perception of threat, the more likely they were to report doing diabetes self-care activities.

6. Controlling for demographic characteristics the health beliefs (self-efficacy, health locus of control, perceived threats of diabetes, perceived barriers to and benefits of self-care, and perceived family and friends support) will predict a significant amount of variance in the reported diabetes self-care activities in Saudi adults with DMT2.

Definition of Terms

Level of Adherence to Diabetes Self-Care Activities

The person's level of adherence to diabetes self-care activities is determined by how many times per week he or she reported to follow diet, do exercise, test blood glucose testing, perform foot care, and take medication (Toobert et al., 2000).

Perceived Threats

The person's perception of threats will be assessed by two short-answer questions that examine their belief about how diabetes can affect and harm the individual's health.

Additionally, the concepts of perceived seriousness and perceived susceptibility will represent the concept of perceived threats.

Perceived seriousness. Perceived seriousness is the person's perception of the severity of the disease (Hayden, 2009). In this study, the concept of perceived seriousness will be defined as the person's belief about the severity of DMT2.

Perceived susceptibility. Perceived susceptibility is the person assessment of his or her risk of getting the disease (Hayden, 2009). In this study, the concept of perceived susceptibility will be defined as the person assessment of his or her risk of developing diabetes complications.

Perceived Benefits

Perceived benefits are the person's judgment about adopting a new behavior, and whether it is better than what the person used to do (Hayden, 2009). In this study, the concept of perceived benefits will be defined as the person's judgment about the benefits of doing the diabetes self-care activities.

Perceived Barriers

The perceived barriers are the person's assessment of the factors that could prevent him or her from accepting a new behavior (Hayden, 2009). In this study, the concept of perceived barriers will be defined as the person's opinion of factors that stop him or her from doing diabetes self-care activities.

Cues to Action: Family and Friends Support

Cues to action are the factors that motivate people to change their health behavior such family, friends, health care providers, and others (Strecher et al., 1997). In this study, cues to action are the person's perception of the support received from family and friends on their diabetes self-care.

Self-Efficacy

Bandura's definition of self-efficacy as a person's belief about his/her capability to perform some behaviors (1997). In this study, self-efficacy will be defined as the persons' belief about their ability to adhere to diabetes self-care activities.

Health Locus of Control

The concept of health locus of control is a person's belief in the level of control he/she has to change his/her life and health (Wallston, 1992). In this study, three dimensions of the concept of health locus of control will be addressed: internal, God, and doctor. A person with an internal locus of control believed that the desired outcome is within his/her ability to control (Houts & Warland, 1989). In this study, the desired outcome will be adhering to self-care activities. God locus of control is the belief of the degree God controls the person's health and illness (Wallston et al., 1999). In this study, God and doctor health locus of control will be defined as the person's belief that God or a Doctor controls their diabetes and people with DMT2 have a minimum control over their health condition, which accordingly influence their adherence to diabetes self-care activities.

Assumptions

1. The health beliefs of people with DMT2 will guide their health behaviors.

2. Adhering to self-care activities is believed to be influenced by the degree the person with DMT2 perceives benefits of diabetes self-care and threats to complications.

3. The greater the participants perception of barriers to self-care activities the lower their level of adherence to diabetes self-care activities.

4. Saudi adults with DMT2 with a high self-efficacy belief will have greater adherence to diabetes self-care activities than participants with a low self-efficacy belief.

5. Saudi adults with DMT2 with a high internal health locus of control belief have greater adherence to diabetes self-care activities than participants who have Doctor or God health locus of control belief.

6. Adherence to diabetes self-care activities will lead to greater metabolic control.

Chapter Summary

DMT2 is a chronic disease that affects many Saudi adults, who struggle to perform their daily self-care activities, which increases their risk for complications. The Saudi culture has a tremendous impact on shaping a person's health beliefs about diabetes and its management, which accordingly influences their self-care behaviors. Little is known about the relationship between Saudi adults with DMT2 health beliefs and their self-care activities. This chapter addressed the problem, the purposes of the study, the significant of the study, the definition of the study concepts, and assumptions. Additionally, this chapter addressed the questions and hypotheses. The concepts of the HBM and their relationship were discussed.

Chapter Two: Literature Review

Introduction

DMT2 prevalence rates in Saudi Arabia is continuously increasing among Saudi adult aged 25 years. The prevalence of DMT2 is expected to rise to 44% in 2022 in this age group, especially if the prevalence of smoking and obesity continue to grow. If the observed obesity trend reached its highest level in males aged 35-44 years (35%) and females aged 45-54 years (60%), the prevalence of DMT2 is expected to increase to 31% in 2013 and to 40% by 2022 (Al-Quwaidhi et al., 2013).

Little is known about the effect of the health beliefs on Saudi Adults with DMT2, and their level of adherence to self-care activities. Accordingly, the aim of this study is to examine the relationship between health beliefs (self-efficacy, health locus of control, perceived threats of diabetes, perceived barriers to and benefits of self-care, and perceived family and friends support) and Saudi adults with DMT2 level adherence to diabetes self-care activities. Concepts of interest and a discussion about the theoretical framework for this investigation will be addressed in this research review of the state of the science regarding DMT2 in Saudi Arabia. Literature was selected from articles published in the fields of nursing, medical, and health psychology using the electronic databases: Cumulative Index to Nursing and Allied Health Literature (CINAHL), Medline, PubMed, and PsycINFO. Additional articles were chosen from the reference lists of published manuscripts, between 2000 to 2016. Keywords used for searching were self-efficacy, health beliefs, health locus of control, God belief, DMT2, social support, family, support, friends' support, self-care activities, barriers to treatment, benefits of treatment, adherence, diabetes severity, and threats of complication.

Diabetes Mellitus Type Two Causative Factors

  Diet. A high calorie diet leads to increased body weight which places the individual at increased risk for developing DMT2, (Parillo & Riccardi, 2004). Overweight and obesity are some of the main factors of insulin resistance syndrome in Saudis with DMT2 (Elhadd, Al-Amoudi & Alzahrani, 2007). Insulin resistance occurs in DMT2 when the body cannot use insulin properly, and the pancreas, tries to secrete extra insulin to maintain normal blood glucose levels. However, over time, the pancreas becomes unable to produce enough insulin to adequately control blood sugar levels DMT2 occurs (ADA, 2015). According to the 2013 Saudi Health Interview Survey, 34% of females and 24% of males were obese, and 48% of adults between 55 and 64 were obese (MOH, 2013). Studies have also found that dietary patterns may increase a person's risk of developing DMT2, specifically, people may be at higher risk for DMT2 if they consume large amounts of processed meats, fatty foods, and sugar-sweetened beverages (Hodge, English, O'Dea, & Giles, 2007; Schulze et al., 2005).

  A case-controlled study done in Saudi Arabia showed that the regular consumption of specific foods could increase a person's risk of developing DMT2. The specific foods included Kabsa (a traditional dish of rice and meat), dates, bakery items, French fries, potato chips, and fish. Drinking coffee and tea with surge also increased adults risk for DMT2 (Midhet, Al-Mohaimeed, & Sharaf, 2010). Another study included 159 adults with DMT2 (cases) and 128 control without the disease, 76% of the participants consumed fatty and fried foods. Additionally, 45% of adults with DMT2 and 76% of controls regularly drink tea and coffee with sugar (Murad, Abdulmageed, Iftikhar, & Sagga, 2014).

  Exercise. A lack of exercise significantly increases a person's risk of developing DMT2 (Hu et al., 2001). Many Saudi adults do not exercise, causing a higher rate of DMT2 in the

country. In terms of the effects of exercise on DMT2 development, females were found to be at the greatest risk for developing DMT2 due to lack of exercise (Alghadira, Awada, Al-Eisaa, & Alghwiri, 2014). Saudi females have been found to participate in inadequate amounts of physical activity. For example, in a study of 74 females who were obese and 70 females who were not obese, 75% of all participants did not exercise or do any kind of physical activity even one or two times a week (Rasheed, 1998). Weather and lack of physical resources and time were some of the barriers to physical activities for some people in Saudi Arabia (Amin, Suleman, Ali, Gamal, & Al Wehedy, 2011). Additionally, cultural barriers and lack of exercise facilities could be one of the main reasons that Saudi females do not engage in more physical activities (Badran & Laher, 2012). Some Saudi males were found to be inactive as females. For instance, among 17395 Saudi males and females aged 30 to 70 years only 6% were active in general, and 94% of males and 98% of females engaged in moderate intensity exercise activities that last less than 30 minutes and less than three times per week (Al-Nozha et al., 2007).

A study found that exercise enhances beta cell function in the pancreas and increases insulin secretion in individuals with DMT2 (Dela, Von Linstow, Mikines, & Galbo, 2004). However, many Saudi adults have sedentary lifestyles that include activities like watching television for long periods of time, and the lack of exercise involved in such lifestyles has led to a rapid increase in rates of obesity (Midhet et al., 2010). A sedentary lifestyle can decrease an individual's metabolic rate and lead to obesity, which can then cause DMT2 (Hu, 2003). A group of investigators conducted a study in 2011 to examine the current prevalence of non-communicable diseases in an urban region such as Riyadh City, which is the Capital City of Saudi Arabia (Al-Daghri et al., 2011). They included 9,149 Saudi people aged 7 to 80 years, and the total number of adults aged 18 to 80 years was 7,773 (about 85%). The prevalence of DMT2

was more common in adults aged 61 to 80 years (58%) and 46 to 60 years (47%), and the age-adjusted prevalence of obesity in females (40%) was significantly higher than males (25%; p < 0.001; Al-Daghri et al., 2011).

Genetic predisposition. Genetics is another risk factor for DMT2 (Barroso, 2005); however, the person's lifestyle is one of the main risk factors of the disease. Family history of diabetes was found to be one of the predictors of DMT2. Individuals who have one parent with DMT2 have a 40% risk of getting the disease, and those who have two parents with DMT2 have a 70% risk of developing the condition (Ahlqvist, Ahluwalia, & Groop, 2011). If one monozygotic twin has DMT2, there is a 70% chance of the other twin having the condition, while dizygotic twins have only a 20–30% risk of developing the condition if the other twin has it (Ahlqvist et al., 2011). In a study that included 159 Saudi adults with DMT2, 72% of the participants had a first degree relative that have the disease such as a mother, father, brother, and sister (Murad et al., 2014). Additionally, alternatives in 11 genes were significantly linked to DMT2 risk. These alternatives included CDKAL1, FTO, HHEX, IGF2BP2, JAZF1, KCNJ11, NOTCH2, PPARG, SLC30A8, TCF7L2, and WFS1 (Lyssenko et al., 2008). The prevalence of DMT2 in Saudi Arabia could be related to the increased genetic predisposition caused by the high incidence of consanguineous marriages within the country (Elhadd et al., 2007). A retrospective study of 210 cases found that consanguinity and familial aggregation of DMT2 in Saudi Arabia was one of the variables that contributes to the prevalence of the disease (Anokute, 1992).

Complications of Diabetes

Uncontrolled diabetes can lead to secondary health problems such as neuropathy, nephropathy, and retinopathy, (Deshpande et al., 2008); some Saudi adults with DMT2 were

found to have one or more complications from the diabetes. A study randomly included 506 Saudi adults with DMT2, and the result showed that the majority of the participants (73%) suffer from one or more diabetic complication (33% had one complication, 25% two complications, 15% multiple complications). The most common complications the participants had were cardiovascular problems, diabetic foot, peripheral neuropathy, renal problems, diabetic retinopathy, and cerebrovascular problems (Khan et al., 2014).

Neuropathy. Neuropathy is a common problem for people with uncontrolled diabetes (National Institutes of Health [NIH], 2009). Diabetic neuropathy is a group of diseases that affects almost all types of nerves and is caused by metabolic alterations, such as elevated blood sugars (Smeltzer & Bare, 2004). Neuropathy can be categorized as peripheral, autonomic, proximal, or focal (NIH, 2009), with autonomic and peripheral neuropathy the most common (Sytze, Cotter, Bravenboer, & Cameron, 2013). Distal symmetric polyneuropathy is the most common subtype of peripheral neuropathy; this subtype is associated with the individual having numbness and pain in the feet, and it can increase their risk of falling (Callaghan, Cheng, Stables, Smith, & Feldman, 2011).

Nephropathy. Diabetic nephropathy causes renal failure for many Saudi adults (Badran & Laher, 2012). Diabetic nephropathy occurs when an individual has proteinuria of more than 500 mg within 24 hours (Fowler, 2011). Diabetes affects the body's waste excretion process by affecting the kidney capillaries, which act as filters that allow waste products to pass and maintain useful substances such as red blood cells and proteins from passing. Hyperglycemia can cause the kidneys to filter blood excessively. Over time, this can damage the capillaries and result in loss of protein through the urine (ADA, 2015). Diabetic nephropathy has two stages: microalbuminuria and macroalbuminuria (Gross et al., 2005). Microalbuminuria, which is

indicated when patients excrete 20–200 µg of urinary albumin per minute in an overnight urine sample, is the first sign of renal problems in individuals with DMT2. During the macroalbuminuria stage, the individual excretes more than 200 µg of urinary albumin per minute (Remuzzi, Schieppati, & Ruggenenti, 2002). Microalbuminuria usually begins occurring at least 10 years after the person is diagnosed with DMT2 (Gross et al., 2005). If early treatment is not received for the microalbuminuria, it can progress and cause proteinuria and diabetic nephropathy (Fowler, 2008).

Retinopathy. The development of diabetic retinopathy in individuals with DMT2 depends on the duration and severity of hyperglycemia, and usually occurs approximately 7 years before an individual's diagnosis of DMT2 (Fowler, 2008). Two types of diabetic retinopathy have been identified: non-proliferative and proliferative (ADA, 2015). Non-proliferative diabetic retinopathy is a mild problem that is characterized by an elevation of vascular permeability that can later progress to moderate and severe stages, causing blood vessel obstruction. The proliferative diabetic retinopathy is a severe problem (Fong et al., 2004) and can block vision and cause vitreous hemorrhage (ADA, 2015).

Foot ulcers. DFU involve ulceration, infection, and damage of deep tissues in the feet that is caused by neurologic anomalies or peripheral arterial disease in the lower extremities in people with diabetes (Katsilambros, Dounis, Makrilakis, Tentolouris, & Tsapogas, 2010). People with DFU have a high risk of lower limb amputation in some point in their lives (Zubair, Malik, & Ahmad, 2012). In a study of 275 people with DMT2 in Saudi Arabia who had DFU, 49% of them had a lower limb amputated within a year (Alzahrani, Tashkandi, & Alzahrani, 2012).

Specific Comments on the Significance of Diabetic Foot Ulcers

      Causative factors. Diabetes can affect the small blood vessels in the body and the peripheral nerves, causing a peripheral diabetic neuropathy that later can cause DFU (Callaghan et al., 2011). Hyperglycemia increases the action of the two enzymes sorbitol dehydrogenase and aldose reductase causing the intracellular glucose to be converted to sorbitol and fructose. The buildup of these sugars (sorbitol and fructose) can reduce the synthesis of nerve cell myoinositol, which is necessary for normal neuron conduction (Clayton & Elasy, 2009). Therefore, frequent elevation of blood glucose level can cause a demyelination of the nerves and slow the nerve conduction (Porth & Matfin, 2009). The chemical process to convert glucose can further elevate nerve cell oxidative stress, which increases vasoconstriction and causes ischemia (Clayton & Elasy, 2009). The presence of ischemia can lead to nerve cell damage and a loss of sensation in the lower extremities, which consequently increases the person's risk of injuries and DFU (Porth & Matfin, 2009).

      Adherence to self-care activities is important, as failure to adhere to self-care activities increases the risk of developing DFU (Saurabh et al., 2014). A study was conducted with 350 Saudis with DMT2 who had no foot problems, 41% of them were found to wear unsuitable footwear; males were found to wear inappropriate footwear more than females (45% vs. 36% respectively). The majority of the participants (54%) had diabetes neuropathy, which put them at high risk of DFU (Ahmed, Algamdi, Algurashi, Alzhrani, & Khalid, 2014). Another study included 93 Saudi and 14 non-Saudi adult with diabetes found that 47% did not perform regular foot care, 32% of the adults had dry skin on their feet, and 31% had fungal infections. Additionally, 68% of the participants did not dry their feet after washing them for prayer and

37% of participants did not know the potential damaging effect of diabetes on the foot (Al-Khaldi, 2008).

Significance. People with DMT2 who have a foot ulcer secondary to diabetes have been found to have a diminished quality of life (Navicharern, 2012). In Saudi Arabia, it was found that poor quality of life was associated with ulcer severity and duration, as was the occurrence of multiple DFUs (Alzahrani & Sehlo, 2013). For instance, adults (N = 60) who had one or more DFU that were severe, and of long duration were found to report having a poor quality of life. Additionally, the participants were found to smoke and had diabetes complications more than adults without a DFU (Alzahrani & Sehlo, 2013). Pain is one major factor that diminishes the quality of life for a person with DFU (Callaghan et al., 2011), as can limitations to a person's mobility and their daily self-care practices (Goodridge, Trepman, & Embil, 2005; Siersma et al., 2014). It has been reported that the adults with DMT2 found that the decrease in mobility due to their ulcer was one of the worst things that happened to them (Rieger et al., 2007). DFU can also affect personal relationships with others; for example, DFUs can increase stress for patients as well as for the caregivers (Goodridge et al., 2005), and the person suffering from DFUs can be socially isolated (Nabuurs-Franssen, Huijberts, Nieuwenhuijzen Kruseman, Willems, & Schaper, 2005). People who have their first DFU were found to have a high mortality risk after 5 years (Winkley et al., 2012). People with DFUs may also face challenges with employment due to the ulcer, which lead to unemployment, early retirement, or were incapable of working because of disability or pain (Goodridge et al., 2005; Waters & Holloway, 2013).

Having an ulcer can cause emotional problems for the person, such as low self-esteem, feelings of guilt, and depression (Rieger et al., 2007). A study found that 41% of people with DFU had anxiety or depression (N = 1088; Siersma et al., 2014). Other researchers reported to

find that people with DFU had more symptoms of depression than those who were merely at risk

of DFU (Coelho, Zantut-Wittmann, & Parisi, 2014). Furthermore, having severe depression

affects a person's level of adherence to diabetic self-care activities, as depression has been found

to lead to poor adherence to diet, medication, and exercise (Gonzalez et al., 2007).

Strategies to Improved Diabetes Self-Care

Providing ongoing education to people with diabetes can help them achieve their

treatment goals (Haas et al., 2013). Diabetes self-management education is a continuous process

that helps enhance a person's knowledge and skills that are required to perform diabetes self-care

(Funnell et al., 2012). The aim of diabetes self-management is to improve people's lifestyle

practices (Nolan, Damm, & Prentki, 2011) and to help them take responsibility for controlling

their condition (Haas et al., 2013). Self-management programs have been found to be effective to

help people with diabetes manage their disease (Micklethwaite, Brownson, O'Toole, &

Kilpatrick, 2012; Steinsbekk, Rygg, Lisulo, Rise, & Fretheim, 2012). Furthermore, self-

management programs are significantly effective in increasing self-efficacy levels in people with

DMT2, as well as in improving their glycemic control, blood pressure, quality of life, body

weight (Moriyama et al., 2009), and self-care activities, such as regular inspection of their feet,

eating lower fat meals, and monitoring blood glucose levels (Rygg, Rise, Gronning, &

Steinsbekk, 2011). Attending education programs also helped increase people with DMT2's

acceptance of their health condition (Gregg, Callaghan, Hayes, & Glenn-Lawson, 2007).

Blood sugar monitoring is the best way that a person with diabetes can assess whether

their DMT2 is under control. Therefore, DMT2 patients are encouraged to check their blood

sugar frequently in order to prevent complications and effectively manage their disease (ADA,

2015). A cross-sectional study (N = 349) examined adults with DMT2 who were not treated with

insulin in order to assess the effect of self-monitoring of blood sugar level on glycemic control (Baltaci et al., 2012). The study found that patients who checked their blood sugar regularly had a significant decrease ($p = 0.0285$) in their HbA1c level compared to participants who did not regularly monitor their blood sugar (Baltaci et al., 2012). Data showed that maintaining blood glucose levels within a normal range could decrease the risk of developing diabetes complications (Meeuwisse-Pasterkamp, van der Klauw, & Wolffenbuttel, 2008). Additionally, the ADA (2017) has recommended that to prevent microvascular complications of diabetes, patients' HbA1c levels should be kept at less than 7%. Therefore, people with DMT2 are encouraged to adhere to their medication plan in order to control the disease and to keep their HbA1c levels in normal limits (Hill-Briggs et al., 2005).

People with diabetes are advised to avoid wearing shoes that can increase the risk of having a DFU (Ahmed et al., 2014; Braun, Fisk, Lev-Tov, Kirsner, & Isseroff, 2014). Furthermore, performing regular foot examinations can help minimize the risk of DFU and the need for future amputations (Alexiadou & Doupis, 2012). People with diabetes need to check the inside of their shoes before wearing them and avoid walking barefoot, as proper hygiene is necessary to protect the feet from problems (ADA, 2015). It is recommended that people with diabetes wash their feet daily with warm water, avoid soaking their feet, keep the skin between their toes dry to prevent infection, and use lotion on the tops, bottoms, and sides of the feet to keep the skin smooth (National Diabetes Education Program, 2015).

Some of the goals of nutritional therapy in diabetes are preventing complications, achieving glycemic control, and maintaining normal weight (Evert & Riddell, 2015). Therefore, people with diabetes are instructed to eat whole grain breads and cereals, eat low carbohydrate foods, avoid fried foods, and eat low-fat food (NIH, 2015). A study was conducted by Westman,

Yancy, Mavropoulos, Marquart, and McDuffie (2008) who found that following a low-carbohydrate ketogenic diet could help decrease body weight and improve HbA1c and high-density lipoprotein cholesterol levels in people with DMT2 who were obese. Esposito and colleagues (2009) compared the usefulness of a low-fat diet and a low-carbohydrate Mediterranean diet in managing DMT2 without anti-hyperglycemic medication. The researchers found that after 4 years, participants who followed the low-carbohydrate Mediterranean diet lost more weight, had better glycemic control, and decreased their risk of coronary problems more than participants who ate a low-fat diet. Additionally, only 44% of the participants who followed a low-carbohydrate Mediterranean diet needed to take anti glycemic medication compared to 70% of the low-fat diet group (Esposito et al., 2009).

Good blood pressure and lipid profile control is also important for people with diabetes to manage the disease, as well as exercise, stress reduction, and smoking cessation (ADA, 2017; Nolan et al., 2011). Regular exercise can help manage DMT2 and improve overall health (Colberg et al., 2010). Therefore, it is recommended that people with diabetes should do moderate-intensity exercises everyday and workout 7 days per week (ADA, 2017). In a meta-analysis study conducted by Boule, Haddad, Kenny, Wells, and Sigal (2002), it was found that exercising decreases HbA1c levels and reduces the risk of diabetic complications for people with DMT2. Aerobic interval activities that include low and high-intensity exercise were found to be more effective in attaining glycemic control in people with DMT2 than high-intensity continuous exercise (Karstoft, Christensen, Pedersen, & Solomon, 2014).

Treatment of Diabetic Foot Ulcer

Many treatment options can be used to cure or effectively manage DFU (Braun et al., 2014). An off-loading device is an essential method of DFU treatment that helps relieve pressure

on the affected foot (Andrews et al., 2015), and it is necessary to promote healing (Kravitz et al., 2007). Non-removable off-loading devices such as total contact casting are more effective to increase ulcer healing than removable devices, especially for non-infected neuropathic DFU (Andrews et al., 2015).

Wound dressings are one of the treatment options that is effective in treating DFUs; however, wound dressings should not be the only option used to cure the DFU (Andrews et al., 2015). The aim of wound dressing in DFU is to promote a moist wound environment, protect the wound from a secondary infection, help remove wound exudate, enhance tissue restoration, and prevent trauma (Braun et al., 2014; Jeffcoate et al., 2008). Different types of dressing are available to be used in DFU such as films, foams, alginates, hydrogels, hydrocolloids, impregnated, and topical medication (Kravitz et al., 2007). Due to the different features and stages of DFU, there is no single dressing that can be applied in all cases. Therefore, healthcare providers should choose the best dressing based on the DFU stage, type, and patient condition (Moura, Dias, Carvalho, & De Sousa, 2013).

Hyperbaric oxygen therapy has been widely used to treat ischemic DFU, and it helps increase ulcer healing and decrease the risk of major amputation (Game et al., 2012). The aim of hyperbaric oxygen therapy is to increase the oxygen supply to the ulcer in order to promote healing; using this treatment can help heal DFU in 6 weeks (Kranke, Bennett, Martyn-St, Schnabel, & Debus, 2012). Ozone therapy, which is similar to oxygen therapy, is considered one of the most effective oxidants; its local application can stimulate cellular metabolism that accordingly helps improve the DFU healing process (Viebahn-Hansler, Leon Fernandez, & Fahmy, 2012). Low level laser therapy (LLLT) has been shown to be effective as an adjunct to traditional treatment for DFU (Kajagar, Godhi, Pandit, & Khatri, 2012).

Having a DFU can increase a person's risk of developing an infection (Kravitz et al., 2007). The most common organisms that are found in wounds of people with a DFU are gram-positive, gram-negative, and methicillin-resistant staphylococcus aureus (Leung, 2007; Turhan et al., 2013). Different types of antimicrobial drugs can be used to treat DFU, such as oral, topical, intravenous, and systematic antibiotics (Nelson et al., 2006; Rao & Lipsky, 2007). The purpose of antimicrobial treatment in DFU is to treat infection, but not to heal the ulcer (Andrews et al., 2015). The antimicrobial treatment should be selected based on route of administration, comorbidity, culture and sensitivity, spectrum on the microorganism, and history of previous antimicrobial therapy (Rao & Lipsky, 2007).

Growth factors are believed to be helpful in enhancing the normal process of wound health, which involves a hemostasis phase, inflammation phase, proliferation phase, and tissue remodeling phase (Futrega, King, Lott, & Doran, 2014). Platelet rich plasma or growth factors are an effective treatment option for mild DFU (Game et al., 2012). Negative pressure wound therapy is usually used after amputation or for ulcers that were recently debrided (Jeffcoate et al., 2008). The purpose of negative pressure wound therapy is to protect the ulcer, improve skin graft outcomes, prepare the ulcer for healing, increase patients' comfort, and decrease treatment cost (Lesiak & Shafritz, 2013).

Debridement is a basic procedure that is used to enhance DFU healing. Debridement helps remove calluses, abnormal tissue edges, and necrotic tissue and reduces bacterial biofilms (Alavi et al., 2013). Several surgical procedures exist to treat DFU, but the choice of surgical procedures depends on the stage and severity of the wound (Varma, 2011). Partial or complete amputation can be performed in cases of severe DFU, but this increases the risk of complications or death (Bruttocao et al., 2010) and pain (Weledji & Fokam, 2014). Although lower limb

amputation can be risky, it can be the only option for non-healing ulcers or ulcers with gangrene (Leung, 2007).

Person's Health Beliefs and Diabetes Self-Care

Perception of Threats to Diabetes Complications

The perception of susceptibility and seriousness of a disease can be considered a motivational force the makes the person change his or her behavior in order to control or prevent the threats of illness (Strecher et al., 1997). When people perceive the threat of developing a health problem such as diabetes, but they do not believe that they can manage the problem, they usually tend to focus their attention on methods that minimize their fear, but not on preventing the threat (Heuman, Scholl, & Wilkinson, 2013). However, when people believe that they can prevent or control the threat by doing some activities such as doing exercise and following a diet, they are most probably will engage in healthy behaviors (Heuman et al., 2013). Peoples' perception of the severity of a disease is commonly based on their knowledge and belief about how the condition will affect their life (Alsunni, Albaker, & Badar, 2014). For instance, a study was conducted that included 200 Saudi patients and the researchers found that 76% of the participants perceived that diabetes is a severe disease, and 60% of the patients reported that diabetes could prevent the person from having a normal life (Alsunni et al., 2014). A majority of the participants (75%) did not believe that treatment could help a person manage diabetes and 67% perceived that there was no need to take medication for diabetes management if the blood glucose level was within normal limits. Additionally, 89% of the participants reported that diabetes treatment could not prevent complications (Alsunni et al., 2014).

Knowledge of diabetes was studied in another investigation conducted in Saudi Arabia. There were 384 adults with DMT2 who participated in the investigation, where the majority of

the participants (71%) were found to be aware of more than one of diabetes complication (Al-Rasheedi, 2014). However, participants' awareness about different types of diabetic complication varies. The majority of the participants were aware of the potential for eye problems (68%) and renal problems (62%); however, only a few of the participants were aware of diabetes neuropathy (11%). The participant's level of education was found to influence their awareness of diabetes complications and their self-care behaviors, with higher education levels related to greater awareness of diabetes complications and adherence to diet (Al-Rasheedi, 2014). Participants with DMT2 who are knowledgeable about diabetes complications were not always compliant with managing their disease, even though they were aware of the potentially negative consequences (Al-Rasheedi, 2014). People with DMT2 who were found to have knowledge about multiple diabetes complications, still had poor glycemic control (Al-Rasheedi, 2014).

In the literature, it has been reported that people with diabetes were found to engage in self-care activities more frequently if they perceived that diabetes could lead to severe complications (Ayele, Tesfa, Abebe, Tilahun, & Girma, 2012). Rosenstock, Strecher, & Becker (1988) mentioned in their discussion about behavioral theories, including the HBM and Social Learning Theory that people tend to change their behavior when they feel that they are at risk or have the potential to have a severe psychological and physical harm. Accordingly, the person is expected to engage in certain behaviors when he or she perceive the seriousness of the disease and feel that he or she is at risk of developing a health problem (Rosenstock et al., 1988). Unfortunately, persons with diabetes who do not always perceive that they are at risk of developing a complication, which will most likely not lead them to change their behavior (Merz, Buse, Tuncer, & Twillman, 2002). Merz and colleagues conducted a study, which included 900

physicians and 2,008 adults with diabetes. The investigators goal was to examine the

participant's opinion about the association between diabetes and the risk of cardiovascular

problems. Nearly all of the physicians (91%) reported that their patients with diabetes were at

risk for developing cardiovascular problems. Additionally, the physicians reported that patients

with diabetes have poor adherence to medication and behavioral modification treatment, which

could be some of the barriers to minimizing their risk of cardiovascular problems (Merz et al.,

2002). Cardiovascular diseases can cause death to many people with diabetes, and stroke and

ischemic heart disease are one of the common comorbidities associated with the disease

(Deshpande et al., 2008). However, Merz et al. (2002) indicated that more than half of people in

their study believed that they were at lower risk of developing cardiovascular problems, and

more than two third of them did not consider heart problems as serious complications of

diabetes. People with diabetes who were 65 years of age and above did not perceive that they

were at risk of heart problems (65%), stroke (61%), or high blood pressure or cholesterol level

(70%; Merz et al., 2002).

People with DMT2 can be at greater risk for developing complications such as DFUs,

which increases their susceptibility for a lower limb amputation (Robinson et al., 2016). Adults

with DMT2 who lack accurate information about the causes of DFU, may not perceive that they

are at risk for getting a DFU (Gale et al., 2008). A qualitative study was conducted by Gale et al.

(2008) and included 18 people with DMT2. The investigators found that some participants

lacked accurate knowledge about the causes and risks for developing a DFU. Recognition that

having diabetes can lead to developing diabetic complications, such as a foot ulcer or

amputation, could potentially motivate a person with DMT2 to engage in healthy behaviors

(Scollan-Koliopoulos, Walker, & Bleich, 2010). However, persons with DMT2 may not realize

until after they develop a complication, how important it is to manage their diabetes and can lead to greater self-management, as reflected in study conducted by Albargawi and colleagues in 2016. The investigators found that among Saudi adults with DMT2, participants who had a DFU were more likely to adhere to foot care, medication and diet than people who did not have a foot ulcer complication.

Self-management education programs could be an effective strategy to increase people with DMT2 perceptions of threats about diabetes complications (Jalilian, Motlagh, Solhi, & Gharibnavaz, 2014). However, peoples' perception of severity and threats of diabetes complications after attending such a program could influence their self-care behaviors positively or negatively (Scollan-Koliopoulos et al., 2010). Persons with an increased concern about their diabetes can actually lead them to demonstrate more avoidance or denial behaviors (Harvey & Lawson, 2009). An example of this was found by Sollan-Koliopoulos et al. (2010) who conducted a study that included 70 people with DMT2 who attended a self-management education program. Participants who knew a family member who had required a lower limb amputation were found to have less fear about the risk of having an amputation. However, those same participants were also found to report effective foot self-care management. Conversely, participants who had a family history of amputation, with an elevated perception of fear and risk of losing their lower limb because of diabetes were found to demonstrate poor foot care. Participants who had a high perception of fear and risk of amputation, without a family history of the relatives with amputation, were found to have good foot care practice (Scollan-Koliopoulos et al., 2010).

Perception of Benefits of and Barriers to Diabetes Self-Care

Health care professionals usually encourages their patients to adopt healthy behaviors, and the person should be motivated to change in order to prevent illness or to increase his or her well-being. Additionally, people might change their behavior based on the value of the outcome (Peterson & Bredow, 2009). A person's perception of the benefits of adopting a new behavior is considered a significant incentive for them to engage in healthy activities (Strecher et al., 1997). People who perceive that adopting a new behavior is difficult, or it will not lead to a desirable outcome, will not be motivated to change their behavior (Strecher et al., 1997). Sweileh and colleagues (2014) found that persons with DMT2, who perceived that taking diabetes medication was harmful to their health and can cause side effects for them, had poor adherence. However, as persons with DMT2 become more knowledgeable about the benefits of the diabetes treatment they were found to engage in healthy behaviors (Jalilian et al., 2014).

In addition, evidence in the literature showed that people's perception of benefits of diabetes self-care activities motivates them to maintain their healthy behaviors (Mohebi et al., 2013). Furthermore, people can engage in healthy activities when they experience previous positive outcomes of doing the behavior (Bandura, 1997). This was demonstrated in a study by Pinto, Lively, Siganga, Holiday-Goodman, and Kamm (2006), who conducted a study using the HBM and included 70 people with diabetes. The investigators found that participants who perceived benefits of pharmacological services and education were more likely to monitor their blood sugar and maintain their consultation with their pharmacist.

Similarly, other studies used the HBM to examine the relationship between the health beliefs of people with diabetes and their self-care behaviors (Ayele et al., 2012; Sharifirad, Entezari, Kamran, & Azadbakht, 2009). Ayele and colleagues (2012) conducted a study that

included 222 adults with diabetes type one and two, and examined their perspectives on their risk

for complications. A majority of the participants (78%) reported that they were at moderate risk

of developing complications due to their diabetes, while not quite half (44%) perceived that

performing diabetes self-care activities had moderate benefits to their health. Additionally, the

majority of the participants were knowledgeable about self-care activities (93%) and the

importance of taking medication (86%). The investigators found that over half of the participants

(56%) perceived that performing diabetes self-care activities are beneficial, perceived less

barriers to self-care (67%), and only 39% of them were able to do the recommended daily self-

care activities. Additionally, only 31% of the participants were able to exercise for 30 minutes

per day and 42% of them measured their blood glucose surge once daily within three days of

their interview. However, 26% of the participants were not able to engage in physical activities

that last for 30 minutes nor tested their blood glucose level (42%; Ayele et al., 2012).

People can determine their actions, even though they face some barriers that can hold

them back from performing certain behaviors (Fawcett, 2005). Increasing adults with DMT2

perceptions about the benefits of diabetes treatment could help them manage the disease better

(Jalilian et al., 2014). However, when people's perception of barriers to an activity are greater

than their perception of benefits, they might not engage in a specific activity (Strecher et al.,

1997). People's perception of barriers can affect their health promotion behaviors directly or

indirectly. The direct influence of the perceived barriers can be recognized when the person does

not engage in certain activity. The indirect effect of the perceived barriers can be explained when

the person cannot maintain the behavior (Peterson & Bredow, 2009).

Multiple factors have been identified in the literature as barriers for people with DMT2 to

performing self-care, including external, cultural, or interpersonal barriers. External barriers can

be related to the health care system (Glasgow, Toobert, & Gillette, 2001), as people with diabetes might face access barriers, such as visiting a dietician, so they skip their following appointments. Visiting a dietitian was not effective to make a noticeable change in their health (Spikmans et al., 2003). In Saudi Arabia, access to facilities and health insurance might be one barriers to self-care, especially for people who work in the private sector. Additionally, transportation might be an issue for people, which limits their access to health care services (Almalki et al., 2011).

Limited access to facilities and cultural norms can be barriers to adopting healthy behaviors (Badran & Laher, 2012). However, El Bcheraoui et al. (2015) indicated that barriers to access services could be related to the individual, and not the system. El Bcheraoui et al. (2015) found that the type of services provided to the Saudi people with diabetes and hypertension and the distance to health care facilities were not associated with people poor self-behaviors. The researchers found that other people could influence the participant's health behavior. For instance, some females in Arab countries might not engage in physical activities after they get married and they tend to eat more, which accordingly increases their weight (El Bcheraoui et al., 2015). Barriers to physical activities were reported in a study by Al-Kaabi et al. (2009) that included 390 people with DMT2. The investigators found that barriers included cultural concerns, family responsibility, and lack of interests and time. In Saudi Arabia, obesity in males and females (N = 10,735) was associated with marital status, with married people were more likely to be obese (Memish et al., 2014). Sedentary lifestyle can also be another cause of obesity and barrier to physical activity in Saudi Arabia and Kuwait, as it is common to hire cooks and house cleaners, which decrease the opportunities for physical activity in women, and encourages an inactive lifestyle (Badran & Laher, 2012).

Cultural norms and lifestyle factors were found to be barriers that influence people's self-care health behaviors in the Middle East and North Africa countries and increased their risks for neurovascular problems (Zabetian, Keli, Echouffo-Tcheugui, Narayan, & Ali, 2013). Persons with diabetes might not wear therapeutic footwear to protect their feet from injuries (Waters & Holloway, 2013) due to cultural ideas of footwear. Additionally, cultural traditions, social restriction, and weather in Saudi Arabia were the most commonly identified barriers to physical activity by 2176 Saudi adults (Amin et al., 2011). Abozaid and Farahat (2010) conducted a study that included 329 Saudi people who had diabetes, hypertension, were smoking, or were obese. Participants who were not active reported that lacking of time and exercise facility and their diabetes were some of the barriers to physical activity. Additionally, participants who were not active reported that they did not practice exercise because they were worried about being embarrassed by others (Abozaid & Farahat, 2010).

The interpersonal barriers include personal and psychosocial barriers (Glasgow et al., 2001). Beverly et al. (2012) conducted a qualitative study that included 19 physicians and 34 people with DMT2. The result showed that some physicians perceived that they feel responsible if a patient struggle to achieve the treatment goals because of communication barriers. However, they also believed that patients who with poor glycemic control might not consider diabetes as a serious disease because they did not develop complications or they lack proper information. Patients, in contrast, felt responsible and depressed that they could not achieve the treatment goals. Additionally, some of them felt that they were unable to manage the disease effectively, and it was hard for them to change their behavior, which could increase their risks of complications, especially when they struggle to follow a diet or maintain a healthy weight (Beverly et al., 2012).

Family and Friends Support and Diabetes Self-Care

Interpersonal factors can influence peoples' health promoting behavior directly or indirectly. The indirect effect of interpersonal factors can be identified by encouragement or social pressure to do or maintain the behavior (Peterson & Bredow, 2009). Social support could promote people with DMT2 health behaviors (Chin et al., 2013; Keyvanara, Hosseini, & Emami, 2012). For instance, in a study that included 183 adults with DMT2, perception of family support and self-efficacy positively influenced the participants' diet and exercise self-care (Wen, Shepherd, & Parchman, 2004). This means that the more the participants perceived support from their family and they believed to have self-efficacy to eat healthy and to do physical activity, the more they will follow their diet and exercise (Wen et al., 2004). Some people with DMT2 reported that when their family are familiar with the disease, they help them manage it better (Mayberry & Osborn, 2012). In a qualitative study conducted by Mayberry and Osborn (2012), people with DMT2 indicated that when their family member were knowledgeable about diabetes that made it easier for them to do the self-care activities. Additionally, some participants mentioned that family members were helpful to buy healthy food and to help them when they experience hypoglycemia (Mayberry & Osborn, 2012).

Another study, however, found that although Saudi adults with DMT2 (N = 917) reported to have family support about diabetes management, they did not adhere well to self-care activities, which accordingly lead to poor glycemic control (Khattab, Khader, Al-Khawaldeh, & Ajlouni, 2010). For example, the majority of them did not follow their diet (81%), did not exercise (68%), and test their blood sugar as recommended (62%). However, they had a good adherence to medication (92%; Khattab et al., 2010). Good adherence to medication was also indicated in another study that included Saudi adults with DMT2 (Albargawi et al., 2016). The

median participants' level of adherence to medication in Albargawi et al. (2016) was 7 days per week. Conversely, the participant median adherence to exercise was one to two days per week. Participants who were unmarried were found to have a better adherence to diet, medication, and blood glucose testing than married adults (Albargawi et al., 2016).

Family member supportive behavior might lead to poor adherence to treatment when it is disrupted (Mayberry, Egede, Wagner, & Osborn, 2015). A study included 192 adults with DMT2 to examine the relationship between medication adherence, depressive symptoms, stressors, and family obstructive support. Some of the stresses that were examined in Mayberry et al. (2015) study were transportation, unsafe neighborhood, and others. The result of the study showed that more family criticism about unfollowing self-care activities increased the relationship between stress and depressive symptoms, which accordingly lead to poor medication adherence (Mayberry et al., 2015). Another study by Mayberry and Osborn (2012) found a similar finding in which people with DMT2 (N = 60) who perceived that their family were unsupportive, were found to have poor adherence to medication. Additionally, some participants indicated that they were frustrated with their family members' unsupportive behaviors because it made it difficult for them to change their lifestyle and follow a diet. Some of the participants furthermore indicated that family support produced conflict and affected with their self-care behavior. For instance, some of the participants who were married mentioned that changing diet or taking medication was an issue that causes conflict between them frequently (Mayberry & Osborn, 2012).

In Saudi Arabia, some people with DMT2 lacked social support to follow a healthy diet and to do physical activity (AlQuaiz & Tayel, 2009). For instance, family gathering was found to be a barrier to diet adherence for some Saudi people with diabetes (Alneami & Coleman, 2016).

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In many Arabian Gulf countries, people tend to eat a large amount of food in large gatherings as a part of the socialization process. The food that usually served at these gatherings is usually high in carbohydrate and fat (Badran & Laher, 2012), which is not appropriate for a person with DMT2.

Self-Efficacy and Diabetes Self-Care

The construct of self-efficacy is one of the primary constructs of Bandura's self-efficacy theory. The self-efficacy theory proposes that people with high self-efficacy beliefs are more likely to engage in certain activity and accomplish tasks than those with low self-efficacy (Bandura, 1997). Bandura indicated that people's judgment of their abilities usually develops in four ways: through new experiences, past skills, other impacts, and expectations of future outcomes (Smith & Liehr, 2003). Furthermore, in order for people to change their health behavior, they should have some expectations about the outcome. For example, a person who is newly diagnosed with DMT2 might expect less positive outcomes about glycemic control and might therefore have poorer adherence to their treatment recommendations (Nouwen et al., 2011). When people perceive that they have the ability to complete a task, their expectation about the outcome will be higher (Bandura, 1997). One study included 145 people with DMT2 found that participants with high self-efficacy and outcome expectancy beliefs were better able to complete self-care behaviors and to manage their disease (Wu et al., 2007).

The construct of self-efficacy has been examined in many health-related studies and has been recognized as a significant predictor of health behavior change (Chen, Chien, Kang, Jeng, & Chang, 2014; Loeb, Steffensmeier, & Kassab, 2011). For instance, Dehghani-Tafti, et al. (2015) conducted a study that included 110 people with diabetes. Self-efficacy was found to be a strong predictor of self-care activities. Participants were found to have a good adherence to

medications in which they take it every day (Dehghani-Tafti, et al., 2015). Self-efficacy additionally has been found to affect a person's weight loss behavior; the higher the self-efficacy, the better weight changes are seen in overweight or obese people (Meybodi, Pourshrifi, Dastbaravarde, Rostami, & Saeedi, 2011). Furthermore, people with high self-efficacy beliefs were more likely to quit smoking (Schnoll et al., 2011) and to adhere to medications (Wu, Song, & Moser, 2015).

In the context of DMT2 management, self-efficacy beliefs have been found to influence and enhance the way people adhere to foot care, diet, exercise, blood glucose monitoring, and medication (Chin et al., 2013; Sarkar, Fisher, & Schillinger, 2006; Sharoni & Wu, 2012). A systematic review of the relationship between self-efficacy and diabetes self-management pointed out that including such constructs in education programs can improve the outcomes (Krichbaum, Aarestad, & Buethe, 2003). For instance, a hospital-based clinical intervention that focused on enhancing self-efficacy in people with DMT2 was useful in improving participants' glycemic control and self-care behaviors (Shi, Ostwald, & Wang, 2010). Furthermore, the construct of self-efficacy was an important factor in an intervention program designed to help people with DMT2 increase their physical activity (Van der Heijden, Pouwer, Romeijnders, & Pop, 2012).

Self-efficacy was found to correlate negatively with depression and anxiety in some people with DMT2. Additionally, self-efficacy was found to increase with increase diabetes duration and performing self-care activities (Wu et al., 2013). Furthermore, people with DMT2 perception of self-efficacy were found to be associated negatively with their perceptions of barriers to self-care (N= 390; Vazini & Barati, 2014). When people perceived that they have the ability to perform the daily self-care behaviors, their perception of barriers was found to diminish

(Vazini & Barati, 2014). Some people with DMT2 who had less perception of barriers and more planning self-efficacy belief, were found to avoid eating large amount of food (Aljasem et al., 2001). Additionally, some people with DMT2 who have a high self-efficacy belief, a low barriers perception, and a high benefit perception was found to perform daily foot self-care (Chin et al., 2013). Some people with diabetes, however, might not perceive that they can do the recommended self-care activities (Ayele et al., 2012). For instance, in a study that included 858 adults with DMT2, participants who had self-efficacy perception was found to have good adherence to diet, exercise, blood glucose testing, and foot care, but not medication (Sarkar et al., 2006). For some people with DMT2, infrequent blood glucose testing was associated with assertiveness efficacy belief, which is the person's ability to stand up for himself or herself when dealing with others and physician. However, some people with DMT2, who perceived that they can seek assistance from others (reliance efficacy), were found to have good diet self-care (Aljasem et al., 2001).

Health Locus of Control and Diabetes Self-Care

Locus of control can be considered a general expectancy (Wallston, 1992). Rotter identified health locus of control as a unidimensional construct in which a person can hold either internal or external beliefs (1954). People with an internal locus of control believe that the desired outcome—the reinforcement value—is within their ability to control, whereas people with external loci of control believe that the desired outcome is not within their controlling capacity (Wallston, 1992). A person with the external beliefs perceives that other factors such as powerful others, fate, chance, or luck controls their actions (Houts & Warland, 1989). People who have an internal locus of control and value their health will maintain healthy behaviors. When they get sick, such people seek information about their condition in order to regain health

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(Strickland, 1978). For instance, some Saudi adults with DMT2, who perceived that they have an internal health locus of control belief, they felt that they were responsible for adhering to self-care activities, and they were accountable if it becomes worse. Conversely, those who perceived to have external health locus of control tend to seek help from their doctor to manage the disease and to prevent complications. Additionally, some of them recognized that diabetes control was out of their control, and God control their health (Albargawi, et al., 2016).

In a cohort study conducted by Gale et al. (2008), internal health locus of control was found to be associated with a reduced risk of psychological distress, poor health, obesity and overweight in adults. Furthermore, females who have stronger internal beliefs were less likely to suffer from high blood pressure (Gale et al., 2008). People with type 1 diabetes mellitus were found to have a weaker internal locus of control, more fatalistic beliefs, and less trust in other people than people with DMT2 (Trento et al., 2008). Additionally, internal health locus of control becomes stronger in adults with DMT2 after receiving group care that focused on enhancing knowledge about diabetes and improving the quality of life (Trento et al., 2006). In a study by Wu, Tang, and Kwok (2004), 191 elderly Chinese people with DMT2 were recruited. The results showed that participants who perceived that they and their doctors could control their diabetes, who valued their health, and who had self-efficacy were more likely to be involved in health-promoting activities (Wu et al., 2004). Some Saudi adults with DMT2 who had an internal health locus of control belief were found to have good adherence to diet and foot care. Additionally, those who believed that their doctors could help them manage diabetes were found to adhere to diet (Albargawi et al., 2016).

People who perceived that they have minimal control over their health are less likely to engage in health-promoting activities (Chen, Acton, & Shao, 2010). Additionally, people with

high chance external locus of control beliefs perceive that outcomes occur randomly due to luck and are therefore out of their control (Gutierrez, & Long, 2011). People who hold powerful others external locus of control beliefs perceive that other people, such as family members, doctors, or friends, influence their behavior. Additionally, they perceive that they have minimal control over the outcome (Aberle et al., 2009; Wu et al., 2004). Some people who had diabetic foot problems were found to have lower health control belief and more self-balm perception (Waters & Holloway, 2013). Kacerovsky-Bielesz et al. (2009) conducted a study that included 257 people with DMT2, who were on insulin therapy. Female participants were found to hold an external health locus of control belief. Those females were also found to have poor glycemic control. Similarly, in a study by Abredari et al., 2015 who included 120 adults with diabetes, participants who reported having more external health locus of control belies, such as powerful others and chance had poor adherence to foot self-care.

The persons' sense of control of health and fatalism could potentially affect their health behaviors (Heuman et al., 2013). For instance, people might feel powerless to manage or delay the onset of diabetes, which made them unmotivated to change or maintain their health behaviors or seek information (Heuman et al., 2013). Some authors, such as Gabbard, Howard, and Tageson (1986), have considered the construct of the God locus of control to be a type of external locus of control. Welton and his colleagues (1996) reported that high God locus of control beliefs can make up for the weak internal locus of control beliefs. They also found that people with a high God locus of control beliefs tend to engage in healthy behaviors. However, some Saudi adults who had God health locus of control belief were found to have less adherence to diet (Albargawi et al., 2016). Some Muslim females with DMT2 additionally believed that coping with diabetes and control it was to God will (Lundberg, & Thrakul, 2013).

Diabetes Self-Care and Modifying Variables

People's demographic characteristics and sociocultural background can affect their health care needs and behaviors (Orem, 2001). Khan et al. (2014) conducted a study that randomly included 506 Saudi adults with DMT2, who were registered in Al Ahsa Ministry of Health Chronic Disease Clinic. The result of the study showed that only 11% of the participants had good diabetic control, whereas 71% of them had poor control. Additionally, the majority of the participants were obese (class one obesity 30%, class two 13%, and class three 11%) or overweight. The percentages of females who were overweight or obese (91%) were significantly higher than males (87%; $p = 0.00$). Additionally, females (78%) had a significantly higher percentage of complications than males (76%; $p = 0.038$). Females also were substantially higher than males in the number of complications they had ($p = 0.039$). Thirty-five percent of females had one diabetic complication, 26% had two complications, and 17% multiple complications. Whereas 29% of males had one complication, 23% had two complications, and 14% had multiple complications (Khan et al., 2014).

In a retrospective study by Alwakeel et al. (2008) that included 1952 (from 1989-2004) Saudi adults with DMT2 from a hospital in Riyadh City, the diabetic complications were found to occur within 1 to 4 years after diagnosis. Additionally, older age and longer DMT2 duration were significantly related to complications. The majority of the participants were obese (45%) or overweight (39%), and they had another comorbidity such as hypertension (78.07%) and dyslipidemia (39%). For diabetic complications, 32% of the participants had nephropathy, 23% had cataracts, 17% had retinopathy, 14% myocardial infarction, 13% peripheral neuropathy, and 10% stroke. Females were found to be less likely to suffer from diabetes complications than males. Males were found to have cataracts (26%), background retinopathy (13%), and

neuropathy (17%), foot infections (5%), and amputation (2%) more than females. However, females were found to have amputation earlier than males (11.6±5.8 years vs. 17.9±5.2 years respectively). The overall mortality rate was 8%, and the survival rate was significantly higher in females than males (10% vs. 7%, respectively; p = 0.024; Alwakeel et al., 2008).

Al-Rubeaan et al. (2015) conducted a cross-sectional study included 62,681 Saudi adults with diabetes found that 43% of participants who were not married, had a current ulcer, and 30% of them had a history of ulcer. Neuropathy was one of the most problems in foot ulcer (30%), amputation (15%), and gangrene (3%). Participants who had foot problems had a significantly higher level of HbA1c than those who did not suffer from foot problems ($M = 9.91$, SD ± 2.18 vs. $M = 8.8$, SD ± 2.36 respectively; p < 0.001). Additionally, 59% of participants who had a foot ulcer were overweight, and 63% of them were obese. The majority of the participants who suffered from foot problems were 45-64 years old (41%) or above 65 years (52%). Furthermore, foot problems were more commonly affected males (69%) than females (31%). Most of the cases of foot problems involved adults with DMT2 (94%); this group also had the highest rate of gangrene and amputation (Al-Rubeaan et al., 2015).

Gap in the Literature

Culture is behaviors, symbols, beliefs, and values that are commonly shared by some group of people (Al-Shahri, 2002). A person's beliefs are influenced by cultural norms and values (Bean, Cundy, & Petrie, 2007). Culture is an important factor affecting the way people with DMT2 manage their disease (Abubakari et al., 2013; Rodriguez, 2013). Saudi culture is based on Islamic beliefs. Most of Saudi peoples' activities based on Islamic faiths. Some Muslims believe in fatalism that everything in their lives should happen for a reason (Al-Shahri, 2002). However, Islam encourages people to engage in healthy behaviors and to take action to

maintain their health (Yosef, 2008). Therefore, although Saudi people believe in predestination, they still seek medical treatment and engage in health-protective behaviors (Al-Shahri, 2002).

The effect of a person's beliefs on their health behavior using the construct of the HBM has not yet gained much attention in the literature for Saudi population. For instance, only two studies have examined such a relationship in the context of diabetes in Saudi Arabia (Alatawi, Kavookjian, Ekong, & Alrayees, 2015; Al-Mutairi, Bawazir, Ahmed, & Jradi, 2015). However, one study was a descriptive study about health beliefs of Saudi and non-Saudi adolescence who did not have DMT2 (Al-Mutairi et al., 2015). The other study examined the relationship between HBM constructs and medication adherence in Saudi adults with DMT2 (Alatawi et al., 2015); adherence to other self-care activities such as foot care, exercise, blood glucose testing, and diet was not examined. Additionally, in both Alatawi et al. (2015) and Al-Mutairi et al. (2015) study, the concept of health locus of control was not examined, which was found to be an important belief that influenced Saudi adults with DMT2 adherence to some self-care activities (Albargawi et al., 2015).

In Al-Mutairi et al. (2015) study, the HBM was used as the theoretical framework. A total of 426 adolescents (Saudi n = 371 and non-Saudi n = 55) were recruited from two private and two public schools in Riyadh City. None of the participants had DMT2; however, some of them had other chronic conditions (10%) such as heart problems, asthma, sickle cell anemia, and gastrointestinal problems. The participants were asked to complete a self-reported survey about their knowledge and attitude about DMT2. Additionally, the survey assessed the participants' perception about susceptibility and severity of DMT2, benefit and barriers of a healthy lifestyle, and self-efficacy. The result of the study showed that the majority of the participants indicated that DMT2 was an infectious disease; however, most of them were aware of its risk factors.

Additionally, few participants were aware of DMT2 complications such as eye and renal problems. Only 29% of the participants perceived that DMT2 will be a serious disease and 27% of them expected to have it in the future. The majority of the participants perceived that healthy lifestyle was important to have a good health, and they identified low barriers to healthy habits such as lack of time and choices of low-calorie diet, hot weather, and unpleasant taste of healthy food. The majority of the participant reported that they have self-efficacy to do exercise (50%), avoid smoking (94%), and eat food with low sugar and fat (58% and 52% respectively; Al-Mutairi et al., 2015).

In Alatawi et al. (2015) study, 222 Saudi adults with DMT2 were recruited from an outpatient pharmacy clinic located in the northwest region of Saudi Arabia. The participants were asked to complete a self-reported questionnaire that addressed HBM constructs and their medication adherence. The result of the study showed that 43% of the participants did not take their medication daily in the past seven days. In regard the HBM concepts, 44% of the participants perceived that DMT2 as a severe disease; however, only a few of them reported to be at risk to develop complications (39%). Some of the participants who perceived threats to complication indicated that poor management of DMT2 could lead to eye problem (50%), numbness and tingling problems (24%), circulatory problems (23%), and renal problems (16%). The majority of the participants perceived benefit of diabetes treatment (70%) and report to have a self-efficacy to take their medication (60%). Some participants, however, stated that they would not seek medical if they experienced problems with their blood sugar (58%); additionally, 31% of them reported that their family and friends might not provide enough support for diabetes treatment. The barriers to medication adherence that were reported by the participants were travel, fail to recall to take the medicine, work (Alatawi et al., 2015).

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Alatawi et al. (2015) additionally found that participants' perception of self-efficacy, susceptibility to the complication, and benefitss were positively associated with better medication adherence. However, Alatawi et al. (2015) did not use a summary score for the concepts of perceived barriers, which limited their ability to examine how participants' perceptions of barriers affect their medication adherence. Alatawi et al. (2015) emphasized the need to conduct further studies that examined health beliefs of Saudi adults with DMT2 and their adherence to self-care. Therefore, conducting this study might provide a significant result that can help understand Saudi adults with DMT2 level of adherence to self-care activities and the effect of their beliefs on their health behaviors.

Health Belief Model

Overview

The HBM was developed based on several research studies that were conducted between 1950 to 1960 to understand peoples' health behavior (Becker, 1974). For example, it was reported that the model was established in the 1950s to explain why preventative health services for tuberculosis was not successful (Hayden, 2009). Therefore, the model initially developed to explain the preventative behavior of people who did not develop a disease. The philosophical perspective of the HBM was driven from the theory of Kurt Lewin. Lewin in Life-Space Theory indicated that the people's behavior is based on their value of the outcome and their estimation that the action will lead to that outcome (Becker, 1974). Additionally, Lewin perceived that the person exists in a life space composed of areas that can be positively or negatively valued. Accordingly, a disease if it was represented in a life space, it will be considered a negative area that the person will most likely try to avoid. The person is expected to avoid negative areas unless he or she perceived that doing that will lead to consequences that are more negative.

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Lewin additionally explained that people's daily activities could be considered as outcomes of positive forces that outweighed negative forces (Becker, 1974).

The earlier assumptions of the HBM were that people take action to avoid a particular disease when they perceived that they were susceptible to it, and the illness at least has moderate severity. People, in this case, believe that doing the behavior will be beneficial to decrease their risks of getting the health condition (Becker, 1974). Additionally, if people develop the health condition, their perceptions of the benefits of doing the behavior will be to decrease the disease severity; however, people's understanding of the benefits should outweigh their perception of barriers (Becker, 1974).

The HBM combines different psychological theories of decision-making, which explain people's action based on their choices in a certain situation and their value of the outcome (Becker, 1974). Rosenstock added the tradition of behavior motivation to the model. Accordingly, the updated version of the model proposed that people motivation to engage in a health behavior are based on their expectation of the outcome. Some researchers further consider the HBM as expectancy and a value theory (Becker, 1974), which means that the behavioral potential is a combined function of expectancy and reinforcement value. For instance, people engage in certain behaviors in a given situation when they expect that their actions will lead to specific outcomes—the expectancy. However, people need to value the outcome in order for the behavior to happen—the reinforcement value (Wallston, Wallston, Kaplan, & Maides, 1976).

The assumptions of the updated version of the HBM are the person readiness to engage in behavior for a health condition is based on their perception of susceptibility to having the condition and their understanding of the negative consequences of the problem (Becker, 1974). Additionally, people evaluate the outcomes of their action based on their knowledge of the

feasibility and efficiency (benefits) of their action to reduce the actual threats (susceptibility and severity of the condition). Peoples' perception of action benefits should be higher than their perception of barriers or cost of their action. Additionally, peoples' behavior is influenced by internal of external stimulus (cues to action) that motivate them to engage in the behavior (Becker, 1974). Cues to actions can include social support, illness of a family member, media, doctors, and other. The concepts of the HBM are assumed to be modified by some of the person' characteristics such as educations level, culture, experience, skills, and others. Personal characteristics were considered to motivate or diminish people to engage in health behavior. Another factor that could motivate the persons to participate in a particular behavior is their self-efficacy belief. The concept of self-efficacy was added to the model in 1988 (Hayden, 2009). Additionally, Aalto and Uutela (1997) added the concept of health locus of control to the model.

Strengths of Health Belief Model

Logical development. The concepts of the HBM were developed or adopted from different health behavior theories that have been proven to explain people's behavior (Becker, 1974). For instance, after the establishment of Lewin theory, other theories were developed that focused on understanding people risk-taking behaviors or design making. Some of these theories were Tolman's Performance Behavior Model, Rotter's Social Learning Theory, Edwards's theory of Subjectivity Expected Utility, and others. These theories shared a common focus, which is to explain a value-expectancy (Becker, 1974). For instance, Rotter's work was based on Tolman and Lewin idea of behavior potential. The fundamental proposal behind Rotter's Social Learning Theory is that peoples' behaviors are based on expectancy and reinforcement value. In the HBM, people desire to decrease their susceptibility and severity of getting a disease can be related to Rotter's concept of reinforcement value. Additionally, the concept of expectancy in

Rotter's theory can explain the construct of perceived benefits and barriers in the HBM (Becker, 1974).

Adequacy. One of the strengths of the HBM model is that it includes basic concepts that are important to examine people health behaviors. Additionally, the model has been used in many health-related studies, and some of its concepts were found to be powerful predictors of self-care (Harvey & Lawson, 2009). For example, in a meta-analysis study that examined the effectiveness of HBM concepts to predict health behaviors in 18 studies, it was found perceived benefits and perceived barriers were stronger predictors of people behavior. Additionally, in studies that used the HBM to examine people preventative practices, the concepts of perceived barriers and benefitss were good predictors of people behavior (Carpenter, 2010).

The utility of the model in diabetes mellitus related research. Understanding a person's perception of health and illness is important in clinical practice (Boruchovitch & Mednick, 2002). The HBM was used in several studies that examined people with DMT2 self-care behaviors (Al-Mutairi et al., 2015; Chin et al., 2013; Sharifirad et al., 2009). For instance, Daoud, Osman, Hart, Berry and Adler (2015) used the HBM to examine the self-care behavior of 230 Palestinians adults with DMT2 in East Jerusalem. Another study used the HBM to consider the perception of 76 people with diabetes who had an amputation about diabetes self-care (Pham, Fortin, & Thibaudeau, 1996). The results of the study showed that perceived social support significantly associated with participants' adherence to diet and exercise. Additionally, participants' perceptions of barriers were found to associate significantly with their adherence to exercise (Pham et al., 1996).

Limitations of Health Belief Model

The HBM is used to explain peoples' behaviors based on their attitudes and beliefs, and its concepts were found to detect a person's health action (Harvey & Lawson, 2009). However, it was found that the concepts of the model account for a small amount of variance to produce a significant behavior change. Additionally, it was indicated that the relationship between the HBM concepts was inconsistent (Harvey & Lawson, 2009). For instance, studies assumed that the concepts of the model were moderated by each other; however, other studies did not consider that there was a moderating effect between the concepts in the model, but rather they have an additive effect (Munro, Lewin, Swart, & Volmink, 2007).

Another limitation of the HBM model is that it focuses on intentional and rational behaviors rather than spontaneous actions (Becker, 1974). Additionally, the model assumes that fear of threats can motivate people to change their behaviors, which might not be a strong motive for some of them to change their behavior (Peterson & Bredow, 2009). The model additionally assumes that most people highly valued their health (Becker, 1974). However, people can refer to their health differently, and each person can view health from a diverse perspective (Boruchovitch & Mednick, 2002). For instance, some people might define health as the absence of a disease or illness (Backett, 1988) and others might see themselves healthy if they can cope with their medical condition (Lewis, 1953) or if treatment is effective in restoring health (Downie & Macnaughton, 1998). Some people might not agree with the idea of having "perfect" health status and would consider health to be more a state of mind (Sherman, Mrus, Yi, Feinberg, & Tsevat, 2006). Additionally, the value of health beliefs can change according to the person's health status. For instance, people with DMT2 have been found to change their perceptions of health after diagnosis. They reported that after they are diagnosed with the disease, health

become a value priority (Nugent, Carson, Zammitt, Smith, & Wallston, 2015). However, a study

of 264 adults who were newly diagnosed with neck cancer found different results. This study

showed that participants who valued their health less did not seek medical care for 3 months

(25%) and the majority of them continued to smoke (50%) and drink (80%) after diagnosis.

Participants who continued to smoke were also found to have more physiological distress
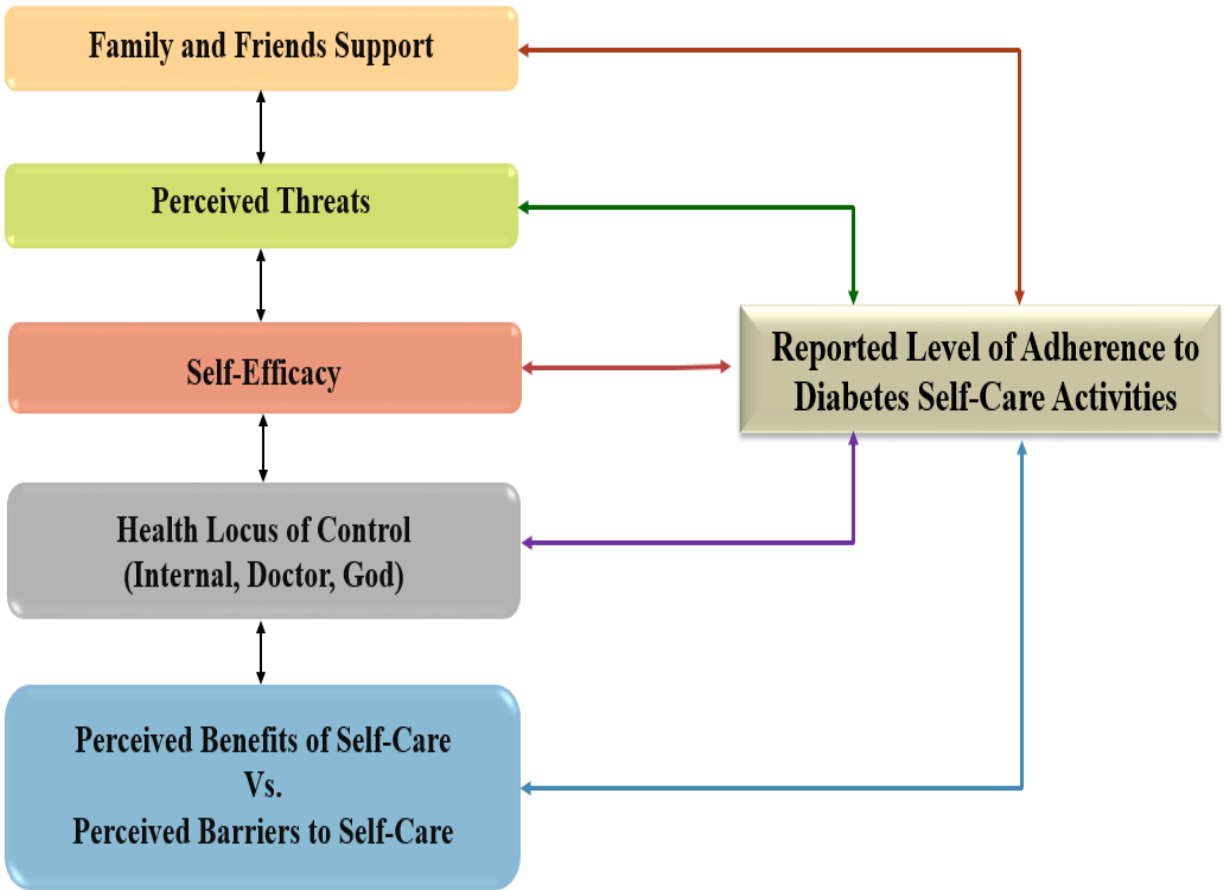
(Tromp et al., 2005).

Modified Health Belief Model

The Health Belief Model has been modified to reflect the actual purpose of this study, as

well as the current literature, in which the modifying variables that include participants'

demographic characteristics will be controlled (see Figure 1). Research outcomes reported in the

literature suggested that there is an association between diabetes self-care management and the

health beliefs of people with DMT2. Therefore, the PI modified the direction of the relationship

between the concepts in the HBM to reflect the outcomes reported in the literature. In the

original HBM, cues to action represented internal or external factors that influence the person's

health behavior (Hayden, 2009). In this study cues to action represented adults' perception of

their family and friends support. In the literature, it has been reported that family and friends

support helped people with DMT2 adhere to their self-care management regimens (Mayberry &

Osborn, 2012). Additionally, people with DMT2 and their family were found to share similar

concerns about the seriousness of diabetes, which motivated them to engage in healthy behaviors

(Whitford, McGee, & O'Sullivan, 2009). In the original HBM, there was no direct relationship

between perceived threats and cues to action (family and friends support). Therefore, the PI

indicated that there was a direct relationship between family and friends support and people with

DMT2 perception of threats. In the literature, it has been reported that people with DMT2 who

were knowledgeable about their risks of complications and they had self-efficacy were more likely to engage in healthy behaviors (Chin et al., 2013). Accordingly, the PI specified in the modified HBM that there was a direct relationship between the concept of perceived threats and self-efficacy, and added the concept of health locus of control to the modified HBM. In a previously published paper, the PI found a significant relationship between Saudi adults with DMT2 perception of their self-efficacy and health locus of control. Internal HLoC, God HLoC, and Doctor HLoC were found to have a significant relationship with the dependent variable reported level of adherence to diabetes self-care activities (Albargawi et al., 2016). Therefore, in the modified HBM the PI reported that there is a direct relationship between the concept of self-efficacy and health locus of control. In a study by Beverly et al. (2012), people with DMT2 who felt responsible to manage their diabetes, perceived benefits of diabetes self-care, yet struggled to perform the self-care activities, were found to blame themselves for not being able to achieve the treatment goals. Therefore, the PI expected that there would be a direct relationship between health locus of control and people with DMT2 perception of the benefits and barriers of self-care.

In this study, Saudi adults who have a high self-efficacy and an internal HLoC were expected to report good adhere to their self-care activities to manage diabetes. Additionally, participants who perceived DMT2 as a threat to their health, believed they had few barriers to performing self-care, perceived that doing diabetes self-care activities is beneficial for them, and received support from their family and friends were expected to report good adhere to their self-care activities to manage diabetes.

Figure 1. Modified health belief model by M. Albargawi, 2017. The original health belief model

was modified to reflect the purpose of this study, as well as the current literature. The Modified

health belief model represented the form of the relationship between health beliefs (self-efficacy,

health locus of control, perceived threats of diabetes, perceived barriers to and benefits of self-

care, and perceived family and friends support). Additionally, it represented the relationship

between health beliefs with the dependent variable reported level of adherence to diabetes self-

care activities.

Chapter Summary

The chapter reported different factors that can lead to DMT2. Additionally, a brief review about some common diabetes complications and treatments for DFU was mentioned. Findings from the literature about the concepts of the HBM was also identified. The HBM concepts addressed in this chapter were self-efficacy, health locus of control, perceived threats of diabetes (susceptibility and severity), perceived barriers to self-care, perceived benefits of self-care, and perceived family and friends support. Most of the studies included in the review about HBM concepts recruited adult populations with DMT2 from different countries including Saudi Arabia. The findings from the literature review indicated the need to explore the health behavior in adults with DMT2. The finding from this study could fill the gap in the literature about the influence of health beliefs on Saudi adults with DMT2 level of adherence to diabetes self-care activities. This chapter additionally provides an overview of the HBM and its strengths and weaknesses.

Chapter Three: Methodology

Introduction

This chapter will outline the study design, questions and hypotheses, sampling technique, and setting. Additionally, it includes information about questionnaires that will be used for the data collection and provide information about their validity, reliability, and scoring. The items of the scales will be presented at the end of the chapter in the appendices. The chapter will additionally include information about data collection procedures, analysis, and management plan. The ethical considerations relevant to this study will be discussed at the end of the chapter.

Method

Design

A descriptive, correlational design was used for this investigation, as it is approriate for the research questions. Additionally, the descriptive correlation design allows for prediction of the relationship between the independent and dependent variables (Polit & Beck, 2012), which matches the aim of this study. Based on the literature review presented in Chapter two, there is a relationship between the independent variables health beliefs (self-efficacy, health locus of control, perceived threats of diabetes, perceived barriers to and benefits of self-care, and perceived family and friends support) and the dependent variable reported level of adherence to diabetes self-care activities. Therefore, using a descriptive correlational design was the most appropriate to exam the relationship between the independent variables and the dependent variable in Saudi adults with DMT2.

Research Questions/Hypotheses

This study explored six research questions, and 1 to 5 were focused on quantitative responses. Responses to question 6 was a qualitative response, which explored the participants' perception of threat due to their diabetes.

1. What is the level of adherence to diabetes self-care activities in Saudi adults with DMT2?

2. What is the overall glycemic control of Saudi adults with DMT2?

3. Is there an association between the level of adherence to diabetes self-care activities for Saudi patients with DMT2 who have had and who have not had a diabetic foot ulcer?

4. How does a person's diabetes self-care activities vary based on demographic characteristics?

5. How do patients with DMT2 perceive that diabetes has impacted their health?

6. Controlling for demographic characteristics, do health beliefs (self-efficacy, health locus of control, perceived threats of diabetes, perceived barriers to and benefits of self-care, and perceived family and friends support) predict a significant amount of variance in the reported diabetes self-care activities in Saudi adults with DMT2?

   Hypotheses. The following hypotheses were tested in this study:

1. Saudi adults with DMT2 will report a low level of adherence (< 7 days/week) to diabetes self-care activities that is less than 7 days per week.

2. Saudi adults with DMT2 have poor glycemic control that is higher than the ADA (2017) standards of glycemic control (HbA1c $>7\%$).

3. Persons with a DFU would report that there were more likely to perform diabetes self-care activities than persons without a DFU.

4. The person's level of adherence to diabetes self-care activities will vary based on demographic characteristics.

5. The greater the Saudi adults with DMT2 perception of threat, the more likely they were to report doing diabetes self-care activities.

6. Controlling for demographic characteristics the health beliefs (self-efficacy, health locus of control, perceived threats of diabetes, perceived barriers to and benefits of self-care, and perceived family and friends support) will predict a significant amount of variance in the reported diabetes self-care activities in Saudi adults with DMT2.

Participants

A convenience sample of participants was recruited for this study, as participants with DMT2 were specifically needed for this study. The inclusion criteria for participation were: (a) Saudi nationality; (b) age 18 and up; (c) diagnosed with DMT2 and (d) have stage one, two, or three DFU using Wagner's ulcer classification system. Wagner's ulcer classification system was chosen since it is commonly used in clinical practice to grade DFU (Karthikesalingam et al., 2010). DFU with grade 1 or 2 is mild and might show signs of necrosis or has early granulation tissue. DFU with grade 3 is moderate, and it can reach bone, ligament, tendon, joint capsule or fascia. Grade 3 DFU does not show any sign of an abscess or osteomyelitis. DFU with grade 4 or 5 is more severe and with gangrene (Wagner, 1987).

Power analysis. The sample size was determined based on a power analysis with a 0.80 effect size ($\beta = 0.20$) and $\alpha = 0.05$, which can express the strength of the relationship between the study variables (Hulley et al., 2013). Based on a power calculation with 80% power and a significance level of 0.05 the minimum sample size needed for this study was 142 participants.

Setting. Participants in this study were recruited from an outpatient diabetic clinic, a diabetes center, and a PHC at King AbdulAziz Medical City, located in Riyadh City, Saudi Arabia. This location has been chosen because many people with DMT2 receive care at this

health care location. King AbdulAziz Medical City-Riyadh provides primary, secondary and tertiary service to people with various health conditions. Additionally, it has a bed capacity of 1501 and nearly 3 million outpatient visits per year. King AbdulAziz Medical City-Riyadh has one of the top emergency care centers and a trauma care center in Saudi Arabia, and it ranked the fourth best emergency care center outside the United States of America. King AbdulAziz Medical City-Riyadh additionally has surgical and critical units, burn units, surgical ICU, endoscopy unit, operating rooms, and rehabilitation units. The ambulatory care clinics and primary health care centers provide many services to different patient population that include health education, lifestyle modification, medical treatment for acute and chronic conditions, counseling, and health promotion (Ministry of National Guard Health Affairs, 2015, 2016).

Data Collection Methods

The data was collected using self-report questionnaires (see Appendix A and B for the general questionnaire instructions). Participants were asked to complete six questionnaires about their health beliefs (self-efficacy, health locus of control, perceived threats of diabetes, perceived barriers to and benefits of self-care, and perceived family and friends support), their level of adherence to diabetes self-care activities, and their demographic characteristics information. Additionally, participants were asked to answer two short answer questions about the concept of perceived threats. The total number of items from of all scales was 66. The following section explained the demographic characteristics, the study measures for the independent variables (self-efficacy, health locus of control, perceived threats of diabetes, perceived barriers to and benefits of self-care, and perceived family and friends support), and the depended variable reported level of adherence to diabetes self-care activities.

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Demographic Characteristics

Description. Demographic characteristic data was measured by 8 items developed by the PI about participants' age, gender, marital status, education level, years of having diabetes, foot ulcer, other health conditions, and HbA1c (see Appendix M for the English version and Appendix N for the Arabic version). All questions were nominal except for HbA1c, age, and years living with diabetes, which was ordinal. The HbA1c was a test that identifies the glycemic control for people with diabetes in which it provides an average of the plasma glucose concentration in the past three months (Porth & Matfin, 2009). The participants were asked to report their HbA1c since the PI did not have access to the patients' medical record. The questions were administered after the consent procedure and were measured once only. Participants in the pilot study (Albargawi et al., 2016) needed 3 minutes or less to answer the questions.

The Mean, Standard Deviation (SD), and frequency were used for age, years living with diabetes, and HbA1c. According to the ADA (2017) and MOH (2013) recommendations, the HbA1c for people with diabetes should be less than 7%. Therefore, the HbA1c level that was less than or equal to 7% was considered as an indicator of good glycemic control. The HbA1c level that was more than 7% was considered as an indicator of poor glycemic control. Frequencies was used for categorical demographic characteristics that include gender, marital status, education level, foot ulcer, and other health conditions. Age, years living with diabetes, and HbA1c were dummy coded in the analysis.

The Study Measure for the Independent Variable: Health Locus of Control

Description. The Arabic version of Form C of the Multidimensional Health Locus of Control Scale and the Arabic version of God Locus of Health Control Scale (Albargawi et al.,

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2016) were used to measure health locus of control. Wallston, Stein, and Smith (1994) developed Form C of the Multidimensional Health Locus of Control Scale. The scale includes four dimensions of health locus of control: internal, chance, other people, and doctor. Form C of the Multidimensional Health Locus of Control Scale is ordinal and consists of 18 items measured by self-report (Wallston et al., 1994). However, in this study, only two dimensions of the scale were examined, which were internal and doctor. In a pilot study (Albargawi et al., 2016), internal and doctor health locus of control was found to have a significant relationship with the reported level of adherence to self-care activities in Saudi adults with DMT2. The other two dimensions, chance and other peoples' health locus of control, were not found to have a significant relationship with the reported level of adherence to self-care activities in Saudi adults with DMT2 (Albargawi et al., 2016).

The God Locus of Health Control Scale is ordinal with six items measured by self-report (Wallston et al., 1999). Wallston (2005) indicated that God Locus of Health Control Scale can be combined with other forms of the Multidimensional Health Locus of Control Scale. Therefore, the two scales, Form C of the Multidimensional Health Locus of Control and God Locus of Health Control, were combined and the total items were 15 (see Appendix C for the English version and Appendix D for the Arabic version). In this study, the scales were administered after the consent procedure and measured only one time; participants during the pilot study (Albargawi et al., 2016) were able to complete this form in less than 7 minutes.

Reliability and validity. The English version of Form C of the Multidimensional Health Locus of Control Scale had a satisfactory internal consistency; the Cronbach alphas for the subscales Internal was 0.87 and for Doctor was 0.71 (Wallston et al., 1994). God Locus of Health Control Scale also had an acceptable Cronbach alpha that ranges from 0.87 to 0.90

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(Wallston et al., 1999). Additionally, Wallston (2005) reported that the English version of the scales was valid. Validity is a method to test if a scale is able to measure the concepts being examined. Content validity of a scale can be determined based on the literature, content experts, or representation of the relevant population (Grove, Burns, & Gray, 2013). Wallston (2005) indicated that a panel of experts evaluated the validity of the items presented in Forms A, B, and C of the Multidimensional Health Locus of Control Scale and God Locus of Health Control Scale. Additionally, the construct validity of the scales was examined. Wallston (2005) stated that Form C of the Multidimensional Health Locus was found to be more valid in different studies than Form A, and B. Form A and B of the Multidimensional Health Locus of Control Scale examined peoples' health locus of control based on their health status (Wallston, 2005). Conversely, Form C of the Multidimensional Health Locus of Control Scale, which was used in this study, examines people's belief about their health locus of control when they have a particular disease (Wallston, 2005). Wallston et al. (1994) indicated that the validity and reliability of Form C of the Multidimensional Health Locus of Control Scale were examined from five data sources. These data sources included people with a different health condition such as type one and two diabetes (N = 111), rheumatoid arthritis (N = 273), cancer (N= 42 and N = 51), and chronic pain (N= 111). Additionally, exploratory factor analysis was done, and the result showed that Form C of the Multidimensional Health Locus of Control Scale was a reliable and valid measure (Wallston et al., 1994).

Albargawi et al. (2016) translated the English version of Form C of the Multidimensional Health Locus of Control Scale and God Locus of Health Control Scale into Arabic language. The Arabic version of Form C of the Multidimensional Health Locus of Control Scale and the Arabic version of God Locus of Health Control Scale was tested in a pilot study (Albargawi et al.,

2016). In Albargawi et al. (2016) study, two bilingual Saudi Ph.D. students used the back-translation method. The combined scale was first translated from English to Arabic, and then from Arabic to English. The two English version then were compared with each other. Then, a Saudi physician and a Saudi psychologist were asked to check the Arabic version of the scale to ensure that it was clear and applicable to be used in Saudi adults with DMT2. Additionally, one adult with DMT2 was asked to answer the questions on the scale and give his opinion about the clarity of the items. The scale content validity index (S-CVI) was 0.9. During the data collection procedure, each one of the participants who were able to read and complete the questionnaire independently was asked by the Principle Investigator (PI) if the questions were clear and understandable. The participants were also requested to give their opinion if the language that was used in any of the items needed to be modified; none of the participants indicated that there was a need to change any of the items for the Subscale Internal, God, or Doctor. The internal consistency for the Arabic version for God Locus of Health Control Scale was adequate (Cronbach alpha = 0.85). Additionally, the Cronbach alpha of the Arabic version of Form C of the Multidimensional Health Locus of Control Scale was acceptable for the Subscales Internal = 0.67 and Doctors = 0.73 (Albargawi et al., 2015). In this study, the Arabic version of Form C of the Multidimensional Health Locus of Control Scale God Locus of Health Control Scale had a satisfactory internal consistency. The Cronbach alphas for the subscales Internal was 0.84, Doctor was 0.61, and God was 0.84.

Scoring. Form C of the Multidimensional Health Locus of Control scale is a 6-point Likert response format range from (1) strongly disagree to (6) strongly agree (Wallston et al., 1994). The score on Form C of the Multidimensional Health Locus of Control is the sum of the values circled for each of the items on the subscale, which were in this study Internal and Doctor.

Internal and Doctor Subscales included in Form C of the Multidimensional Health Locus of Control are independent of each other (Wallston et al., 1994). No items should be reversed (Wallston, 2015). The God Locus of Health Control Scale is ordinal with six items measured by self-report. The scale is a 6-point Likert response format range from (1) strongly disagree to (6) strongly agree (Wallston et al., 1999). The scoring for God Locus of Health Control Scale is the same as for Form C of the Multidimensional Health Locus of Control Scale in which the scores should be summed (Wallston, 2015).

The Study Measure for the Independent Variable: Self-Efficacy

  Description. Part III of the Multidimensional Diabetes Questionnaire includes two subscales that measure the concept of self-efficacy and outcome expectancy (Talbot, Nouwen, Gingras, Gosselin, & Audet, 1997; see). In this study, the Arabic version of the Self-Efficacy Scale was used to measure the concept of self-efficacy (see Appendix E for the English version and Appendix F for the Arabic version). This scale allows investigators to assess people's perceptions of their ability to adhere to diabetes self-care activities. The scale consisted of 7 items and rated on a 0 to 100 scale (Talbot et al., 1997). The scale was administered after the consent procedure, and it was measured only one time. Participants in the pilot study (Albargawi et al., 2016) were able to complete it in less than 5 minutes.

  Reliability and validity. The reliability and validity of the English version of Part III of the Multidimensional Diabetes Questionnaire Self-Efficacy Scale were tested in 249 adults with DMT2. Talbot et al. (1997) did a confirmatory factor analysis to test the construct validity of the scale. Additionally, three authors evaluated the scale content validity. The result showed that the Part III of the Multidimensional Diabetes Questionnaire Self-Efficacy Scale was a valid and reliable scale with a Cronbach alpha of 0.89 (Talbot et al., 1997).

The English version of Part III of the Multidimensional Diabetes Questionnaire Self-Efficacy Scale was translated into Arabic by a translation service called Oxford Outcomes. The Arabic version of the scale was obtained from the scale developer Talbot et al. (1997) who indicated that Oxford Outcomes translated the scale to the Arabic language in order to be used by an Arab-speaking people in Israel. Oxford Outcomes used back translation method to translate the scale from English to Arabic in which it first translated from English to Arabic. Then from Arabic to English. The scale developers were asked to comment on the last English version of the scale to validate if the meaning in each of the items was congruent with the original scale. The Arabic version of the scale was tested in a pilot study that included 30 Saudi adults with DMT2 (Albargawi et al., 2015). Participants who were able to read and complete the questionnaire independently indicated that they were able to understand all of the questionnaire items. The Arabic version of the scale has shown to be reliable and valid with a Cronbach's alpha of 0.86 (Albargawi et al., 2015). Additionally, in this study, the Arabic version of the sale had a satisfactory internal consistency with a Cronbach alpha of 0.75.

Scoring. No items needed to be reversed. The score of the scale was determined by calculating the mean items score. This means to add all item responses for the person and then divide the summed score by the number of responses (Redman, 2003). For example, add items 1 + 2 + 3 + 4 + 5 + 6 + 7 then divide by 7. Redman (2003) reported that in case there are a missing value or the participants indicated that an item is not applicable to them then, the denominator (number of responses) needs to be adjusted (Redman, 2003). For instance, if a participant indicated that an item is not applicable to him or he did not answer the question, then the denominator will be 6 instead of 7.

The Study Measure for the Independent Variables: Perceived Threats, Perceive Benefits of Self-Care, and Perceived Barriers to Self-Care

Description. The Arabic version of the Health Belief Model Diabetes Scale was used to measure perceived threats (perceived severity and susceptibility), perceived benefits (Daoud et al., 2014), and perceived barriers. Bradley, Brewin, Gamsu, and Moses (1984) developed the original version of the Health Belief Model Diabetes Scale. The Arabic version of the scale was used in a study that included 230 Palestinian with DMT2 (Daoud et al., 2014). Daoud et al. (2014) indicated that they used two items from the original scale to measure the concept of perceived severity, four items for the concept of perceived susceptibility, and four items for the concept of perceived benefits. The Perceived Barriers Scale is ordinal and contains 6 items (Bradley, 1994), and the Arabic version of the scale was used to measure the concept of perceived barriers to self-care. The total items of the Arabic version of the Health Belief Model Diabetes Scale including the Arabic version of the Perceived Barriers Scale was 16 (see Appendix G for the English version and Appendix H for the Arabic version). In this study, the scales was administered after the consent procedure and measured only one time. Participants complete it in less than 10 minutes. Additionally, the participants were asked to answer two short answer questions about their perception of threats of DMT2, and participants needed approximately 4 minutes or less to complete it.

Reliability and validity. Daoud et al. (2014) translated all the items from the original Health Belief Model Diabetes Scale from English to Arabic. Daoud et al. (2014) indicated that the meaning of the translated items was congruent with the original scale. Additionally, Daoud et al. (2014) used factor analysis to test the validity of the scale, and they concluded that it was valid. The subscales of the Arabic version of the Health Belief Model Diabetes Scale has an

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acceptable reliability (Perceived Susceptibility α = 0.60; Perceived Benefits α = 0.74). The reliability value of the subscale Perceived Severity was not reported because the scale contained only two items (Daoud et al., 2014). In this study, the Arabic version of the Health Belief Model Diabetes Scale had a satisfactory internal consistency. The Cronbach alphas for the subscales perceived threats was 0.79 and for perceived benefits was 0.80.

Bradley et al. (1984) examined the psychometric properties of the English version of the Perceived Barriers Scale by using construct validity and factor analysis. The scale showed to be valid, and the Cronbach's alpha was 0.79 (Bradley et al., 1984). In this study, two bilingual Saudi Ph.D. students used the back-translation method to translate the English version of the Perceived Barriers Scale into Arabic language. The scale was first translated from English to Arabic, and then from Arabic to English. The two English version then were compared with each other. Then, the Arabic version of the scale was sent to two Saudi nurses and two Saudi physicians were asked to examine its content validity and wordiness. The scale content validity index (S-CVI) was 1.0. Additionally, during the data collection procedure, each one of the participants who were able to read and complete the questionnaire independently was asked by the PI if the questions were clear and understandable; none of the participants reported that there was a need to change any of the items. The Arabic version of Perceived Barriers Scale had a satisfactory internal consistency, and the Cronbach alphas was 0.79.

Scoring. The Arabic version of the Health Belief Model Diabetes Scale is a 4-point Likert scale that ranges from (1) strongly disagree to (4) strongly agree (Daoud et al., 2014). The Perceived Barriers Scale is a 7-point Likert scale that ranges from (0) strongly disagree to (6) strongly agree (Bradley, 1994). No items needed to be reversed. The Subscales Perceived Severity and Perceived Susceptibility were combine to represent the concept of perceived

threats. The scores for the Subscales Perceived Severity, Perceived Susceptibility, and Perceived Benefits of the Arabic version of the Health Belief Model Diabetes Scale should be summed across all items (Daoud et al., 2014). The scores for the Perceived Barriers Scale should be summed. The higher the score, the greater perception of barriers (Bradley, 1994). Additionally, the data collected by the two short answer questions was analyzed by themes to explore further the concept of perceived threats.

The Study Measure for the Independent Variable: Perceived Family and Friends Support

Description. The Arabic version of the Support Received Scale was used to measure cues to action, which was in this study the perceived family and friends support (Al-Akour, 2003; see Appendix I for the English version and Appendix J for the Arabic version). Fitzgerald et al. (1996) developed the original Support received Scale, which was a part of the Diabetes Care Profile. The Support Received Scale is a subscale of Support Scale. The Support Scale consisted of three Subscales: Support Needs, Support Received, and Support Attitudes. Each of the subscales has one question that has six items (Michigan Diabetes Research Center [MDRC], 2016). In this study, the Subscale Support Received was used. The Support Received Scale is a self-reported measure that consists of one question that has six items to examine the participants' perception of support provided to them by their families and friends (MDRC, 2016). In this study, the questionnaire was administered after the consent procedure and measured only one time. The participants completed it in less than 4 minutes.

Reliability and validity. Fitzgerald et al. (1996) examined the reliability and validity of the English version of the Support Received Scale in patients with diabetes. The scale was found to be reliable, and the Cronbach's alpha was ranging from 0.69 to 0.77. The Arabic version of the scale has shown to be reliable with Cronbach's alpha of 0.65 (Al-Akour, 2003). Additionally, Al-

Akour (2003) indicated that the scale was valid and back translation method was used to translate the scale from English to Arabic. Al-Akour (2003) stated that two bilingual and Arabic speakers people who were knowledgeable about the content of the Support Received Scale were involved in the translation process. The scale was first translated from English to Arabic, and then from Arabic to English. Then, two raters examined the Arabic and the two versions of the scale to ensure accuracy, and they repeated the back translation process when errors were noted. Al-Akour (2003) indicated that the translation process was repeated three times until the two raters established a joint agreement about the translated scale. In this study, the Arabic version of the Support Received Scale had a satisfactory internal consistency, and the Cronbach alphas was 0.89.

Scoring. No items needed to be reversed. Since the Support Received Scale is a 6-point Likert scale ranging from strongly disagree to do not apply, the none applicable responses can be considered as a missing value (MDRC, 2016). The score for the other response should be summed across all items (a to f) and divided by the count of non-missing items. The total score can range from 1 to 5 in which a higher score indicated that the person perceives to have good support from family and friends about diabetes self-care (MDRC, 2016).

The Study Measure for the Dependent Variable: Reported Level of Adherence to Diabetes Self-Care Activities

Description. The Arabic version of the Revised and Expanded Summary of Diabetic Self-Care Activity Scale was used to measure the participants reported level of adherence to self-care activities (AlJohani, Al Kendall, & Snider, 2016). The original scale was developed by Toobert et al. (2000), and the scale measures the rate of doing the main self-care activities recommended for people with DMT2. The scale allows investigators to identify how well the

participants adhere to self-care activities in the past 7 days that include diet, foot care, exercise, blood glucose monitoring, and medication. The scale is ordinal and consists of 11 main sets of items and 14 additional items measured by self-report (Toobert et al., 2000). In this study, 12 items were used (see Appendix K for the English version and Appendix L for the Arabic version) and the questionnaire was administered after the consent procedure and measured only one time. Participants in the pilot study (Albargawi et al., 2016) were able to complete this survey in less than 7 minutes.

Reliability and validity. AlJohani et al. (2016) examined the reliability and validity of the Arabic version of the Revised and Expanded Summary of Diabetic Self-Care Activity Scale. AlJohani et al. (2016) examined the validity of the scale in a sample that included 243 Saudi adults with DMT2. Additionally, AlJohani et al. (2016) stated that the scale was translated from English to Arabic langue using professional translating services. A panel of experts from Saudi Arabia, who specialized in diabetes, examined the Arabic version of the scale. This panel of experts involved in the back translating process. The representativeness content validity index (R-CVI) of the Arabic version of the scale was 95.3, and the clarity content validity index (C-CVI) was 94.8. The Arabic version of the scale was found to have good test–retest reliability ($r = 0.912$) and internal consistency (Cronbach's alpha = 0.76). Additionally, the subscales were reliable. The Cronbach's alpha for the Subscale Diet was 0.89, for the Exercise was 0.83, for Blood Glucose Monitoring was 0.92, and for Foot Care was 0.77 (AlJohani et al., 2016).

Additionally, the Arabic version of the scale has been shown to be reliable and valid when it was used by Saudi adults with DMT2 (Albargawi et al., 2015). The overall reliability if the scale was α = 0.70. The Subscale reliabilities was for General diet α = 0.865, Exercise α = 0.89, Blood Glucose Monitoring α = 0.87, Medication α = 0.84, and Foot Care α = 0.55. The

Subscale for Foot Care in Albargawi et al. (2015) study included three of the scale core items and two of the additional items; in this study, the same items were used. In this study, the Arabic version of the Revised and Expanded Summary of Diabetic Self-Care Activity Scale had a satisfactory internal consistency. The Cronbach alphas of the scale was 0.69.

Scoring. The fourth item of the subscale foot care needed to be reversed. After changing the item, the scores for each of the subscale except for medication should be computed by taking the mean number of days. The item in the medication subscale, a total number of days should be calculated. The possible scores range from 0 to 7, with 0 indicating "not at all" and 7 representing "every day" (Toobert et al., 2000). In this study, the scores of the Subscales Diet, Exercise, Foot Care, Medication, and Blood Glucose Monitoring were added together to represent an overall rating for participants reported level of adherence to diabetes self-care activities.

<div align="center">

Data Collection Procedure

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Recruitment Plan

Recruitment for this study was completed through posting flyers at select outpatient clinic, diabetes center, and PHC at King AbdulAziz Medical City-Riyadh. The PI talked to staff nurses at the outpatient clinic, diabetes center, and PHC to determine if they were willing to assist in identifying participants for recruitment. The PI trained staff nurses who agree to help on how to explain to participants the permission to contact form and flyers. The permission to contact form is a one-page document that indicated that the participant agreed to be contacted by the PI (see Appendix O for the English version and Appendix P for the Arabic version). Grove et al. (2013) emphasized that people who are involved in the data collection procedure should be aware of the inclusion and exclusion criteria to minimize bias when identity potential

participants. Therefore, the PI made sure that the staff nurses who agreed to assist were familiar with the inclusion and exclusion criteria.

To maintain participants' confidentiality and keep their information anonymously to the PI, the flyers, and permission to contact forms were given to potential participants by staff nurses working in the select outpatient clinic, diabetes center, and PHC when patients arrived at the clinic. The PI provided information to the potential participants about the study and provided the consent form to them in a private location at the outpatient clinic, diabetes center, and PHC, such as an empty exam room or a physician's office that is not in use. The PI ensured that all consent forms were provided in writing to participants and that the consent form was verbally shared with each participant (see Appendix Q). Participants were only asked to fill in the questionnaires one time after the consent procedure. Participants needed approximately 35 to 40 minutes to complete the questionnaires.

Participants' understanding can affect the validity of data collected by self-reported questionnaire (Hulley et al., 2013). Therefore, the PI read the questionnaires to persons with low education level or low vision and for those who were fatigued in order to ensure understanding. Additionally, the PI offered to read the questionnaire to participants if they preferred. The PI informed the participants to take breaks if they feel tired and encouraged them to ask questions if they did not understand the questionnaire items. The PI responded to any questions the participants had about the questionnaires to ensure that the participants understood all of the questionnaire items.

Data Analysis Plan

The data was analyzed using the program SPSS ® version 22. Mean, SD, and frequency were used for continuous variables (Field, 2009). The frequency can give an overview of the

sample. The mean helps provide an average score for the variables; the SD describes the variability of the data, and it used to identify outliers and skewness (Field, 2009). The continuous variables in this study were reported level of adherence to diabetes self-care activities, health locus of control, self-efficacy, perceived threats of diabetes, perceived barriers to and benefits of self-care, perceived family and friends support, HbA1c, age, and years living with diabetes. Frequencies were used to describe categorical variables (Field, 2009) of gender, education, marital status, other health conditions, and foot ulcer.

One-way ANOVA was used to test the relationship between categorical independent variables and a continuous dependent variable (Field, 2009; Polit & Beck, 2012). In this dissertation study one-way ANOVA was used to examine the relationship between the dependent variable (reported level of adherence to diabetes self-care activities) and categorical demographic variables including gender, education, marital status, and other health conditions. Additionally, a one-way ANOVA was used to examine the differences in the reported level of adherence to diabetes self-care activities among participants with and without DFU. The F-statistic was used to determine the significance of differences between the groups. The level of significance was 0.05 (Field, 2009; Polit & Beck, 2012).

Pearson's Correlation coefficient was used to describe the relationship between all the study variables: demographic characteristics, health beliefs (self-efficacy, health locus of control, perceived threats of diabetes, perceived barriers to and benefits of self-care, and perceived family and friends support), and the reported level of adherence to diabetes self-care activities.

Hierarchical multiple regression analysis was used to examined the relationship between the study variables and the independent variable reported level of adherence to diabetes self-care activities. Significant demographic characteristics that were categorical were dummy coded

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before entering them in the regression analysis. Simple linear regression analysis was first used to identify variables that have a significant relationship with the level of adherence to diabetes self-care activities. Identifying such relationship was used to determine which demographic characteristics should be controlled for and which independent variables should be entered in the hierarchical multiple regression analysis.

The hierarchical multiple regression analysis was used to test the relationship of health beliefs (self-efficacy, health locus of control, perceived threats of diabetes, perceived barriers to and benefits of self-care, and perceived family and friends support) with the reported level of adherence to diabetes self-care activities after controlling for significant demographic characteristics. The first block included the significant demographic characteristics to control for their effects (Cohen et al., 2003). Followed by independent variables family and friends support, followed by perceived threats of diabetes, followed by self-efficacy, followed by health locus of control (internal, God, and doctor), and followed by perceived barriers to and benefits of self-care (see Appendix R).

The PI thematically analyzed data collected by the short answer questions for the variable perceived threats. The PI transcribed the participants' responses to the short answer questions and translated them from Arabic into English. All responses to the short answer questions were then back translated into Arabic by a native Arabic speaking PhD prepared professor, who is fluent in English. The PI then examined the two Arabic versions of the participants' responses to ensure accuracy between the translations; 100% consistency was noted between the translations.

The PI and the Major Professor (MP) read through the responses multiple times and examined them line by line to identify the common codes that emerged from the data. The data were then coded by the PI and MP, ensuring that consensus was achieved for the codes of all the

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responses. Using the codes that emerged from the data, the PI created a matrix and put all coded responses under each one of the codes in order to look for patterns and themes that emerged from the data. The PI and MP then examined the matrix and identified the patterns, combined the codes that fit with each pattern together, and were able to identify the major themes.

Data Management Plan

Several threats can affect the internal validity of the study (Polit & Beck, 2012). Therefore, to minimize validity threats, the PI ensured that all recruited participants met the inclusion criteria. Additionally, the PI excluded patients with severe DFU to control for confounding variable because they might not be able to perform the diabetes self-care activities as other participants with a mild to moderate foot ulcer. People with severe ulcers also can be considered extreme cases, and including them can affect the accuracy of the results. Polit and Beck (2012) also stated that including persons who are extremely different from other participants might bias the result of the relationship between the independent and dependent variables. To decrease instrument bias, all the tools that were used in the study were assessed for their reliability value using Cronbach's alpha (Grove et al., 2013). The instrument could be identified to have a good reliability if the value of Cronbach's alpha was between 0.70 and 0.95. However, a low value of Cronbach's alpha that is less than 0.70 could be due to a small number of items in the scale (Tavakol & Dennick, 2011). Therefore, in this study, the instruments with small numbers of items could be identified to have an acceptable reliability if the value of Cronbach's alpha was between 0.60 and 0.70.

Ethical Considerations

The PI obtained the ethical approval from the University of Wisconsin-Milwaukee and from King Abdullah International Medical Research Center in Riyadh City. No ethical issues were anticipated to be violated when conducting this study.

Confidentiality and Privacy

People's participation in a study should be voluntary, and their confidentiality should be protected (Grove et al., 2013). Therefore, the data in this study was collected in a private location and the participation in the study was voluntary. The PI ensured that all information kept confidential, and each participant was informed about the study prior to giving their consent. To ensure participants' confidentiality, the completed questionnaires and the consent forms were stored in a password-protected suitcase accessed only by the PI. Additionally, the PI entered the data from the completed questionnaires in a password-protected database.

Autonomy and Description of Informed Consent

Participants who agree to participate in a study will provide informed consent after they receive detailed information about the study (Grove et al., 2013). Therefore, participants received detailed information about the study, and they indicated that they agreed to participate in this study by putting a mark next to the word "Agree" in the consent form. Additionally, participants received a copy of the consent form, and it additionally explained verbally. The PI informed the participants that they did not have to respond to any question that they feel uncomfortable answering. The PI furthermore, informed the participants that participation in the study is optional, and it will not influence their medical treatment and they can withdraw from the study or refuse to participate at any time (Polit & Beck, 2012) up until they give their surveys to the

investigator. As the investigator did not collected names or identifiers on the surveys, once they were given to the investigator, there were no way to ensure which surveys were the participants.

Chapter Summary

The chapter included information about the methodology that was used in this study and the analysis that was used which were descriptive statistics, One-way ANOVA, Pearson's correlation coefficient, and regression analysis. A convenience sample of Saudi adults with DMT2 was recruited. The chapter included description of the sample size and its characteristics, setting, instruments, and data collection procedures, analysis, and management. Additionally, ethical considerations were discussed.

Chapter Four: Findings

Introduction

This chapter includes the results from the examination of relationships between the study variables based on the analysis plan mentioned in chapter 3. Additionally, it includes the results from each of the research hypotheses of this study. The SPSS ® software version 22 was used for all statistical analysis and themes were created for short answer questions about the concepts of perceived threats of DMT2.

Descriptive Data Related to Study Variables

The total number of participants in this study was 202 Saudi adults with DMT2. Mean, SD, median, range, and frequency were used for continuous variables to give an overview of the sample (see Table 1). The continuous variables in this study were (a) reported level of adherence to diabetes self-care activities, (b) health locus of control, (c) self-efficacy, (d) perceived threats of diabetes, (e) perceived barriers to and benefits of self-care, (f) perceived family and friends support, (g) HbA1c, (h) age, and (i) years since DMT2 diagnosis. Frequencies were used for categorical variables, which are (a) gender, (b) education, (c) marital status, (d) other health conditions, and (e) the presence of a foot ulcer (see Table 2).

Participants' Demographic Characteristics

Participants' ranged from 32 to 83 years of age, with a mean of 61 years of age (SD = 10.37), with a majority (53%) of the participants under 60 years of age. A majority (78%) of the participants were married, with nearly half (46%) reporting less than a college education. Most of the participants (68%) did not know their HbA1c, and 78% had other health problems in addition to DMT2. The length of time since the participants were diagnosed with DMT2 ranged

from one to 40 years, with a mean of 15.37 years (SD = 9.25), and over half (53%) of the participants had been diagnosed with

DMT2 for less than 15 years.

Table 1

Descriptive Statistics for Continuous Demographic Variables and Health Belief Model Variables

Variable	Mean	SD	Median	Range	Minimum	Maximum
Age (years)	60.34	10.18	60	51	32	83
Years since DMT2 diagnosis	15.37	9.25	15	39	1	40
HbA1c (%)	9.16	2.49	8	9	5.4	14
Internal HLoC	28.70	8.17	32.00	29.00	7.00	36.00
Doctor HLoC	16.01	2.88	17.00	15.00	3.00	18.00
God HLoC	30.04	6.98	33.00	30.00	6.00	36.00
Self-efficacy	55.69	20.42	55.71	104.29	2.86	107.14
Threats of diabetes	22.60	2.69	24.00	18.00	6.00	24.00
Benefits of self-care	15.10	1.99	16.00	12.00	4.00	16.00
Barriers to self-care	24.34	10.64	27.00	36.00	6.00	42.00
Family and friends support	24.50	7.39	28.00	24.00	6.00	30.00

Table 2

Description of Participants

Variable	N	%
Age		
≤ 60 yrs.	107	53%
≥ 61 yrs.	89	44%
Not reported	6	3%
Gender		
Male	101	50%
Female	101	50%
Marital status		
Not married	42	21%
Married	158	78%
Not reported	2	1%
Level of education		
No School	73	36.1%
Less than college education	93	46.1%
College education	35	17.3%
Not reported	1	0.5%
HbA1c		
≤ 7%	21	10%
> 7%	44	22%
Did Not Know	137	68%
Years since DMT2 diagnosis		
≤ than 15 years	106	53%
> than 15 years	88	43%
Not reported	8	4%
Foot problem secondary to DMT2		
Yes	100	50%
No	102	51%
Other health problems besides DMT2		
Yes	157	77.7%
No	44	21.8%
Not reported	1	0.5%

Participants' Health Locus of Control

One of the variables that were explored in this study was the participants Internal HLoC. A majority (87%) of the participants reported that they are responsible for their diabetes, and if the condition becomes worse, 90% believe their behavior determines when they can feel better again. A majority (80%) of the participants perceived that their behavior affects their diabetes, and most of them (73%) feel guilty if their condition becomes worse. Seventy-five percent of the participants reported that if their diabetes becomes worse, that is an indication that they had not taken care of their health. Additionally, 73% of the participants agreed that they should be blamed if their diabetes becomes worse and receive the credit when their health improves.

In this study, we also examined the participants perception of their doctors HLoC. The majority (93%) of the participants reported that seeing their doctor regularly can reduce their risk of developing diabetes related complications. An overwhelming number of participants (91%) reported that following their physician's recommendations is the best method for managing their diabetes. Additionally, 90 percent of the participants reported that they would seek medical assistance if their diabetes becomes worse.

Participants' perceptions of how God (God HLoC) influences or controls their health outcomes was examined in this study. A majority (80%) of the participants perceived that God is in control of their diabetes and 89% reported that what happens to them due to their diabetes is God's will. Additionally, the participants (75%) reported that if their diabetes becomes worse, only God can determine if they will feel better again.

Participants' Self-Efficacy

Participants' perceptions of their own self-efficacy was examined in this study. Over half of the participants (52%) reported feeling confident in their ability to follow their diet, test their blood sugar regularly (59%), resist food temptations (59%), and to follow their diabetes treatment (64%). Conversely, a majority of the participants (76%) reported that they were not confident that they would be able to exercise regularly, 56% were not confident to keep their blood sugar under control, and 55% were not able to control their weight.

Participants' Perception of Benefits and Barriers to Self-Care

Participants perception of the benefits and barriers to self-care were also examined in this study. Participants reported that they could control their DMT2 through diet (95%), exercise (92%), and medication (97%). Ninety-seven percent of the participants reported that routine medical visits could prevent diabetes complications, and 68% found that controlling DMT2 forced them to make changes in their lifestyle. DMT2 was reported to interfere with participants work (58%) and affected their leisure activities (53%). Fifty-four percent of the participants reported that controlling DMT2 could prevent them from living their life in a way that is acceptable to them. Nearly half of the participants (47%) reported that following their diet could make eating in public difficult; while 35% reported feeling embarrassed when they have to manage their DMT2 in a public setting.

Participants' Perception of their Family and Friends Support

In this study, we examined the participants' perception of their family and friends support. Most of the participants reported that they receive support from family and friends to follow their diet (80%), take their medication (84%), monitor their blood sugar (82%), and handle their feelings about DMT2 (81%). Additionally, participants reported that their family

and friends were also very supportive of them doing their own foot self-care (70%) and exercise (67%).

Participants' Perception of Threats of DMT2

Participants' perceptions of how DMT2 could be a threat to their health and well-being was explored in this study. Eighty-nine percent of the participants reported that DMT2 could be a severe disease if it is not controlled, and 95% of them indicated that not controlling their DMT2 could affect their health negatively in the future. The majority (96%) of the participants reported that DMT2 could become worse if they did not manage it effectively. Additionally, participants indicated that they could prevent complications by following their diet (98%), exercising (98%), and taking their medication (97%) as prescribed.

Characteristics of Participants' Responding to the Short Answer Questions

Participants were asked to respond to 2 short answer questions regarding what they perceived to be threats to their health due to having DMT2. The completed short answer responses were reviewed by the Principal Investigator (PI) to identify how many participants responded to the short answer questions about the concept of perceived threats of DMT2. Only 60 (30%) participants out of the 202 participants responded to the short answer questions. Among those who responded, 16 (27%) of the participants answered the first question, and of those 16, only 2 (3%) of the participants answered the second question. There were 42 (70%) of the participants who responded to both the first and second short answer questions. The overall number of participants who responded to the first question was 58 participants and a total of 44 participants responded to the second question.

Themes

The PI thematically analyzed data collected by the short answer questions for the variable perceived threats of diabetes. Four major themes emerged from the analysis: (a) physical alterations, (b) behavioral change, (c) self-care management adherence, and (e) higher power.

Physical alterations. Participants discussed physical alterations as one of the effects of having DMT2. The adults reported having experienced many physical alterations due to their DMT2, including fatigue, hypertension, problems with their feet, kidney, heart, eyes and functional impairment. Functional impairment reported by the participants included impaired physical functioning, sleep problems, an inability to drive or travel, and poor wound healing. The participants concerns related to their physical alterations were reflected in the following statements:

- *I have diabetes for 30 years, and it affected my eye. I had to do an eye surgery because of diabetes*

- *My health became worse when it increases I feel dizzy, and when it decreases I feel tired and dizzy*

- *The effects began in the eye and feet, teeth falling out, pain in legs and hands.*

- *Diabetes affects the body if it is high by teeth falling, vision weaknesses, feeling of cold in the legs, and the wound does not heal quickly.*

- *Diabetes affected my vision, it prevented me from traveling because of being afraid of hypoglycemia and hyperglycemia, and it affected my genital and nerve.*

- *It makes the person tired have poor thinking and general impairment in vision.*

- *It has multiple negative effects for example vision, hearing, difficulty in concentration, memory, urinary tract, the strength of focus, sexual power, emotion.*

Behavioral change. Participants reported that having DMT2 caused them to demonstrate behavioral changes that they had not previously experienced. Not only did the participants become angry easily, but their behaviors reflected emotional changes as well as differences in their energy levels. One participant stated that DMT2 could make a person avoid external stressors such as marital and family conflict and they reported, "*Stay away from all external influences and marital and family problems.*" According to a participant, their behavioral changes included: "*Being afraid of hypoglycemia and hyperglycemia. I can become angry very quickly from anything went wrong or not expected.*"

Self-care management adherence. One of the themes that emerged from the participant's responses addressed their adherence to self-care management. Participates' responses conveyed that poor self-care management was one of the reasons that DMT2 affected their health. The poor self-care management adherence included not taking their medication or following the physicians orders related to diet, exercise, and follow-up. The following statements reflected the participants perceptions of their poor adherence to self-care management:

- *Diabetes influences when not caring about it and not taking medication on time like insulin and pills that were prescribed from the diabetes doctor and not doing exercise and following a healthy diet.*

- *When I eat something that has a percentage of sugars and fats; therefore, everything that can be eaten or drink should be controlled to avoid an increase in sugar.*

- *Harm my health if did not commit to diet and eating too much as well drinking carbonated and sugary substance.*

- *If did not care and if it was neglected by the patient and did not follow up with diabetes doctor.*

Higher power. Reflections on their spiritual higher power of God was discussed by the participants in their responses to the short answers. Participants shared that God was who helped ensure their diabetes was under control, as God controlled the disease. Statements were shared by the participants that reflected their attributing their health status to their higher power:

- *Praise be to God the impact is very low, everything from God is satisfied.*

- *On vision and afraid of a hypoglycemic attack God forbid.*

- *Thank God that my diabetes is still under control.*

Relationship between Study Variables

A Pearson's Correlation coefficient statistical analysis was conducted to examine the relationship between all the study variables. The study variables were demographic characteristics and health beliefs (self-efficacy, health locus of control, perceived threats of diabetes, perceived barriers to and benefits of treatment, and perceived family and friends support). The cut-off value was set at 0.05 to determine a significant relationship between the study variables. Accordingly, a relationship is considered significant if the P-value was less than 0.05.

Relationship between Demographic Variables

Participants with a high level of education are significantly more likely to suffer from more health problems, ($r = 0.176$; $p = 0.013$) than participants who have low levels of education (see Table 3). Participants who have been diagnosed with diabetes more recently are significantly more likely to have foot problems ($r = - 0.238$; $p < 0.05$), than participants who have been diagnosed with DMT2 for a longer period of time.

Table 3

Correlation between Demographic Variables

Variable	Age	Foot problem	Level of education	Other disease beside DMT2	Years since diagnosis with DMT2
	r	r	r	r	r
Age	1				0.44**
Foot problem		1			- 0.238**
Level of education			1	0.176*	
Other disease beside DMT2				1	
Years since diagnosis with DMT2					1

Note. ** P < 0.001; * P < 0.05

Relationship between Demographic Variables and Health Belief Model Variables

Participants who perceived that they have more barriers to performing self-care, were more likely to have a DFU ($r = - 0.165$; $p = 0.020$; see Table 4). Additionally, the more the participants perceived that their doctor cannot help them control DMT2, the more likely they were to have a DFU ($r = - 0.175$; $p = 0.013$). Participants' with higher levels of education were more likely to report having greater self-efficacy and internal HLoC ($r = 0.153$, $p = 0.031$; $r = 0.163$, $p = 0.21$ respectively).

The longer since the participants have been diagnosed with DMT2, the more likely they were to report having internal HLoC ($r = 0.148$; $p = 0.041$), perceive that DMT2 can be threatening to their health ($r = 0.154$; $p = 0.032$), and that self-care is best for their condition ($r = 0.162$; $p = 0.024$). Participants who perceived that God controlled their DMT2, were more likely to have report having completed fewer levels of education ($r = - 0.225$; $p = 0.001$), have other health issues in addition to having DMT2 ($r = - 0.193$; $p = 0.006$), and have poor glycemic control ($r = 0.272$; $p = 0.034$).

Table 4

Significant Correlation between Demographic Variables and Health Belief Model Variables

	Foot Problem	HbA1c	Level of Education	Other disease beside DMT2	Years Since DMT2 Diagnosis
Variable	r	r	r	R	r
Barriers	- 0.165*				0.163*
Benefits					
Doctor HLoC	-0.175*				
God HLoC		0.272*	- 0.225**	- 0.193**	
Internal HLoC			0.153*		0.151*
Self-efficacy	0.141*		0.163*		
Threats of diabetes					0.155*

Note. ** P < 0.001; * P < 0.05

Relationship between Health Belief Model Variables

Participants who reported receiving support from their family and friends, were more likely to perceive that their doctor can control their DMT2 (r = 0.143; p = 0.047), that performing their own self-care is beneficial to their DMT2 condition (r = 0.162; p = 0.024), and that DMT2 can be threatening to their health (r = 0.193; p = 0.007; see Table 5). However, the greater the support that participants receive from their family and friends, the more likely they are to perceive that they have barriers to performing their own self-care (r = 0.176; p = 0.014).

Participants who perceived that their physician could control their DMT2 believed that performing self-care is beneficial for their condition (r = 0.255; p < 0.05), and that they have internal HLoC (r = 0.355; p < 0.05). Similarly, the more the participants perceive that God

controls their DMT2, the more they believe that doing self-care is beneficial for their condition ($r = 0.150$; $p = 0.034$).

Participants who perceived they have greater self-efficacy were more likely to perceive that self-care is beneficial to their condition ($r = 0.143$; $p = 0.043$), perceive that DMT2 is a condition that can be threatening to their health ($r = 0.162$; $p = 0.022$), and perceive that they have fewer barriers to self-care ($r = -0.173$; $p = 0.014$).

Table 5

Significant Correlation between Health Belief Model Variables

Variable	Barriers	Benefits	Doctor HLoC	God HLoC	Internal HLoC	Self-efficacy	Threats of diabetes	Family and friends support
	r	r	r	r	r	R	r	r
Barriers	1					- 0.173*		0.176*
Benefits		1	0.255**	0.150*	0.320**	0.143*	0.650**	0.162*
Doctor HLoC			1	0.164*	0.355**		0.271**	0.143*
God HLoC				1				
Internal HLoC					1	0.151*		0.403**
Self-efficacy						1		0.162*
Threats of diabetes							1	0.193**
Family and friends support								1

Note. ** $P < 0.001$; * $P < 0.05$

Results of the Analysis of the Research Questions

Research Question One

What is the level of adherence to diabetes self-care activities in Saudi adults with DMT2?

Hypothesis One

Saudi adults with DMT2 will report a low level of adherence (< 7 days/week) to diabetes self-care activities that is less than 7 days per week.

Statistical analysis was conducted to obtain descriptive statistics that included mean, SD, and frequency, which was used to answer this question. Participants in this study adhered to their medication regimen 7 days per week. However, their adherence was lower in other self-care activities, especially exercise. The participates reported that they did not adhere to exercise in the last seven days. However, they reported adhering to their diet regimen 5 days per week, to foot care regimen 4 to 5 days per week, and to blood glucose monitoring 3 days per week (see Table 6). The overall level of adherence to diabetes self-care activities was 3 to 4 days per week. Therefore, the findings supported the hypothesis that Saudi adults with DMT2 have a low level of adherence to diabetes self-care activities.

Table 6

Reported Level of Adherence to Diabetes Self-Care Activities

Variable	Median	Mean	SD	Minimum	Maximum	Alpha
Medication	7.00	6.62	1.43	0.00	7.00	
Diet	5.00	4.45	2.44	0.00	7.00	0.94
Foot Care	4..20	4.60	1.61	0.50	7.00	0.61
Blood glucose monitoring	3.00	3.61	2.87	0.00	7.00	0.95
Exercise	0.00	1.56	2.33	0.00	7.00	0.90
Total for overall scale	3.62	3.63	1.26	0.00	6.75	0.69

Research Question Two

What is the overall glycemic control of Saudi adults with DMT2?

Hypothesis Two

Saudi adults with DMT2 have poor glycemic control that is higher than the ADA (2017) standards of glycemic control (HbA1c >7%).

Statistical analysis was conducted to obtain descriptive statistics that included mean, SD, and frequency, which were used to address this question. Most of the participants did not know their HbA1c (68%), and of those who reported their HbA1c levels, 22% indicated that they have poor glycemic control (HbA1c > 7%), while the remaining 10% reported that they have good glycemic control (HbA1c ≤ 7%). The HbA1c of those who reported their HbA1c ranged from 5.4% to 14%, with a mean HbA1c of 9.16 (SD = 2.49), and the median was 8%. The results supported the hypothesis that Saudi adults with DMT2 have poor glycemic control.

Research Question Three

Is there an association between the level of adherence to diabetes self-care activities for Saudi patients with DMT2 who have had and who have not had a DFU?

Hypothesis Three

Persons with a DFU would report that there were more likely to perform diabetes self-care activities than persons without a DFU.

A one-way ANOVA was conducted to examine the differences in the reported diabetes self-care activities among participants with and without a DFU. One-way ANOVA is equivalent to independent sample t-test when comparing two groups mean scores (Pallant, 2010). The PI examined the assumptions of one-way ANOVA before conducting the analysis. Both one-way ANOVA and independent sample t-test share similar four assumptions (Pallant, 2010):

1. Simple random sample and the observations in the two groups are independent of each other (Pallant, 2010). For this cross-sectional self-selected convenience sample, the assumption of random selection was not met. However, the measures of the two groups were independent since the person can only have a DFU or do not have a DFU.

2. Observations are normally distributed (Pallant, 2010). The Kolmogorov-Smirnov and Shapiro-Wilk test was used to examine the skewness and both were not significant ($P = 0.2$; $P = 0.8$ respectively), which indicated that the normality assumption was met (Field, 2009).

3. Homogeneity of variance, which means the variance of the population should be equal and standard deviation of the two groups is nearly equal (Pallant, 2010). The Leven's test was used to test the null hypothesis that the variance of the groups were equal. The Leven's test for equality of variances was not statistically significant ($F = 0.041$, $p = 0.839 > 0.05$), which indicated that the mean scores of the two groups were not significantly different.

4. The dependent variable should be measured by interval or ration scale (Pallant, 2010). In this study, the dependent variable reported level of adherence to diabetes self-care activities was created by the sum of ordinal level responses. When the ordinal level values were added together the sum takes on the properties of interval level data (Field, 2009; Polit & Beck, 2012).

   The assumptions of the independent sample t-test/one-way ANOVA were not severely violated. One-way ANOVA is a parametric test that is robust even to violations of assumptions. Therefore, the test could be used to compare the differences in mean scores between participants with and without a DFU. No significant differences were

found in diabetes self-care activities between participants with and without a DFU (F(1,

194) = 1.051; p = 0.30). Therefore, the result did not support the hypothesis. However,

people who had a DFU reported that they performed diabetes self-care activities more

often than participants who had not had a DFU (M = 44.73 SD = 15.28 vs. M = 42.50 SD

15.15 respectively).

Research Question Four

How does a person's diabetes self-care activities vary based on demographic characteristics?

Hypothesis Four

The person's level of adherence to diabetes self-care activities would vary based on demographic

characteristics.

A One-way ANOVA statistical analysis was conducted to examine the relationship

between reported self-care activities and categorical demographic variables, including gender,

education, marital status, and other health conditions. The PI examined the assumptions of the

one-way ANOVA that were explained in the research question three. No severe violations were

observed, which indicated that one-way ANOVA was an appropriate analysis to be used to

answer research question four. Pearson correlation statistical analysis was conducted to examine

the relationship between reported diabetes self-care activities and continuous variables, including

age, years since diagnosed with DMT2, and HbA1c. No association was found between reported

diabetes self-care and participants' demographic characteristics (p > 0.05) except years since

diagnosis (r = 0.149; p = 0.033). Therefore the results did not support the hypothesis. The longer

the timeframe since the participants have been diagnosed with DMT2, the more likely they were

to report doing diabetes self-care activities.

Research Question Five

How do patients with DMT2 perceive that diabetes has impacted their health?

Hypothesis Five

The greater the Saudi adults with DMT2 perception of threat, the more likely they were to report doing diabetes self-care activities.

Pearson correlation statistical analysis was conducted to examine the hypothesis. A significant correlation was found between participants' perception of threats and their diabetes self-care activities. Participants who perceived greater threats regarding DMT2 problems, the more likely they reported performing diabetes self-care activities ($r = 0.233$; $p = 0.001$); therefore, the result was found to support the hypothesis.

Research Question Six

Controlling for demographic characteristics, do health beliefs (self-efficacy, health locus of control, perceived threats of diabetes, perceived barriers to and benefits of self-care, and perceived family and friends support) predict a significant amount of variance in the reported diabetes self-care activities in Saudi adults with DMT2?

Hypothesis Six

Controlling for demographic characteristics the health beliefs (self-efficacy, health locus of control, perceived threats of diabetes, perceived barriers to and benefits of self-care, and perceived family and friends support) will predict a significant amount of variance in the reported diabetes self-care activities in Saudi adults with DMT2.

Hierarchical multiple regression analysis was conducted to test the ability of health beliefs (self-efficacy, health locus of control, perceived threats of diabetes, perceived barriers to and benefits of self-care, and perceived family and friends support) to predict the participants

reported level of adherence to diabetes self-care activities. The PI examined the six assumptions of the regression analysis (Cohen et al., 2003):

1. The relationship between the dependent and independent variables should be linear (Cohen et al., 2003). The scatter plot of the dependent variable (reported level of adherence to diabetes self-care activities) and the health beliefs did not display curvilinear relationship, which indicated the first assumption was met.

2. All variables indicated in the theory should be entered in the model (Cohen et al., 2003). This assumption was met since all variables in the modified HBM were entered in the regression analysis.

3. The measurement needs to be reliable (Cohen et al., 2003). The third assumption was met since all study measures were found to be reliable.

4. The residuals need to have a constant variance (homoscedasticity; Cohen et al., 2003). This assumption was also met since no systematic pattern or dramatic problem was observed in the distribution of the residuals.

5. The residuals are independent and there is no cluster sampling (Cohen et al., 2003). In this study, data were not collected from a nested group nor at different time, which indicated the fifth assumption was met.

6. The residuals should have a normal distribution (Cohen et al., 2003). The sixth assumption was met as evidence of the normal P-P plot of regression-standardized residual, which showed that the residual scattered around the regression line. This indicated that the residual was normally distributed.

Years since DMT2 diagnosis was entered in the first step, explaining 2.2% of the variance in reported diabetes self-care activities (see Table 7). Family and friends support was

entered in the second step, explaining only 0.8% of the variance in the reported diabetes self-care activities after controlling for years since DMT2 diagnosis. In the third step, perceived threats of diabetes complications were entered, significantly explaining an additional 5% of the variance in the reported diabetes self-care activities, after controlling for other variables in the model. Self-efficacy was entered in the fourth step and significantly explained an additional 30.5% of the variance in the reported diabetes self-care activities, after controlling for other variables in the model. In the fifth step, HLoC (internal, God, and doctor) was entered, and the total variance explained by the model, explaining an additional 1.3% of the variance in the reported diabetes self-care activities, after controlling for other variables in the model.

In the sixth step, the perceived barriers to and benefits of self-care were entered, explaining an additional 1.9% of the variance in the reported diabetes self-care activities after controlling for years since DMT2 diagnosis, family and friends support, perceived threats of diabetes complications, self-efficacy, internal HLoC, God HLoC, and doctor HLoC. The total variance explained by the model as a whole was 41.7% ($F_{(9,179)} = 14.23$; $p < 0.05$). In the final model (sixth step) only self-efficacy and perceived barriers self-care was statistically significant, with self-efficacy having higher beta value ($\beta = 0.520$, $p < 0.05$) than perceived barriers to self-care ($\beta = - 0.130$, $p = 0.047$).

Table 7

Hierarchical Multiple Regression Analysis

Variable	Step 1	Step 2	Step 3	Step 4	Step 5	Step 6
	B	β	β	β	β	β
Years since DMT2 diagnosis	.149*	.141	.110	.082	.071	.081
Family and friends support		.087	.041	.002	.011	.030
Threats of diabetes			.235*	.150*	.101	.64
Self-efficacy				.575**	.562**	.535**
Internal HLoC					.127	.125
Doctor HLoC					- .009	- .024
God HLoC					.000	- .002
Barriers to self-care						- .120*
Benefit of self-care						.088
R² Change	0.022	0.008	0.050*	0.305**	0.013	0.019

R² = 0.417   **F(8, 182)** = 14.23   **P** ≤ 0.0005

Note. ** P < 0.001; * P < 0.05

When conducting the hierarchical multiple regression analysis, a mediating effect of perceived threats of diabetes complications and perceived benefit of self-care was observed. To test the mediating effects, three conditions must be met. In the first condition, the mediator should be correlated with the independent variable and the dependent variable (Baron, Kenny, & Reis, 1986). The perceived benefit of self-care was found to be correlated with perceived threats of diabetes complications ($r = 0.664$; $p < 0.05$) and with the reported diabetes self-care activities ($r = 0.236$; $p = 0.001$). In the second condition, the independent variable must be correlated with the dependent variable (Baron et al., 1986). Perceived threats of diabetes complications was found to correlate with the reported diabetes self-care activities ($r = 0.243$; $p = 0.001$). In the third condition, when the mediator is entered into the model, the previous significant relationship between the independent variable with the dependent variable is no longer significant (Baron et al., 1986). When the concept of perceived benefit of self-care was added to the model, the significant relationship between perceived threats of diabetes complications and reported diabetes self-care activities was no longer available ($\beta = 0.141$; $p = 0.130$). This indicates that the concept of perceived benefit of self-care mediates the relationship between the concept of perceived threats of diabetes complications and the dependent variable reported diabetes self-care activities. Accordingly, participants who perceive that DMT2 could be threatening to their health reported to perform diabetes self-care activities when they perceived that doing self-care activities was beneficial for their health.

Since the HBM variables collocated to each other and to find the variable that better predicts participants' diabetes self-care activities, an additional analysis using regression with backward stepwise elimination was conducted. The result of the analysis showed that self-efficacy, internal HLoC, perceived benefits of self-care were significantly associated with the

participants reported diabetes self-care activities (F(4, 191) = 32.736; p < 0.05). Self-efficacy (β = 0.546; p < 0.05), internal HLoC (β = 0.120; p = 0.046), and perceive benefits of self-care (β = 0.124; p = 0.040) explained 40.7% of the variance of the reported diabetes self-care activities. This means that participants, who reported that they had self-efficacy, internal health locus of control, and perceived benefits of doing self-care, reported that they performed the daily diabetes self-care activities (See Figure 2).
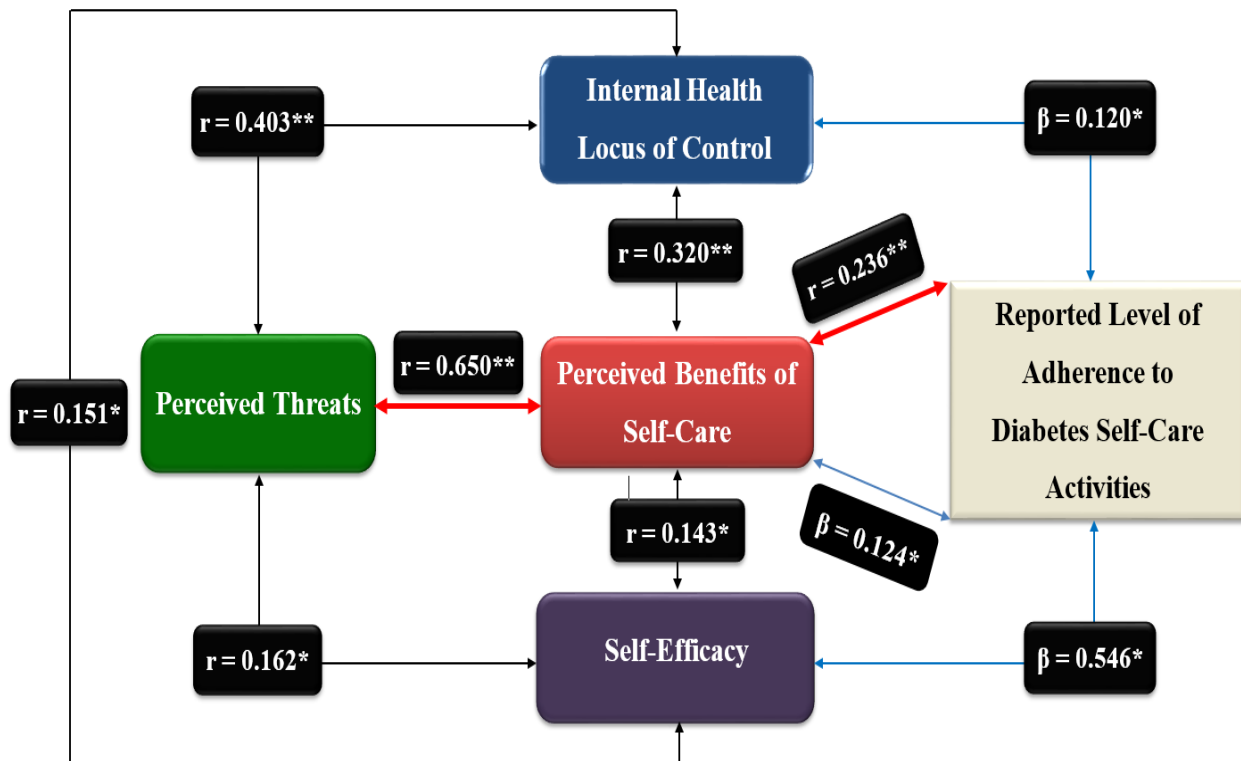
Figure 2. Findings represent the final version of the modified health belief model by M. Albargawi, 2017. Black arrows represent significant correlations between health beliefs. Blue arrows represent significant relationships between health beliefs and reported level of adherence to diabetes self-care activities. Red arrows represent the mediating effect of perceived threats of diabetes and perceived benefit of self-care. ** P < 0.001; * P < 0.05.

Chapter Summary

The results of the study were reported in this chapter. Descriptive statistics and the relationship between the study variables were presented. Additionally, the result for each of the research questions and the two short answer questions were reported. The results of the multiple regression analysis showed that the hypothesis was supported. Self-efficacy, internal HLoC, and perceived benefits of self-care were significant predictors of participants reported diabetes self-care activities in Saudi adults with DMT2. Perceived benefits of self-care was found to mediate the relationship between perceived threats and the reported diabetes self-care activities.

Chapter 5: Discussion

Introduction

This chapter begins with a summary of the main findings of the study. Additionally, the chapter included a discussion and interpretation of the findings and an explanation of how they are similar or different from the results reported in previous studies. The findings will be organized into three sections. The first section will present a discussion about the relationship between the study variables. The second section will present a discussion about the hypotheses. The third section will present a discussion about the findings from the short answer questions. This chapter also presents the implications of the study, limitations, and finally a summary.

Summary of the Main Findings of the Study

The aim of this dissertation study was to examine the relationship between the health beliefs of adults in Saudi Arabia with DMT2 and their reported adherence to their self-care activities to manage their diabetes. A secondary aim was to explore participants' perceptions of threats to their health due to having DMT2. This summary highlighted the overall findings of the study, which will be discussed in details later in the chapter.

In this study, Saudi adults with DMT2 reported different levels of adherence to self-care activities to manage their diabetes and reported having poor glycemic control. Self-efficacy, internal HLoC, and perceived benefits of doing self-care were the significant predictors of whether participants' followed their self-care activities to manage their diabetes. All of the study hypotheses were supported by the findings except the third and fourth hypotheses; for the third hypothesis, no significant difference was found between the reported self-care activities participants with a DFU followed to manage their diabetes and participants who did not have a DFU. Regarding the fourth hypothesis, no association was found between demographic

characteristics and reported self-care activities to manage their diabetes, except for years since being diagnosed with DMT2.

Relationship between Study Variables

The findings from this study indicate that participants with a lower level of education were more likely to perceive that God controlled their DMT2 and they were more likely to have poor glycemic control. Whereas, participants with a higher level of education were more likely to report having greater self-efficacy, internal HLoC and good glycemic control; however, they also reported having more health problems. Participants with a higher level of education might be better prepared to access health resources and to understand diabetes and its related problems than participants with a lower level of education. Accordingly, it is also possible that participants with a higher level of education might report more of their health problems to their health care providers. Similarly, Bahammam (2015) conducted a study that included 454 patients with diabetes (14% type 1 and 86% type 2) in which the majority of the participants were Saudi (86%). The findings showed that participants with a higher level of education had a significantly higher level of awareness about their diabetes in general than participants with limited education, who had a low level of awareness (p <0.00). Additionally, 52 percent of the participants reported that they obtained information about diabetes from the Internet and 51 percent of them learned about the disease from their health care providers. Participants who got information about diabetes from their health care provider had a significantly greater awareness about the disease (P <0.00). Bahammam also found that participants who have been diagnosed with diabetes for a longer duration reported greater awareness of the disease. Similarly, in this study, participants who have been diagnosed with DMT2 for a longer period were more likely to have greater awareness of the details of the disease. Not only did participants who had DMT2 for a longer

duration report that they can control the disease, they reported that the disease could be threatening to their health and doing self-care to manage their DMT2 is beneficial to them.

Participants in this study, who perceived that their physician could help them control DMT2, also reported that self-care is beneficial for their condition and they were responsible for controlling diabetes. In this study, participants who reported having a DFU were more likely to report experiencing barriers to performing their self-care activities to manage their diabetes. However, participants with DFU in this study did not perceive that their physician could help them control their DMT2. Similarly, Otieno, Nyamu, and Atieno-Jalango (2005) conducted a review, and found that the main barrier to proper foot care for people with DFU was associated with the quality of care the patients received by their health care providers. The investigators also found that their participants with diabetes who had a foot problem were at a greater risk for delays in their ulcer healing process (Otieno, Nyamu, & Atieno-Jalango, 2005). Foot care was also addressed in a cross-sectional study by Chiwanga and Njelekela (2015) where it was found that participants receiving education and having a foot examination by their health care providers influenced the health behaviors of patients with diabetes (N = 404). Chiwanga et al. (2015) reported that participants who had a foot examination completed by a physician were more likely to perform foot care regimens more than participants who did not have a foot examination. Patients who received a foot examination from the physician reported that they inspected their feet 6 to 7 days per week (52%), washed their feet (96%), dried between their toes (64%), and checked their shoes (48%), and refrained from soaking their feet (85%).

Badedi et al. (2016) found that Saudi adults with DMT2 were found to be positively influenced when they had a good relationship with their health care providers and received support from their family. Similarly, results were found in this study, where the greater the

support that participants received from their family and friends the more the participants realized that DMT2 can harm their health, and that self-care was beneficial to maintain their wellbeing. However, participants who reported receiving a lot of support from their family and friends were more likely to report that they had more barriers to self-care. For some people with diabetes, having a supportive family and friends could be considered as a barrier to self-care. For instance, a qualitative study conducted by Jones et al. (2008) suggest similar findings to this study, that it was challenging for participants to follow a healthy meal plan due to negative interactions with their family members. In the study by Jones et al., the investigators recruited twenty-one adults with DMT2, and some participants reported that their family was very supportive, yet they perceived that the support was actually a barrier to their ability to perform self-care. The negative relationship between family support and people with DMT2 self-care behaviors might be due to family members' confusion regarding their role in helping the person with diabetes maintain health. This negative relationship is exemplified in a study by Samuel-Hodge, Cene, Corsino, Thomas, and Svetkey (2013), where family members of people with DMT2 reported that they were confused about their family role. Family members indicated that they felt they were responsible for encouraging the person with diabetes to perform their self-care activities to manage their diabetes. Alternatively, some family members found it hard to discuss potential complications with diabetes, as they were concerned that would create conflict between themselves and the family member with DMT2, and they did not want the family member with diabetes to live with the fear of having a diabetic complication.

Family members were concerned that the person with diabetes would be fearful of developing diabetes complications, which could influence a person's behavior (Samuel-Hodge et al., 2013). Individuals who have an illness, such as diabetes, might have a disequilibrium in the

mind, body, and spirit system. People's religious beliefs were also reported in the literature to help persons with DMT2 manage the imbalances in their health and cope with their diabetes (Kaye & Raghavan, 2002). People with DMT2 have been found to use their religious beliefs and practices to help them cope with their disease and gain support to manage their challenges in their daily life (Lundberg & Thrakul, 2013). The participants in this study, who perceived that God controls their DMT2, were more likely to believe that doing self-care is beneficial for their condition, which indicated that the participants' spiritual beliefs influenced their diabetes self-care management.

Spirituality was explored in a qualitative study by Polzer and Miles (2007) who interviewed African American adults (N = 29) with DMT2. The investigators explored how spirituality affects the participants diabetic self-management, and found that the participants' belief in God determined their diabetes self-management. Participants reported that they are responsible for caring for themselves and God has a supporting role in the self-management of their diabetic care. Participants reported that God supported them to manage their health by lowering their blood sugar and assisting them to control the disease by giving them the intelligence to perform their own self-care. Additionally, there were participants who stated that God is always present; however, the persons also need to make some effort to maintain their health and control the disease (Polzer & Miles, 2007).

Another qualitative study by Lundberg and Thrakul (2013) included 48 Thai women with DMT2 (Buddhist =19; Muslims = 29) and found that participants used religious practices to cope with their disease. Muslim women participants reported that what happened to them was God's will, conversely, the Buddhist women participants believed that DMT2 was due to their actions in the current or previous life. However, the women from both religions accepted their DMT2

diagnosis and tried to modify their life style behaviors in order to manage the disease.

People hold varying beliefs that determine their attitude regarding their ability to engage in healthy behaviors (Ahola & Groop, 2013). In the current study, self-efficacy was found to have a significant relationship with participant's other health beliefs. Participants who reported high levels of self-efficacy were more likely to believe that it was beneficial to perform their own self-care regimens and to view DMT2 as a serious disease that could harm their health. Additionally, participants reporting high levels of self-efficacy also reported having fewer barriers to performing their own self-care. Ahola and Groop (2013) conducted a literature review, and found that people with diabetes who had self-efficacy were more willing to engage in healthy behaviors. Participants with high self-efficacy participated more consistently in healthy behaviors when they encountered difficulties with their health, when compared to individuals who reported having a low self-efficacy. People with DMT2 who reported having low self-efficacy were found to have a negative perception regarding their treatment. Holmes-Truscott, Skinner, Pouwer, and Speight, (2015) conducted a study with 273 adults with DMT2 who were on insulin therapy. The researchers found that adults who held negative perceptions about being on insulin therapy had lower levels of self-efficacy. Additionally, adults who held negative perceptions about adhering to their insulin therapy regimen reported having more anxiety and depressive symptoms.

Hypotheses

Hypothesis one. The first hypothesis stated in this study was "Saudi adults with DMT2 will report a low level of adherence (< 7 days/week) to diabetes self-care activities that is less than 7 days per week." The participants in this study were found to have a low level of adherence to diabetes self-care activities, except for following their medication regimen, which supported

hypothesis one. The participants reported that they took their medication 7 days per week, which was consistent with the findings from previous studies that Saudi adults with DMT2 had a high rate of adherence to pharmacological therapy (Albargawi et al., 2016; Al Johani et al., 2015). However, the participants in this study reported having low levels of adherence to other self-care activities, with the lowest adherence levels reported to be related to exercise. Low exercise adherence levels was a finding that was similar to the findings in other studies that reported Saudi adults having inactive lifestyles. Alkahtani, Elkilany, and Alhariri (2015) recruited 84 adults living in Saudi Arabia (n = 68 Saudi and n = 16 non-Saudi) the majority (63%) were overweight and they utilized their free time (66%) on inactive behaviors. Additionally, only 5 percent of the participants in the Alkahtani et al. study reported that they participated in moderate to vigorous physical activity for 14 minutes per day.

DeNicola, Aburizaiza, Siddique, Khwaja, and Carpenter (2015), found in their systematic review that living in a major city was one of the factors contributing to increased obesity in Saudi Arabia. Participants in the present study were from the capital city, which is located in the Central region of Saudi Arabia. The Eastern and Central regions of Saudi Arabia were linked to sedentary behavior and a westernized diet more than other regions in Saudi Arabia (DeNicola et al, 2015). However, participants in the current study reported that they did adhere to their dietary plan 5 days per week. Although participants reported generally adhering to their diet, almost half of them (47%) reported that eating outside of their home was difficult. Another 35% of the participants reported feeling embarrassed when they had to manage their diabetes in a public setting. Feelings of embarrassment and difficulty following a diabetic meal plan in public places could be related to the Saudi culture. Saudi families have frequent family gatherings, and during the gatherings, people are encouraged to consume large quantities of food, regardless of whether

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they are hungry or desire to eat the food. Therefore, in the Saudi culture, people feel pressure to consume large quantities of unhealthy, high fat foods at social gatherings. Refusing to consume large quantity of foods when you are not hungry can be awkward for anyone (Alneami & Coleman, 2016; Alsairafi, Taylor, Smith, & Alattar, 2016; DeNicola et al., 2015), especially persons with DMT2, who want to fit in with the normal routines of the family.

DeNicola et al. (2015) reported in their review that the Saudi culture encourages unhealthy eating habits, as Saudis are used to eating high-fat food in their daily diet, and they serve and consume a lot of foods as a sign of generosity. In another Arab populations that is similar to the Saudi culture, Kuwaiti adults (N = 334) with DMT2, hypertension, or both reported to have more than one social gathering per week with their extended family (80%). The participants considered social gathering as a barrier to adherence to diet regimens (55%) and consuming traditional food made it hard for them to follow their health care provider's dietary recommendations (Serour, Alqhenaei, Al-Saqabi, Mustafa, & Ben-Nakhi, 2007).

In a qualitative study by Benavides Vaello and Brown (2016) Mexican-American with DMT2 (N = 12) also faced challenges to following a healthy diet in social gathering events such as weddings. The participants reported that if they refused to eat the food offered to them that would be considered an offensive behavior. Therefore, the participants reported either consuming less food and giving the rest to their family or they tended to avoid attending the social gathering events. Similarly, Korean immigrants with DMT2 (N = 20) reported facing challenges to following their diet during their family gatherings. Therefore, the participants indicated that they tended to avoid the family gatherings because they were expected to consume a large amount of food in order to show their appreciation for the invitation (Cha et al., 2012).

Cultural practices and traditional footwear were identified to be one of the factors that influences the participants' adherence to daily foot care, and puts Saudi adults with DMT2 at risk for developing foot problems (Ahmed, Algamdi, & Alzahrani, 2015). In this study, the participants reported that they performed their diabetic foot care regimen 4 to 5 days per week. Similar foot care behaviors were reported by the participants in the study conducted by Qadi and Al Zahrani (2011). In Qadi and Al Zahrani study, participants (N = 747) with diabetes were recruited, with the majority (92%) Saudi. A limited number of participants (22%) reported performing foot care regularly, drying their feet after washing (34%), using lotion on their feet (31%), and monitoring their feet for signs of an ulcer (27%). Additionally, half of the participants reported that they did not wear shoes (50%) regularly.

Adherence to monitoring blood glucose levels daily was minimal in this investigation, with participants reporting monitoring their blood sugar 3 times per week. Anecdotally, it was interesting to note that after completing the survey for this study, approximately more than half of the participants stated that their health care provider had not provided instructions on how often they need to check their blood sugar levels. A few participants shared that they had received explanations regarding blood glucose monitoring from their health care provider. However, those who received instructions shared that the explanations were limited to the symptoms of hypoglycemia and hyperglycemia and were told to check their blood surge if the experienced symptoms. Therefore, the limited adherence to blood glucose testing which was reported anecdotally might be due to a lack of education from health care providers regarding the frequency of blood glucose testing. Participants in this study (91%) depended on their physicians' care and recommendations to control DMT2. However, it is possible that health care

providers in Saudi Arabia do not consistently follow diabetes guidelines (AssaadKhalil et al., 2013).

The International Diabetes Federation (IDF, 2009) recommends that health care providers customize blood sugar monitoring for persons with DMT2 not on insulin therapy, based on their needs and conditions. Additionally, health care providers should continually educate patients with DMT2 about the need to perform self-monitoring of blood sugar as a component of their diabetes care management. The guidelines of the American Diabetes Association (ADA, 2017) and the Saudi Ministry of Health (MOH, 2013) additionally emphasize that persons with DMT2 who are on insulin therapy need to check their blood sugar at a minimum before meals. Although the participants' type of treatment for DMT2 was not examined in this study, many reported HbA1c values that reflected poor glycemic control. Participants reporting poor glycemic control potentially could be on insulin therapy, and if so, should check their blood sugar level more frequently, and every day at a minimum. Self-monitoring of blood sugar is necessary to assist health care providers to make treatment decisions for effective diabetes management (MOH, 2014). Parkin, Buskirk, Hinnen, and Axel-Schweitzer (2012) found that structured self-monitoring of blood sugar significantly decreased the HbA1c values of people with DMT2 who were not receiving insulin therapy. Diabetes education provided by health care providers to people with diabetes in Saudi Arabia may be inadequate because of several reasons, such as some health care providers lack time, proper knowledge, or skills to provide effective diabetes education or they are unfamiliar with diabetes guidelines (Barshes et al., 2013). Additionally, some health care providers in Saudi Arabia are not aware of their patients' perceptions of their health conditions or their cultural practices (Harakati et al., 2011), which could influence the effectiveness of the education they receive and demotivate them to engage in healthy behaviors.

Hypothesis two. The second hypothesis stated in this study was "Saudi adults with DMT2 have poor glycemic control that is higher than the ADA (2017) standards of glycemic control (HbA1c >7%)." Participants who reported their HbA1c value had levels > 7%, indicating poor glycemic control, and supported the hypothesis. Al Harbi et al. (2015) conducted a study with adults with DMT2 attending a primary care clinic in Saudi Arabia (N = 450). Similar to the findings of the current study, Al Harbi et al. found that only a few of their participants (24%) met the standards of glycemic control (≤ 7%) set by the ADA. Additionally, Al-Arfaj (2010) conducted a separate study that included patients with diabetes (N = 260) in Saudi Arabia, where a majority of participants had DMT2 (87%). Only 8% of the participants reported an HbA1c that was less than 7%, suggest that a large majority (92%) had poor glycemic control (Al-Arfaj, 2010).

Data in the Al-Arfaj (2010) study included access to patients' medical records, which were reviewed to identify the frequency of HbA1c testing. A majority (88%) of the participates were tested at least once per year, yet that is considerably less than guidelines provided by the ADA or the Saudi Ministry of Health. In this study, the HbA1c was obtained through participants self-reported levels, and a majority of the participants (68%) did not know their HbA1c levels. Participants HbA1c might have been tested during their visits with their healthcare provider, but participants denied knowledge of their HbA1c levels. It is important to note anecdotally that some participants who completed the survey reported not knowing the reason for the HbA1c test, while others reported that their health care provider did not share their HbA1c value with them during their routine visit. AlAboudi, Hassali, Shafie, and Saleem (2016) report that the HbA1c test is a good indicator for glycemic control. Additionally, when adults with DMT2 become aware of their HbA1c level, and strategies for controlling DMT2, they

become more willing to engage in self-care behaviors to manage their condition. However, some health care providers in Saudi Arabia (N = 99) have reported that diabetes self-management education is not necessary for effectively managing an adults DMT2 (Khan et al., 2011), which could explain the reason why some participants in this study reported that their physicians did not inform them about their HbA1c values. Additionally, in the study by Khan et al. (2011) a majority of health care providers (76%) did not know the recommended HbA1c values to control diabetes, and only a few of them (23%) felt that they were well prepared to manage DMT2.

Hypothesis three. The third hypothesis stated in this study was "Persons with a DFU would report that there were more likely to perform diabetes self-care activities than persons without a DFU." No significant differences were found in participants with a DFU and their diabetes self-care activities when compared to participants without a DFU, therefore, the findings did not support the hypothesis. However, participants who had a DFU reported performing self-care activities to manage their diabetes more than adults who had not had a DFU. Given the findings, it is possible that participants in this study who had experienced a foot ulcer might be more aware of the consequences of the problem and the daily self-care regimens. Bonner, Foster, and Spears-Lanoix (2016) found an association between people with DMT2 who lack knowledge about foot self-care and their risk of developing a foot ulcer due to not adhering to foot care regimens. Additionally, in a study by D'Souza et al. (2016), adults (N = 160) with DMT2 were recruited, and nearly half of the participants (41%) suffered from current foot problems. The participants in D'Souza et al. (2016) study who had a high awareness about DMT2 were more likely to perform foot self-care.

Hypothesis four. The fourth hypothesis stated in this study was "The person's level of adherence to diabetes self-care activities will vary based on demographic characteristics."

Participants' self-care behaviors were influenced by years since diagnosis of DMT2, not demographic characteristics, thus the findings for this study did not support this hypothesis. In this study, the longer the duration since participants have been diagnosed with DMT2, the more likely they were to report performing their self-care activities to manage their diabetes. Participants who live with DMT2 for a longer duration of time might have become aware of alternative ways to effectively control or manage the disease. For example, adults with DMT2 (N = 145) who were diagnosed with diabetes longer were engaged significantly more often in self-care activities (Wu et al., 2007). Additionally, Chourdakis, Kontogiannis, Malachas, Pliakas, and Kritis (2014) found that adults with DMT2 (N = 177) who were diagnosed with the disease earlier in their lives reported greater adherence to their care management, including diet, medication, exercise, and blood glucose monitoring more than participants who were more recently diagnosed.

Hypothesis five. The fifth hypothesis stated in this study was "The greater the Saudi adults with DMT2 perception of threat, the more likely they were to report doing diabetes self-care activities." A significant relationship was found between participants' perception of threats and their self-care behavior, which supported the hypothesis. Participants who perceived greater threat to their health due to the DMT2 also reported greater rates of performing their self-care activities to manage their diabetes, which was unlike the findings reported by Voigt et al. (2015) in their study. Voigt et al. recruited adults (N = 242) with DMT2, and the participants reported high rates of concern regarding how the disease could harm their health, yet they had poor glycemic control. Conversely, the investigators found that participants who perceived that they could control their diabetes were found to have good glycemic control. Ahola and Groop (2013), conducted a review of people's perception of threats about diabetes, and found that the threat of

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harm to their health did not motivate the participants to engage in self-care behaviors to manage their diabetes. Similar findings were reported by Berenguera et al. (2016), who conducted a qualitative study with persons diagnosed with DMT2 (N = 43). The participants who had poor glycemic control (HbA1c ≥ 9%) were found to be afraid of the consequences of diabetes; however, they reported to have poor self-care behavior adherence for managing their diabetes. The investigators also found that participants had difficulty controlling the disease or adhering to self-care activities. According to the participants, the disease affected their daily life and it was difficult for them to balance between their needs and achieving the treatment goals (Berenguera et al., 2016).

Hypothesis six. The sixth hypothesis stated for this study was "Controlling for demographic characteristics the health beliefs (self-efficacy, health locus of control, perceived threats of diabetes, perceived barriers to and benefits of self-care, and perceived family and friends support) will predict a significant amount of variance in the reported diabetes self-care activities in Saudi adults with DMT2." Self-efficacy, internal HLoC, and perceived benefits of self-care significantly predicted the participants' self-care activities, which supported hypothesis six. Ahola and Groop (2013) reported that people are more likely to make changes in their lives when motivated. Internal motivation, such as the person's intrinsic beliefs, is a greater motivator of self-care maintenance behaviors than external motivation, such as receiving encouragement from health care providers (Ahola & Groop, 2013). Self-efficacy is considered one of the most important internal motivations that encourage people with diabetes to engage in self-care behaviors (Ahola & Groop, 2013). A higher self-efficacy was significantly associated with better glycemic control in adults with DMT2 (Nugent & Wallston, 2016). In this study, participants who had a high self-efficacy reported more adherence to self-care activities than people with low

self-efficacy. Similarly, in a study by ALAboudi et al. (2016), adults with DMT2 (N = 75) who had high self-efficacy were more likely to adhere to medication, blood glucose monitoring, foot care, diet, and exercise and had strong glycemic control.

Internal HLoC is another inner belief found to influence people with diabetes' health behaviors (Ahola & Groop, 2013). In this study, participants who perceived they had the responsibility to control their diabetes reported adherence to diabetes self-care activates. Internal HLoC empowers people to engage in healthy activities because they feel they have the autonomy to maintain their health (Ahola & Groop, 2013). For instance, in a qualitative study, adults with DMT2 (N = 20) who had an internal HLoC reported that they were responsible for managing their health and diabetes-related risks; conversely, participants with an external HLoC perceived that their health care providers should manage their diabetes (Macaden & Clarke, 2010). In another study, adults with DMT2 (N = 107) who had a low internal HLoC, self-efficacy, and valuation of good health were less likely to engage in self-care behaviors than those with high internal HLoC, self-efficacy, and a desire to maintain good health (Nugent & Wallston, 2016).

People's attitudes about DMT2 management could be another factor that motivates them to engage in healthy behaviors (D'Souza et al., 2016). Ahola and Groop (2013) reported that people with diabetes who perceived gaining more benefits and overcoming more barriers because of performing self-care were more likely to engage in healthy behaviors than those who did not perceive these benefits; however, the perception of the threat of complications was not a strong motivator to change behaviors. For instance, in a study by Amuta, Crosslin, Goodman, and Barry (2016), female undergraduate students were more likely to report higher DMT2-diagnosis threat perceptions than male students; however, their perceptions of the threat did not motivate them to modify their diets or increase their physical activity.

In this study, participants who perceived that practicing self-care was beneficial to their condition reported performing daily diabetes self-care activities, yet the perception of the benefits of doing self-care was stronger in individuals who believed that DMT2 could be threatening to their health, which accordingly motivated them to perform diabetes self-care activities. This finding was different from findings in the literature (Ahola & Groop, 2013). The participants in this study might be more aware of the benefits of performing self-care than the participants in previous studies and knew that if they adhered to self-care activities, their risk of developing complications would decrease. In a review by Rubin (2005), some people with DMT2 reportedly struggled to perform daily self-care activities because they focused on the disadvantages of adherence and the changes they needed to make in their lives to manage their condition. However, they did not realize the long-term advantages of adherence to self-care and how it could decrease their risk of complications (Rubin, 2005). For example, in a qualitative study, Williams and Manias (2014) recruited 39 adults who had diabetes, hypertension, or other chronic diseases. The participants perceived that the disease could threaten their health and survival, and they wished there was a cure so they did not have to take their medication. Additionally, some participates did not check their blood sugar even though they experienced poor clinical indicators; they reported that they did not need to check it because they thought they were healthy.

Findings from the Short Answer Questions

In this dissertation study, four major themes emerged from the participants' responses to the short answer question. Regarding the theme physical alterations, the participants reported that DMT2 made them feel fatigued and caused other health conditions. The participants most frequently reported secondary health conditions caused by DMT2, such as vision, kidney, and

foot problems. The participants' responses were consistent with the findings reported in previous studies that Saudi adults with DMT2 suffered from diabetes-related complications (Al-Rubeaan et al., 2016; Alsenany & Al Saif, 2015). For instance, a population study in Saudi Arabia by Al-Rubeaan et al. (2016) examined 40,827 medical records of Saudi adults with diabetes (DMT1 or DMT2) and found that the majority of the participants had DMT2 (N = 38,478; 94% of the records of living persons and 97% of the records of dead persons). The participants who were dead had significantly poorer glycemic control (71%) than adults who were alive (60%; p < 0.001). Additionally, participants who died had more complications than the living participants, including cerebrovascular disease, coronary artery disease, peripheral vascular disease, retinopathy, neuropathy, and nephropathy (Al-Rubeaan et al., 2016).

The participants in this study additionally reported that DMT2 led to other physical alterations, and it affected their life activities, such as traveling, driving, and sleeping. In the literature, there is evidence of a correlation between DMT2 and sleep disturbance (Idris, Abdulla, Tilbrook, Dean, & Ali, 2013; Kara & Kilic, 2015). For instance, Chasens (2007) reported that diabetes was found to be associated with obstructive sleep apnea in people who are obese. People who have sleep apnea often feel sleepy, lazy, and tired during the day, and for adults with DMT2, not having enough sleep interferes with their self-care behaviors (Chasens, 2007). Similarly, in a qualitative study by Chasens and Olshansky (2006), adults with DMT2 (N = 17) reported that sleepiness was a concern for them and affected their daily self-care activities such as diet and exercise. Additionally, they reported that sleepiness affected their relationships with their family, their concentration, and their memory, which made it difficult for them to remember to check their blood sugar or take their medication. The participants in this study also reported

experiencing behavioral changes and that DMT2 affected their concentration, memory, and emotions.

The alterations in participants' memory and concentration found in this study could be due to sleep disturbance or because DMT2 affected their cognitive performance. A recent meta-analysis found that DMT2 affected people's memory. Additionally, people with DMT2 who had poor glycemic control were found to have poor memories (Sadanand, Balachandar, & Bharath, 2016). Conversely, Ryan et al. (2006) reported that adults with DMT2 who received pharmacological treatment and had good glycemic control were found to experience improvements in their working memories.

In this study, diabetes control was a concern for the participants. Additionally, the participants reported that poor self-care behaviors were one of the reasons that diabetes harmed their health. In a qualitative review study conducted by Stiffler, Cullen, and Luna (2014), people with diabetes who were overwhelmed by their diagnosis encountered the challenge of either accepting it or engaging in self-care behaviors. Additionally, people with diabetes were concerned about the changes they had to make to manage the disease, and they doubted their abilities to perform their daily self-care activities. However, people with diabetes became more willing to engage in self-care activities when they gained further knowledge about diabetes and when their health care providers informed them about ways to manage the disease (Stiffler et al., 2014). Similarly, in this study, the participants emphasized the importance of following physicians' orders to manage the disease and adhering to a diet to avoid increases in blood sugar.

Faith in a higher power was one of the themes this study identified as an influential factor in self-care activities; the majority participants (80%) reported that God was controlling their diabetes. This finding was consistent with the results of a qualitative study that included 66

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adults with chronic diseases (Harvey & Silverman, 2007). In Harvey and Silverman's (2007) study, spirituality was found to influence the participants' perceptions of self-care behaviors and disease management; they reported that God controlled their health and that their faith in God helped them accept the consequences of their illness. Additionally, the participants reported that God gave the health care providers the knowledge to treat the participants' chronic disease.

Implications of the Study

Health beliefs of participants in this study influenced their adherence to self-care activities. Ineffective adherence and poor diabetic control can lead to the development of secondary health issues (Deshpande et al., 2008). Poor health places limitations on people's lives, productivity in society, and increases the burden of healthcare costs on individuals, communities, and society (National Research Council, 2011). Therefore, developing and implementing national and regional policies to prevent or effectively manage DMT2 is important at both 'the governmental and regional level in the country. Based on the findings of this dissertation study, the following implications suggest strategies to improve the health of Saudi adults with DMT2 through improving their adherence to diabetes self-care activities.

Implications for Research

The findings of this dissertation study add to the literature regarding the influence of health beliefs on Saudi adults with DMT2 self-care behaviors. Conducting a study using a mixed method design and recruiting participants from different hospitals and cities in Saudi Arabia would provide additional insight about adults with DMT2 self-care behaviors. Additionally, conducting in-depth interviews to explore perceptions of adults with DMT2, including those with and without a foot ulcer, can provide further insight into developing effective self-care management strategies for individuals with DMT2.

Future research could identify health care providers' perceptions regarding their patients with DMT2 diabetes self-care management. Health care providers' perception of their role in promoting patients' self-care management adherence could initiate strategies to minimize the challenges adults with DMT2 experience when performing their diabetes self-care regimens. In a qualitative study by Akohoue, Patel, Adkerson, and Rothman (2015), the investigators found that adults with DMT2 face challenges when performing their daily self-care activities. The participants reported that one of the barriers to effective diabetes self-care management was the lack of access to health care providers, which prevented them from receiving education about diabetes. Akohoue et al. (2015) additionally reported that patients with DMT2 and their health care providers had different perceptions about diabetes self-care management. Participants with DMT2 were anxious about inconveniencing their family with their altered dietary routines, whereas the health care providers focused on unrealistically high weight management goals (Akohoue et al., 2015). Health care providers support motivated people with DMT2 to manage their disease and improve their glycemic control. However, people with DMT2 have reported having challenges complying with their health care providers' instructions to manage the disease when the education provided to them was not culturally relevant (Venkatesh & Weatherspoon, 2013). Therefore, exploring the health care providers' perceptions about diabetes management could provide insights into their cultural competence when providing health education to adults with DMT2.

In this study, participants newly diagnosed with diabetes reported not performing their self-care activities to manage their diabetes. Exploring the perception of adults with DMT2 starting at the diagnosis of diabetes and following them longitudinally would add to our understanding their experience in managing the disease. Additionally, the findings of a

longitudinal study could help identify factors affecting adults with DMT2 and their families over time, allowing for a more targeted self-care management program for people with diabetes and their families. In this study, the support the participants received from their families and friends influenced their health perceptions. Therefore, involving the family in the diabetes management plan could provide the necessary support for people with DMT2 to adopt healthy behaviors in their daily lives.

Implications for Education

The main findings of this study suggest that adults with DMT2 are not following the recommendations of the ADA (2017) for effectively managing their chronic condition. Although patient education was not the focus of this study, it was evident that the majority of the participants were unaware of their HgA1c values. Lack of knowledge regarding HgA1c levels of individuals with DMT2 is problematic, as it prevents patients from monitoring the effectiveness of their performance of their self-care management regimen. The ADA recommends that health care providers who provide education to people with diabetes should have the knowledge and skills to promote patients' performance of healthy behaviors (Haas et al., 2014). Saudi Arabia has a massive shortage in the number of Saudi healthcare providers, especially Saudi nurses. Saudi Arabia relies heavily on non-Saudi health care providers, with limited or no ability to speak in Arabic. Limited Arabic language skills prevents healthcare providers from sharing healthcare education and instructions for self-care to patients that are congruent with the patients' requirements for healthcare education that addresses their culture, religion, and social values. A royal decree has required the Saudization of the workplace and employers must now provide resources to Saudi employees as an incentive for the provision of quality healthcare services to patients (Aboshaiqah, 2016). Therefore, Saudi health care providers must be prepared

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to provide self-care management education to people with DMT2. At the hospital where data was colleced, health care providers joining the multidisciplinary pain management team are required to have 6 months of pain management training. Similar training programs focused on DMT2 self-care management training could be developed to ensure the quality of services provided to adults with DMT2 and to promote long-term behavioral changes.

The majority of the participants in this study reported depending on their doctor to manage their diabetes. Using a patient-centered care approach requires interdisciplinary collaboration between health care providers, which could lessen the physicians role in managing the patients' conditions. A patient-centered care approach to individualize patient care could facilitate adults with diabetes discussing their perceptions, concerns, and knowledge deficits (Haas et al., 2014; Powers et al., 2015). Nurses are optimally positioned to assess the concerns of adults with diabetes and collaborate with the patient on strategies to effectively manage their disease. Saudi Arabian nursing curricula generally do not have a specific public health education content (Jradi, Zaidan, & Shehri. 2012) such as patient self-care management content that are based on international guidelines. Therefore, student nurses should have an in-depth foundation of instruction on health promotion, addressing the issue of social factors and how patients' health beliefs could influence their behaviors (Aboshaiqah, 2016).

The government of Saudi Arabia emphasizes the need for a collaboration between the ministry of health and the ministry of education to improve the quality of education (Saudi Vision 2030, 2017). Therefore, an updated nursing curricula is needed that emphasizes self-care education, disease management, and patient-centered care for people with chronic diseases. It would be beneficial to have collaborative partnerships between the health care related colleges and the Saudi Commission for Health Specialties. Collaborating together, the healthcare

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professions and the Saudi Commission for Health Specialties could offer workshops on diabetes education and management to enable healthcare providers to provide effective diabetic education. Certificates in diabetes education or advanced diabetes management for health care providers could be obtained by healthcare providers who develop expertise and competency in those content areas.

Implications for Policy

A main finding of the study was that the participants' health beliefs significantly influenced their self-care behaviors, suggesting the need for collaboration between stakeholders. Developing policies that would facilitate collaboration between adults with DMT2, health care providers, and community resources could promote greater effectiveness with diabetes management. The Ministry of Health supervises 20 regional directorates, which are responsible for implementing the health programs and policies of the ministry and collaborating with other governmental organizations. The regional directorates supervise multiple hospitals and health sectors, which oversee number of Primary Health Care centers. Community health issues are communicated back to the Ministry of Health through a selective committee called health friends. Health friends include influential members within the community from Primary Health Care centers, which could include public health nurses, who are aware of the problems as well as the social and cultural norms of the community where they practice. The role of the health friends is to communicate issues to the Primary Health Care clinics, which will relay the concerns to the regional directorates to pass on to the Ministry of Health (Almalki et al., 2011).

Given the established practices within the community and the findings of this study, increasing adults with DMT2 self-care management could be accomplished by developing a health education program provided by the public health nurses, with support from representatives

of religious organizations within the community. Collaboration between public health nurses and other community health workers has been found to improved diabetes control in people with DMT2 and reduced their risk for complications (Gary et al., 2003). Additionally, in a review by Shah, Kaselitz, and Heisler (2013) the collaboration between community health workers helped improve people with DMT2 HgA1c, enhance their diabetes knowledge, increase their self-efficacy, and motivate them to practice exercise and eat healthy. Furthermore, the collaboration between community health workers was a cost-effective intervention. In Saudi Arabia, many people trust and follow the recommendations (Fatwa) of Saudi clerics who work at the Ministry of Islamic Affairs & Endowments. The Ministry of Islamic Affairs & Endowments is a governmental organization that is directly supervised by the king. The Saudi clerics' recommendations are considered legal opinions that are based on the Islamic principle. The majority of the participants in this study perceived that God controlled their diabetes and if diabetes become worse, only God can determine if the person will feel better again. In the literature, it has been reported that involving religious leaders in diabetes management helped promoting healthy behaviors in people with diabetes (Rivera-Hernandez, 2015). Additionally, including religious leaders increased the effectiveness of health intervention programs (Bopp et al., 2009). Therefore, seeking support from representatives of religious organizations within the community could help to persuade people with diabetes to engage in healthy behaviors and to follow their treatment recommendations. For instance, Saudi clerics could encourage people to avoid unhealthy behaviors, such as eating large quantities of food and failing to exercise.

The participants in this study reported adherence to exercise was very poor. According to the Saudi Arabia vision of 2030, a national transformation program will be implemented in the country. One of the objectives of the program is to increase the percentage of time spent

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exercising from 13% to 40% in people 15 years of age and older. Accordingly, the Saudi government is planning to open a gym in every district and assist in opening female sport centers (Saudi Vision 2030, 2017). The government of Saudi Arabia is collaborating with the private sector to lower the high cost of membership fees for women. Princess Reema Al-Saud has recently proposed promoting healthy lifestyles and physical activity in females in Saudi Arabia, and to accomplish this, women could practice physical activities by attending licensure female gyms, and the proposal was recently approved (World Cancer Congress, 2017).

Saudi Arabia also has a national policy to encourage healthy lifestyles; however, the scope of the policy did not cover people with chronic diseases (WHO, 2014). The findings of the current study suggest the need to expand the scope of the national policy of physical activity to include people with chronic disease, such as diabetes, and encourage them to be active. People however should be motivated to participate in exercise and join the gym. One way to motivate people with diabetes is by providing ongoing education and support for exercise during their routine visit. Encouragement and education was successful in a patient empowerment program for people with DMT2 (N = 2282). The program was implemented at an ambulatory care clinic to motivate patients to engage in health behaviors. The program demonstrated effectiveness in lowering the HbA1c for participants who enrolled in the program, while also improving their lipid profile, and decreasing their hospital admission and emergency visits (Wong et al., 2014). In the literature, it has been reported that Saudi adults with DMT2 have a high rate of hospital admission and the mean hospital stay ranged from 13 to 28 days (Al-Rubeaan et al., 2015). Therefore, developing a similar program to motivate people with DMT2 to be active and to have a healthy lifestyle would be beneficial in assisting them to more effectively manage their diabetes and be free from complications. The MOH created a national eHealth network

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(International Trade Administration, 2016), which also could be used to connect patients with DMT2 with their health care providers to gain knowledge or receive assistance and support regarding diabetes self-care management.

The participants in this study reported that following the diet made eating in public difficult, as they felt embarrassed trying to manage the disease when they were in public settings. The MOH established dietary guidelines for Saudi and they were displayed under the logo *Healthy Food Palm*. The healthy food palm was created to increase people's awareness about their healthy food and the daily calories requirement and to motivate them to exercise in order to avoid developing health conditions such as diabetes (MOH, 2012). The healthy food palm is similar to the food guide pyramid; however, the palm graphic was chosen to fit the Saudi eating habits and culture. The MOH emphasized that the healthy food palm should be communicated to the public to increase their awareness about healthy food options and their serving size. Additionally, the MOH suggested that the healthy food palm could be used to educate people in social and education settings and it could be printed and distributed to Saudi families (MOH, 2012). In the literature, it has been reported that offering information to people about food calories and nutrients at restaurants, at the point of purchase, helped people making healthier choices, which accordingly assisted them to maintain their weight management goals (Howlett, Burton, Bates, & Huggins, 2009). Distributing the healthy food palm at restaurants could help people with DMT2 maintain healthy eating outside of their homes. Furthermore, requesting that restaurants list the calories for each food selection can help people with DMT2 choose foods that are appropriate for their condition.

Limitations

Few limitations were identified in this study. In the literature, it has been reported that the health behaviors of Saudi who live in big cities were different from Saudi adults living in smaller cities (DeNicola et al., 2015). Therefore, using a sample from one hospital in Riyadh City minimized the generalizability of findings to all adults' population with DMT2 in Saudi Arabia. Another limitation of the study was the use of a self-reported questionnaire to collect the data. Although the PI read the questionnaires to persons with low education level and answered all participants' questions, there was a chance that they did not understand the survey. The final limitation of the study was using a descriptive correlational design, which does not allow testing causality. However, using this design was appropriate for the purpose of the study to examine the relationship between Saudi adults with DMT2 health beliefs and their reported adherence to diabetes self-care activities.

Chapter Summary

In this chapter, a discussion of the findings and hypotheses was addressed. Additionally, a discussion was reported about the results of the short answer questions about the participants' perception of diabetes threats. This chapter also included a section about the implications of the study that included a proposal of national and local policies for diabetes management in Saudi Arabia. The study limitations and recommendations for future research was presented. Future studies are encouraged to explore the way people with DMT2 manage the disease and examine the cultural and environmental factors that could influence their self-care behaviors in order to develop effective strategies to help them stay healthy and avoid complications.

References

Aalto, A., & Uutela, A. (1997). Glycemic control, self-care behaviors, and psychosocial factors among insulin treated diabetics: A test of an extended health belief model. *International Journal of Behavioral Medicine, 4*(3), 191-214.

Aberle, I., Scholz, U., Bach-Kliegel, B., Fischer, C., Gorny, M., Langer, K., & Kliegel, M. (2009). Psychological aspects in continuous subcutaneous insulin infusion: A retrospective study. *The Journal of Psychology, 143*(2), 147-160.

Aboshaiqah, A. (2016). Strategies to address the nursing shortage in Saudi Arabia. *International Nursing Review, 63*(3), 499-506.

Abozaid, H., & Farahat, F. (2010). Physical activity profile among patients attending family medicine clinics in western Saudi Arabia. *Saudi Medical Journal, 31*(4), 428-33.

Abredari, H., Bolourchifard, F., Rassouli, M., Nasiri, N., Taher, M., & Abedi, A. (2015). Health locus of control and self-care behaviors in diabetic foot patients. *Medical Journal of the Islamic Republic of Iran, 29*, 283.

Abubakari, Ar., Jones, Mc., Lauder, W., Kirk, A., Anderson, J., Devendra, D., & Naderali, Ek. (2013). Ethnic differences and socio-demographic predictors of illness perceptions, self-management, and metabolic control of type 2 diabetes. *International Journal of General Medicine*, 617.

Ahlqvist, E., Ahluwalia, T., & Groop, L. (2011). Genetics of type 2 diabetes. *Clinical Chemistry, 57*(2), 241-54.

Ahmed, A. A., Algamdi, S. A., & Alzahrani, A. M. (2015). Surveillance of risk factors for diabetic foot ulceration with particular concern to local practice. *Diabetes & Metabolic Syndrome: Clinical Research & Reviews, 9*(4), 310-315.

Ahmed, A. A., Algamdi, S. A., Algurashi. A., Alzhrani, A. M., Khalid, K. A. (2014). Risk

 factors for diabetic foot ulceration among patients attending primary health care services.

 *Journal of Diabetic Foot Complications, 6(*2), 40-47.

Ahola, A. J., & Groop, P. (2013). Barriers to self-management of diabetes. *Diabetic Medicine,*

 30(4), 413-420. doi:10.1111/dme.12105

Akohoue, S. A., Patel, K., Adkerson, L. L., & Rothman, R. L. (2015). Patients', Caregivers', and

 Providers' Perceived Strategies for Diabetes Care. *American Journal of Health Behavior,*

 39(3), 433-440. doi:10.5993/AJHB.39.3.15

ALAboudi, I., Hassali, M., Shafie, A., & Saleem, F. (2016). Self-efficacy, self-care behaviors

 and glycemic control in type 2 diabetic patients in Riyadh, Saudi Arabia. *Journal of*

 Public Health, 24(4), 281-290. doi:10.1007/s10389-016-0723-x

Al-Akour, N. (2003). *The Relationships Among Knowledge of Diabetes, Attitude Toward*

 Diabetes, Family and Friends' Support, Benefits of and Barriers to Treatment and

 Compliance with Health Regimens of Jordanian Adolescents with Insulin Dependent

 Diabetes Mellitus. Retrieved from CINAHL Plus with Full Text.

Al-Arfaj, I. S. (2010). Quality of diabetes care at Armed Forces Hospital, Southern Region,

 Kingdom of Saudi Arabia, 2006. *Journal Of Family & Community Medicine*, *17*(3), 129-

 134. doi:10.4103/1319-1683.74328

Alatawi, Y. M., Kavookjian, J., Ekong, G., & Alrayees, M. M. (2015). The association between

 health beliefs and medication adherence among patients with type 2 diabetes. *Research In*

 Social & Administrative Pharmacy: RSAP, doi:10.1016/j.sapharm.2015.11.006

Alavi, Afsaneh, Sibbald, R. Gary, Mayer, Dieter, Goodman, Laurie, Botros, Mariam, Armstrong,

David G., . . . Kirsner, Robert S. (2013). Diabetic foot ulcers:Part II. Management: Part II. Management. *Journal of the American Academy of Dermatology, 70*(1), 21-24.

Albargawi, M., Snethen, J., Al Gannass, A., Kelber, S. (2016). Perception of Persons with Diabetes Mellitus Type 2 in Saudi Arabia. *International Journal of Nursing Sciences, 3*(1), 39-44. doi:10.1016/j.ijnss.2016.02.007

Al-Daghri, N. M., Al-Attas, O. S., Alokail, M. S., Alkharfy, K. M., Yousef, M., Sabico, S. L., & Chrousos, G. P. (2011). Diabetes mellitus type 2 and other chronic non-communicable diseases in the central region, Saudi Arabia (Riyadh cohort 2): a decade of an epidemic. *BMC Medicine, 9*, 76. doi.org/10.1186/1741-7015-9-76

Alexiadou, K., & Doupis, J. (2012). Management of Diabetic Foot Ulcers. *Diabetes Therapy, 3*(1), 1-15.

Algarni, A. M., Khan, N. A., & Alavudeen, S. S. (2013). Awareness and causes of diabetes foot ulcers among diabetic patients at Aseer diabetic center. *Pharmacie Globale*, *4*(7), 1-3.

Alghadira, A., Awada, H., Al-Eisaa, E., & Alghwiri, A. (2014). Diabetes risk 10 years forecast in the capital of Saudi Arabia: Canadian Diabetes Risk Assessment Questionnaire (CANRISK) perspective. *Biomedical Research, 25*(1): 88-96.

Al Harbi, T., Tourkmani, A., Al-Khashan, H., Mishriky, A., Al Qahtani, H., & Bakhiet, A. (2015). Adherence to the American Diabetes Association standards of care among patients with type 2 diabetes in primary care in Saudi Arabia. *Saudi Medical Journal, 36*(2), 221-7.

Aljasem, L., Peyrot, M., Wissow, L., & Rubin, R. (2001). The impact of barriers and self efficacy on self-care behaviors in type 2 diabetes. *The Diabetes Educator, 27*(3), 393-404.

AlJohani, K. A., Kendall, G. E., & Snider, P. D. (2016). Psychometric Evaluation of the

    Summary of Diabetes Self-Care Activities–Arabic (SDSCA-Arabic). *Journal of*

    Transcultural Nursing, *27*(1), 65-72 8p. doi:10.1177/1043659614526255

Al Johani, K.A., Kendall, G.E., & Snider, P.D. (2015). Self-management practices among

    type 2 diabetes patients attending primary health-care centres in Medina, Saudi

    Arabia. *Eastern Mediterranean Health Journal, 21*(9), 621.

Alkahtani, S., Elkilany, A., & Alhariri, M. (2015). Association between sedentary and physical

    activity patterns and risk factors of metabolic syndrome in Saudi men: A cross-sectional

    study. *BMC Public Health*, 151234. doi:10.1186/s12889-015-2578-4

Al-Khawaldeh, O. A., Al-Hassan, M. A., & Froelicher, E. S. (2012). Self-efficacy, self

    management, and glycemic control in adults with type 2 diabetes mellitus. *Journal of*

    Diabetes and Its Complications, 26(1), 10-16.

Al-Kaabi, J., Al-Maskari, F., Saadi, H., Afandi, B., Parkar, H., & Nagelkerke, N. (2009).

    Physical activity and reported barriers to activity among type 2 diabetic patients in the

    United arab emirates. *The Review of Diabetic Studies, 6*(4), 271-278.

Al-Khaldi, Y. (2008). Foot care among male diabetic in family practice center, Abha, Saudi

    Arabia**.** *Journal of Family and Community Medicine, 15*(3), 103-106.

Almalki, M., Fitzgerald, G., & Clark, M. (2011). Health care system in Saudi Arabia: An

    overview. *Eastern Mediterranean Health Journal, 17*(10), 784.

Almutairi, K. M. (2015). Quality of Diabetes Management in Saudi Arabia: A Review of

    Existing Barriers. *Archives of Iranian Medicine, 18*(12), 816-821.

Al-Mutairi, R. L., Bawazir, A. A., Ahmed, A. E., & Jradi, H. (2015). Health Beliefs Related to

    Diabetes Mellitus Prevention among Adolescents in Saudi Arabia. *Sultan Qaboos*

University Medical Journal, *15*(3), e398-e404. doi:10.18295/squmj.2015.15.03.015

Alneami, Y. M., & Coleman, C. L. (2016). Risk factors for and barriers to control type-2 diabetes among Saudi population. *Global Journal of Health Science, 8*(9), 10-19.

Al-Nozha, M. M., Al-Hazzaa, H. M., Arafah, M. R., Al-Khadra, A., Al-Mazrou, Y. Y., Al Maatouq, M. a., … Al-Shahid, M. S. (2007). Prevalence of physical activity and inactivity among Saudis aged 30-70 years: A population-based cross-sectional study. *Saudi Medical Journal*, *28*(4), 559–568. doi.org/20060992

AlQuaiz, A., & Tayel, S. (2009). Barriers to a healthy lifestyle among patients attending primary care clinics at a university hospital in Riyadh. *Annals Of Saudi Medicine*, *29*(1), 30-35.

Al-Quwaidhi, A. J., Pearce, M. S., Sobngwi, E., Critchley, J. A., & O'Flaherty, M. (2013). Comparison of type 2 diabetes prevalence estimates in Saudi Arabia from a validated Markov model against the International Diabetes Federation and other modelling studies. *Diabetes Research and Clinical Practice, 103*(3), 496-503.

Al-Rasheedi, A. A. (2014). The Role of Educational Level in Glycemic Control among Patients with Type II Diabetes Mellitus. *International Journal of Health Sciences, 8*(2), 177-87.

Al-Rubeaan, K., Abu El-Asrar, A., Youssef, A., Subhani, S., Ahmad, N., Al-Sharqawi, A., . . . Ibrahim, H. (2015). Diabetic retinopathy and its risk factors in a society with a type 2 diabetes epidemic: A Saudi National diabetes registry-based study. *Acta Ophthalmologica, 93*140-147.

Al-Rubeaan, K., Al Derwish, M., Ouizi, S., Youssef, A., Subhani, S., Ibrahim, H., & Alamri, B. (2015). Diabetic foot complications and their risk factors from a large retrospective cohort study. *PloS One, 10*(5), E0124446.

Al-Rubeaan, K., Al-Manaa, H., Khoja, T., Al-Sharqawi, A., Aburisheh, K., Youssef, A., . . .

Al-Gamdi, A. (2015). Health care services provided to type 1 and type 2 diabetic patients in Saudi Arabia. *Saudi Medical Journal, 36*(10), 1216-25.

Al-Rubeaan, K., Youssef, A. M., Ibrahim, H. M., Al-Sharqawi, A. H., AlQumaidi, H., AlNaqeb, D., & Aburisheh, K. H. (2016). All-cause mortality and its risk factors among type 1 and type 2 diabetes mellitus in a country facing diabetes epidemic. *Diabetes Research & Clinical Practice*, 118130-139. doi:10.1016/j.diabres.2016.06.012

Alsairafi, Z., Taylor, K., Smith, F., & Alattar, A. (2016). Patients' management of type 2 diabetes in Middle Eastern countries: Review of studies. *Patient Preference and Adherence, 10*, 1051-1062.

Alsenany, S., & Al Saif, A. (2015). Incidence of diabetes mellitus type 2 complications among Saudi adult patients at primary health care center. *Journal of Physical Therapy Science, 27*(6), 1727-1730.

Al-Shahri, M. (2002). Culturally sensitive caring for Saudi patients. Journal of Transcultural Nursing, 13, 133–138.

Alsunni, A. A., Albaker, W., & Badar, A. (2014). Determinants of misconceptions about diabetes among Saudi diabetic patients attending diabetes clinic at a tertiary care hospital in Eastern Saudi Arabia. *Journal of Family and Community Medicine, 21*(2), 93-99.

Alwakeel, J., Sulimani, R., Al-Asaad, H., Al-Harbi, A., Tarif, N., Al-Suwaida, A., & ... Hammad, D. (2008). Diabetes complications in 1952 type 2 diabetes mellitus patients managed in a single institution. *Annals of Saudi Medicine*, *28*(4), 260-266.

Alzahrani, H. (2013). The direct cost of diabetic foot management in some of private hospitals in Jeddah, Saudi Arabia. *International Journal of Diabetes in Developing Countries*, *33*(1), 34-39. doi:10.1007/s13410-012-0107-x

Alzaman, N., & Ali, A. (2016). Obesity and diabetes mellitus in the Arab world. *Journal of*

    Taibah University Medical Sciences, 11(4), 301-309.

Alzahrani, H., & Sehlo, A. (2013). The Impact of Religious Connectedness on Health-Related

    Quality of Life in Patients with Diabetic Foot Ulcers. *Journal of Religion and*

    Health, 52(3), 840-850.

Alzahrani, A. H., Tashkandi, A. W., & Alzahrani, H. A. (2012). The management of diabetic

    foot disorders in six hospitals in Jeddah, Saudi Arabia. *Asian Journal of Medical*

    Research, 1(2), 50-56.

American Diabetes Association. (2014). *Foot care*. Retrieved from

    http://www.diabetes.org/living-with-diabetes/complications/foot-complications/foot-

    care.html

American Diabetes Association. (2015). *Kidney Disease (Nephropathy).* Retrieved from

    http://www.diabetes.org/living-with-diabetes/complications/kidney-disease-

    nephropathy.html

American Diabetes Association. (2015). *Retinopathy.* Retrieved from

    http://www.diabetes.org/living-with-diabetes/complications/eye-complications/

American Diabetes Association. (2017). Standards of medical care in diabetes--2017. *Diabetes*

    Care, 40(Suppl. 1):S1–S2. doi: 10.2337/dc17-S001. Retrieved from

    http://care.diabetesjournals.org/content/diacare/suppl/2016/12/15/40.Supplement_1.DC1/

    DC_40_S1_final.pdf

American Diabetes Association. (2015). *Type 2*. Retrieved from

    http://www.diabetes.org/diabetes-basics/type-2/?referrer=https://www.google.com/

American diabetes Association. (2015). *What We Recommend.* Retrieved from

http://www.diabetes.org/food-and-fitness/fitness/types-of-activity/what-we-recommend.html?referrer=https://www.google.com/

Amin, T. T., Suleman, W., Ali, A., Gamal, A., & Al Wehedy, A. (2011). Pattern, Prevalence, and Perceived Personal Barriers Toward Physical Activity Among Adult Saudis in Al-Hassa, KSA. *Journal Of Physical Activity & Health*, *8*(6), 775-784.

Amuta, A. O., Crosslin, K., Goodman, J., & Barry, A. E. (2016). Impact of Type 2 Diabetes Threat Appraisal on Physical Activity and Nutrition Behaviors among Overweight and Obese College Students. *American Journal of Health Behavior, 40*(4), 396-404. doi:10.5993/AJHB.40.4.1

Andrews, K., Houdek, M., & Kiemele, L. (2015). Wound management of chronic diabetic foot ulcers: From the basics to regenerative medicine. *Prosthetics and Orthotics International, 39*(1), 29-39.

Anokute, C. C. (1992). Suspected synergism between consanguinity and familial aggregation of Type- 2 diabetes in Saudi Arabia. *Journal of the Royal Society of Health, 112*(4), 167-169.

Assaad-Khalil, S. H., Al Arouj, M., AlMaatouq, M., Amod, A., Assaad, S. N., Azar, S. T . . . Alberti, K. M. (2013). Barriers to the delivery of diabetes care in the Middle East and South Africa: A survey of 1,082 practicing physicians in five countries. *International Journal of Clinical Practice, 67*(11), 1144-1150. doi: 10.1111/ijcp.12205

Asiri, S. A. (2015). Client education plan for improving diabetes management during primary health care in Saudi Arabia. Austin Journal of Nursing and Health Care, 2(2), 1018.

Ayele, K., Tesfa, B., Abebe, L., Tilahun, T., & Girma, E. (2012). Self-care behavior among patients with diabetes in Harari, Eastern Ethiopia: The health belief model

perspective. *Plos ONE*, *7*(4), 1-6. doi:10.1371/journal.pone.0035515

Backett, K. (1988). The Health and Lifestyle Survey: Preliminary Report (Book). *Sociology of Health & Illness, 10*(2), 208-210.

Badedi, M., Solan, Y., Darraj, H., Sabai, A., Mahfouz, M., Alamodi, S., & Alsabaani, A. (2016). Factors Associated with Long-Term Control of Type 2 Diabetes Mellitus. *Journal of Diabetes Research*, 1-8. doi:10.1155/2016/2109542

Badran, M., & Laher, I. (2012). Type II Diabetes Mellitus in Arabic-Speaking Countries. *International Journal of Endocrinology*, *2012*(18), 902873. doi.org/10.1155/2012/902873

Bahammam, M. A. (2015). Periodontal health and diabetes awareness among Saudi diabetes patients. *Patient Preference & Adherence*, *9*, 9225-233. doi:10.2147/PPA.S79543

Baltaci, D., Kutlucan, A., Ozturk, S., Saritas, A., Celer, A., Celbek, G., & ... Ankarali, H. (2012). Effectiveness for self-monitoring of blood sugar on blood glucose control in Turkish patients with type 2 diabetes mellitus. *Medicinski Glasnik*, *9*(2), 211-217.

Bandura, A. (1997). *Self-efficacy the exercise of control*. New York, NY: W.H. Freeman. ISBN0716726262

Bani, I. A. (2015). Prevalence, knowledge, attitude and practices of diabetes mellitus among Jazan population, Kingdom of Saudi Arabia (KSA). *Journal of Diabetes Mellitus, 5*, 115-122.

Baron, R., Kenny, D., & Reis, H. T. (1986). The Moderator-Mediator Variable Distinction in Social Psychological Research: Conceptual, Strategic, and Statistical Considerations. *Journal of Personality and Social Psychology, 51*(6), 1173-1182.

Barroso, I. (2005). Genetics of Type 2 diabetes. *Diabetic Medicine, 22*(5), 517-535.

Barshes, N., Sigireddi, M., Wrobel, J., Mahankali, A., Robbins, J., Kougias, P., & Armstrong, D.

(2013). The system of care for the diabetic foot: Objectives, outcomes, and opportunities. *Diabetic Foot & Ankle, 4*, 1-12. doi: 10.3402/dfa.v4i0.21847

Bean, D., Cundy, T., & Petrie, K. (2007). Ethnic differences in illness perceptions, self-efficacy and diabetes self-care. *Psychology & Health*, *22*(7), 787-811.

Becker, M. H. (1974). The health belief model and sick role behavior. *The health belief model and personal health behavior* (pp. 82–92). Thorofare, NJ: Charles S. Black, Inc.

Benavides-Vaello, S., & Brown, S. A. (2016). Sociocultural construction of food ways in low-income Mexican-American women with diabetes: a qualitative study. *Journal of Clinical Nursing, 25*(15-16), 2367-2377.

Berenguera, A., Mollo-Inesta, A., Mata-Cases, M., Franch-Nadal, J., Bolibar, B., Rubinat, E., & Mauriciol, D. (2016). Understanding the physical, social, and emotional experiences of people with uncontrolled Type 2 diabetes: a qualitative study. Patient Preference & Adherence, 102323-2332. doi:10.2147/PPA.S116173

Beverly, E., Ritholz, M., Brooks, K., Hultgren, B., Lee, Y., Abrahamson, M., & Weinger, K. (2012). A qualitative study of perceived responsibility and self-blame in type 2 diabetes: Reflections of physicians and patients. *Journal of General Internal Medicine, 27*(9), 1180-7.

Bonner, T., Foster, M., & Spears-Lanoix, E. (2016). Type 2 diabetes--related foot care knowledge and foot self-care practice interventions in the United States: a systematic review of the literature. Diabetic Foot & Ankle, 7-14.

Bopp, M., Wilcox, S., Laken, M., Hooker, S. P., Parra-Medina, D., Saunders, R., & ... McClorin,

146

L. (2009). 8 Steps to Fitness: A Faith-Based, Behavior Change Physical Activity

Intervention for African Americans. *Journal of Physical Activity & Health, 6*(5), 568-

577.

Boruchovitch, E., & Mednick. B. R. (2002). The meaning of health and illness: Some

considerations for health psychology. *Psico-USF,7*(2), 175.

Boule, N., Haddad, E., Kenny, G., Wells, G., & Sigal, R. (2002). Effects of exercise on glycemic

control and body mass in type 2 diabetes mellitus: A meta-analysis of controlled clinical

trials. *Scandinavian Journal of Medicine & Science in Sports, 12*(1), 60-61.

Bradley, C. (1994). *Handbook of psychology and diabetes: A guide to psychological

measurement in diabetes research and practice*. Langhorne, PA: Psychology Press

Bradley, C., Brewin, C. R., Gamsu, D. S., & Moses, J. L. (1984). Development of scales to

measure perceived control of diabetes mellitus and diabetes-related health

beliefs. *Diabetic Medicine: A Journal of the British Diabetic Association*, *1*(3), 213-218.

Braun, L., Fisk, R., Lev-Tov, W., Kirsner, A., & Isseroff, H. (2014). Diabetic Foot Ulcer: An

Evidence-Based Treatment Update. *American Journal of Clinical Dermatology, 15*(3),

267-281.

Bruttocao, A, Terranova, C, Martella, B, Spirch, S, Nistri, R, Gruppo, M, . . . Militello, C.

(2010). Rate of amputation and mortality in new-onset diabetic foot ulcers in the

elderly. *BMC Geriatrics, 10*(Suppl 1), A48.

Callaghan, B. C., Cheng, H. T., Stables, C. L., Smith, A. L., & Feldman, E.

L. (2011). Diabetic neuropathy: Clinical manifestations and current treatments. *Lancet

Neurology, 11*(6), 521-534.

Carpenter, C. J. (2010). A Meta-Analysis of the Effectiveness of Health Belief Model Variables

in Predicting Behavior. *Health Communication*, *25*(8), 661-669.

doi:10.1080/10410236.2010.521906

Cha, E., Yang, K., Lee, J., Min, J., Kim, K. H., Dunbar, S. B., & Jennings, B. M. (2012).

Understanding Cultural Issues in the Diabetes Self-Management Behaviors of Korean

Immigrants. *Diabetes Educator, 38*(6), 835-844. doi:10.1177/0145721712460283

Chasens, E. R. (2007). Obstructive sleep apnea, daytime sleepiness, and type 2 diabetes. *The Diabetes Educator, 33*(3), 475.

Chasens, E., & Olshansky, E. (2006). The experience of being sleepy while managing type 2 diabetes. *Journal of the American Psychiatric Nurses Association, 12*(5), 272-278.

Chen, S., Acton, G., & Shao, J. (2010). Relationships among nutritional self-efficacy, health locus of control and nutritional status in older Taiwanese adults. *Journal Of Clinical Nursing*, *19*(15/16), 2117-2127 11p. doi:10.1111/j.1365-2702.2009.03186.x

Chen, S., Chien, Y., Kang, C., Jeng, C., & Chang, W. (2014). Comparing self-efficacy and self care behaviours between outpatients with comorbid schizophrenia and type 2 diabetes and outpatients with only type 2 diabetes. *Journal Of Psychiatric & Mental Health Nursing*, *21*(5), 414-422 9p. doi:10.1111/jpm.12101

Chin, Y., Huang, T., & Hsu, B. (2013). Impact of action cues, self-efficacy and perceived

barriers on daily foot exam practice in type 2 diabetes mellitus patients with peripheral neuropathy. *Journal of Clinical Nursing, 22*(1/2), 61-68. doi:10.1111/j.1365-2702.2012.04291.x

Chiwanga, F. S., & Njelekela, M. A. (2015). Diabetic foot: Prevalence, knowledge, and foot self care practices among diabetic patients in Dar es Salaam, Tanzania - A cross-sectional study. *Journal of Foot & Ankle Research, 8*(1), 1-7. doi:10.1186/s13047-015-0080-y

Chourdakis, M., Kontogiannis, V., Malachas, K., Pliakas, T., & Kritis, A. (2014). Self-Care
Behaviors of Adults with Type 2 Diabetes Mellitus in Greece. *Journal of Community
Health, 39*(5), 972-979.

Clayton, W. Jr. & Elasy, T. A. (2009). A review of the pathophysiology, classification, and
treatment of foot ulcers in diabetic patients. *Clinical Diabetes, 27*(2), 52.

Coelho, C. R., Zantut-Wittmann, D. E., Parisi, M. C. (2014). A cross-sectional study of
depression and self-care in patients with type 2 diabetes with and without foot ulcers.
Ostomy/Wound Management, 60(2), 46-51.

Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2003). *Applied multiple regression
correlation analysis for the behavioral sciences*, (3rd ed.). Mahwah, NJ: LEA.

Colberg, S., Sigal, R., Fernhall, B., Regensteiner, J., Blissmer, B., Rubin, R., . . . Braun, B.
(2010). Exercise and type 2 diabetes: The American College of Sports Medicine and the
American Diabetes Association: Joint position statement. *Diabetes Care, 33*(12), E147-
67.

Critchley, C. R., Hardie, E. A., & Moore, S. (2012). Examining the Psychological Pathways to
Behavior Change in a Group-Based Lifestyle Program to Prevent Type 2
Diabetes. *Diabetes Care, 35*(4), 699-705.

Daoud, N., Osman, A., Hart, T. A., Berry, E. M., & Adler, B. (2015). Self-care management
among patients with type 2 diabetes in East Jerusalem. *Health Education Journal*, *74*(5),
603-615.

Dehghani-Tafti, A., Mazloomy Mahmoodabad, S. S., Morowatisharifabad, M. A., Afkhami

Ardakani, M., Rezaeipandari, H., & Lotfi, M. H. (2015). Determinants of Self-Care in Diabetic Patients Based on Health Belief Model. *Global Journal Of Health Science*,*7*(5), 33-42. doi:10.5539/gjhs.v7n5p33

Dela, F., Von Linstow, M., Mikines, K., & Galbo, H. (2004). Physical training may enhance beta-cell function in type 2 diabetes. *American Journal of Physiology. Endocrinology and Metabolism, 287*(5), E1024-31.

DeNicola, E., Aburizaiza, O. S., Siddique, A., Khwaja, H., & Carpenter, D. O. (2015). Obesity and public health in the Kingdom of Saudi Arabia. *Reviews On Environmental Health, 30*(3), 191-205. doi:10.1515/reveh-2015-0008

Deshpande, A., Harris-Hayes, M., & Schootman, M. (2008). Epidemiology of diabetes and diabetes-related complication. *Physical Therapy, 88*(11), 1254- 1264.

D'Souza, M. S., Ruppert, S. D., Parahoo, K., Karkada, S. N., Amirtharaj, A., Jacob, D., & ... Al Salmi, N. M.D. (2016). Foot care behaviors among adults with type 2 diabetes. Primary Care Diabetes, 10(6), 442-451. doi:10.1016/j.pcd.2016.04.002

Downie, R. S. & Macnaughton, R. J. (1998). Images of health. *Lancet, 351*(9105)*,* 823-826.

Dipnall, J. F., Pasco, J. A., Meyer, D., Berk, M., Williams, L. J., Dodd, S., & Jacka, F. N. (2015). The association between dietary patterns, diabetes and depression. *Journal of Affective Disorders*, *174*215-224. doi:10.1016/j.jad.2014.11.030

El Bcheraoui, C., Basulaiman, M., Tuffaha, M., Daoud, F., Robinson, M., Jaber, S., . . . Mokdad, A. (2014). Status of the diabetes epidemic in the Kingdom of Saudi Arabia, 2013. *International Journal of Public Health, 59*(6), 1011-1021.

El Bcheraoui, C., Tuffaha, M., Daoud, F., Kravitz, H., AlMazroa, M. A., Al Saeedi, M., & ...

Mokdad, A. H. (2015). Access and barriers to healthcare in the Kingdom of Saudi
Arabia, 2013: findings from a national multistage survey. *BMJ Open*, *5*(6).
doi:10.1136/bmjopen-2015-007801

Elhadd, T. A., Al-Amoudi, A. A., Alzahrani, A. S. (2007). Epidemiology, clinical and
complications profile of diabetes in Saudi Arabia: a review. *Annals of Saudi Medicine,
27*(4), 241-50.

Esposito, K., Maiorino, M., Ciotola, M., Di Palo, C., Scognamiglio, P., Gicchino, M., . . .
Giugliano, D. (2009). Effects of a Mediterranean-style diet on the need for anti-
hyperglycemic drug therapy in patients with newly diagnosed type 2 diabetes: A
randomized trial. *Annals of Internal Medicine, 151*(5), 306-14.

Evert, A. B., & Riddell, M. C. (2015). Lifestyle Intervention: Nutrition Therapy and Physical
Activity: Nutrition Therapy and Physical Activity. *Medical Clinics of North
America, 99*(1), 69-85.

Fawcett, J. (2005). *Contemporary nursing knowledge analysis and evaluation on nursing models
and theories* (2ne Ed.). Philadelphia, PA: F. A. Davis Company. ISBN 0-8036-1194-3.

Field, A. (2009). *Discovering Statistics using SPSS*. (3rd Ed). Thousand Oaks, California: SAGE.

Fitzgerald, J., Davis, W., Connell, C., Hess, G., Funnell, M., & Hiss, R. (1996). Development
and validation of the Diabetes Care Profile. *Evaluation & the Health Professions, 19*(2),
208-230.

Fong, D., Aiello, L., Gardner, T., King, G., Blankenship, G., Cavallerano, J., . . . Klein, R.
(2004). Retinopathy in diabetes. *Diabetes Care, 27 Suppl 1*, S84-7.

Fowler, M. J. (2011). Microvascular and macrovascular complications of diabetes. *Clinical
Diabetes, 29*(3), 116.

Funnell, M., Brown, T., Childs, B., Haas, L., Hosey, G., Jensen, B., . . . Weiss, M. (2012). National Standards for Diabetes Self-Management Education. *Diabetes Care, 35*(Suppl 1), S101-S108.

Fuscaldi, F., Balsanelli, A., & Grossi, S. (2011). Locus of control in health and self-esteem in type-2 diabetic patients. *Revista Da Escola De Enfermagem Da U S P, 45*(4), 855-61.

Futrega, K., King, M., Lott, W. B., & Doran, M. R. (2014). Treating the whole not the hole: Necessary coupling of technologies for diabetic foot ulcer treatment. *Trends in Molecular Medicine, 20*(3), 137-142.

Gabbard, Clinton E, Howard, George S, & William Tageson, C. (1986). Assessing locus of control with religious populations. *Journal of Research in Personality, 20*(3), 292-308.

Gale, L., Vedhara, K., Searle, A., Kemple, T., & Campbell, R. (2008). Patients' perspectives on foot complications in type 2 diabetes: A qualitative study. *The British Journal of General Practice : The Journal of the Royal College of General Practitioners, 58*(553), 555-63.

Game, F., Hinchliffe, R., Apelqvist, J., Armstrong, D., Bakker, K., Hartemann, A., . . . Jeffcoate, W. (2012). A systematic review of interventions to enhance the healing of chronic ulcers of the foot in diabetes. *Diabetes/Metabolism Research and Reviews, 28*, 119-141.

Gary, T., Bone, L., Hill, M., Levine, D., McGuire, M., Saudek, C., & Brancati, F. (2003). Randomized controlled trial of the effects of nurse case manager and community health worker interventions on risk factors for diabetes-related complications in urban African Americans. *Preventive Medicine, 37*(1), 23-32.

Glasgow, R. E., Toobert, D. J., & Gillette, C. D. (2001). Psychosocial Barriers to Diabetes Self Management and Quality of Life. *Diabetes Spectrum*, *14*(1), 33-41.

Gonzalez, J., Safren, S., Cagliero, E., Wexler, D., Delahanty, L., Wittenberg, E., & ... Grant, R.

(2007). Depression, self-care, and medication adherence in type 2 diabetes: relationships across the full range of symptom severity. *Diabetes Care*, *30*(9), 2222-2227.

Goodridge, D., Trepman, E., & Embil, J. (2005). Health-related quality of life in diabetic patients with foot ulcers: Literature review. *Journal of Wound, Ostomy, and Continence Nursing: Official Publication of the Wound, Ostomy and Continence Nurses Society WOCN, 32*(6), 368-77.

Gregg, J. A., Callaghan, G. M., Hayes, S. C., & Glenn-Lawson, J. L. (2007). Improving diabetes self-management through acceptance, mindfulness, and values: A randomized controlled trial. *Journal of Consulting and Clinical Psychology, 75*(2), 336-343. doi:10.1037/0022-006X.75.2.336

Gross, J., De Azevedo, M., Silveiro, S., Canani, L., Caramori, M., & Zelmanovitz, T. (2005). Diabetic nephropathy: Diagnosis, prevention, and treatment. *Diabetes Care, 28*(1), 164-76.

Grove, S. K., Burns, N., & Gray, J. R. (2013). *The Practice of Nursing Research, Appraisal, Synthesis, and Generation of Evidence* (7th Ed.). Philadelphia: W. B. Saunders.

Gutierrez, J., & Long, J. (2011). Reliability and validity of diabetes specific Health Beliefs Model scales in patients with diabetes and serious mental illness. Diabetes Research & Clinical Practice, 92(3), 342-347. doi:10.1016/j.diabres.2011.02.018

Haas, L., Maryniuk, M., Beck, J., Cox, C. E., Duker, P., Edwards, L., . . . Youssef, G. (2014). National Standards for Diabetes Self-Management Education and support. *Diabetes Care, 37*(1), S144.

Haas, L., Maryniuk, M., Beck, J., Cox, C. E., Duker, P., Edwards, L., . . . Youssef, G. (2013).

National standards for diabetes self-management education and support. *Diabetes Care, 36*(1), S100.

Harakati, M., Shaheen, F., Tamim, H., Taher, S., Qublan, A. A., & Sayyari, A. A. (2011). Saudi Patients and Health Care Providers: Divergent Perceptions of Illnesses and Their Symptoms. *Anthropology of the Middle East, 6*(1), 35-46. doi:10.3167/ame.2011.060104

Harvey, J., & Lawson, V. (2009). The importance of health belief models in determining self care behavior in diabetes. *Diabetic Medicine, 26*(1), 5-13.

Harvey, I., & Silverman, S. (2007). The Role of Spirituality in the Self-management of Chronic Illness among Older African and Whites. *Journal of Cross-Cultural Gerontology, 22*(2), 205-220.

Hayden, J. (2009). *Introduction to health behavior theory.* New York, NY: W.H. Freeman. Sudbury, Mass. Jones and Bartlett. ISBN 9780763743833

Heuman, A., Scholl, J., & Wilkinson, K. (2013). Rural Hispanic Populations at Risk in Developing Diabetes: Sociocultural and Familial Challenges in Promoting a Healthy Diet. *Health Communication, 28*(3), 260-274.

Hjelm, K., Bard, K., Nyberg, P., & Apelqvist, J. (2003). Religious and cultural distance in beliefs about health and illness in women with diabetes mellitus of different origin living in Sweden. *International Journal of Nursing Studies, 40*(6), 627. doi:10.1016/S0020-7489(03)00020-8

Hill-Briggs, F., Gary, T. L., Bone, L. R., Hill, M. N., Levine, D. M., & Brancati, F. L. (2005). Medication Adherence and Diabetes Control in Urban African Americans With Type 2 Diabetes. *Health Psychology*, *24*(4), 349-357. doi:10.1037/0278-6133.24.4.349

Hodge, A., English, D., O'Dea, K., & Giles, G. (2007). Dietary patterns and diabetes incidence in

the Melbourne Collaborative Cohort Study. *American Journal of Epidemiology, 165*(6), 603-10.

Holmes-Truscott, E., Skinner, T. C., Pouwer, F., & Speight, J. (2015). Negative appraisals of insulin therapy are common among adults with Type 2 diabetes using insulin: Results from Diabetes MILES - Australia cross-sectional survey. *Diabetic Medicine, 32*(10), 1297-1303. doi:10.1111/dme.12729

Houts, S. S., & Warland, R. H. (1989). Age and locus of control among women food preparers. *Psychological Reports, 65*(1), 227.

Howlett, E., Burton, S., Bates, K., & Huggins, K. (2009). Coming to a Restaurant Near You? Potential Consumer Responses to Nutrition Information Disclosure on Menus. *Journal of Consumer Research*, 36(3), 494-503.

Hu, F. (2003). Sedentary lifestyle and risk of obesity and type 2 diabetes. *Lipids, 38*(2), 103-108.

Hu, F., Manson, J., Stampfer, M., Colditz, G., Liu, S., Solomon, C., & Willett, W. (2001). Diet, Lifestyle, and the Risk of Type 2 Diabetes Mellitus in Women. *The New England Journal of Medicine, 345*(11), 790-797.

Hulley, S. B., Cummings, S. R., Browner, W. S., Grady, D., & Newman, T. B. (2013). *Designing clinical research* (3rd ed.). Philadelphia, PA: Lippincott Williams &Wilkins.

Idris, I., Abdulla, H., Tilbrook, S., Dean, R., & Ali, N. (2013). Exenatide improves excessive daytime sleepiness and wakefulness in obese patients with type 2 diabetes without obstructive sleep apnea. *Journal of Sleep Research, 22*(1), 70-75. doi:10.1111/j.1365-2869.2012.01030.x

International Diabetes Federation. (2009). *Guideline on Self-monitoring of Blood Glucose in*

Non-Insulin Treated Type 2 Diabetes. Retrieved from

http://www.idf.org/webdata/docs/SMBG_EN2.pdf

International Diabetes Federation. (2015). *Middle East and North Africa Region.* Retrieved

from http://www.idf.org/node/23519

International Diabetes Federation. (2014). *Middle East and North Africa at A Glance*.

Retrieved from

https://www.idf.org/sites/default/files/attachments/MENA%20factsheet.pdf

International Diabetes Federation. (2015). *Saudi Arabia*. Retrieved from

http://www.idf.org/membership/mena/saudi-arabia

International Trade Administration. (2016). *2016 Top Markets Report Health IT Country Case

Study: Saudi Arabia.* Retrieved from

http://trade.gov/topmarkets/pdf/Health_IT_Saudi_Arabia.pdf

Jalilian, F., Motlagh, F. Z., Solhi, M., & Gharibnavaz, H. (2014). Effectiveness of self

management promotion educational program among diabetic patients based on health

belief model. *Journal of Education And Health Promotion*, *3*14. doi:10.4103/2277-

9531.127580

Jeffcoate, W., Lipsky, B., Berendt, A., Cavanagh, P., Bus, S., Peters, E., . . . Bakker, K. (2008).

Unresolved issues in the management of ulcers of the foot in diabetes.*Diabetic

Medicine, 25*(12), 1380-1389.

Jones, R. A., Utz, S. W., Williams, I. C., Hinton, I., Alexander, G., Moore, C., . . . Oliver, N.

(2008). Family interactions among African Americans diagnosed with type 2

diabetes. *The Diabetes Educator, 34*(2), 318-326. doi:

10.1177/0145721708314485

Jradi, H., Zaidan, A., & Shehri. M. A. (2012). Public health nursing education in Saudi Arabia. *Journal of Infection and Public Health, 6*(2), 63-68.

Kacerovsky-Bielesz, G., Lienhardt, S., Hagenhofer, M., Kacerovsky, M., Forster, E., Roth, R., & Roden, M. (2009). Sex-related psychological effects on metabolic control in type 2 diabetes mellitus. *Diabetologia, 52*(5), 781-8.

Kajagar, B., Godhi, M., Pandit, A., & Khatri, S. (2012). Efficacy of Low Level Laser Therapy on Wound Healing in Patients with Chronic Diabetic Foot Ulcers—A Randomized Control Trial. *Indian Journal of Surgery, 74*(5), 359-363.

Kara, B., & Kilic, O. (2015). Predictors of poor sleep quality and excessive daytime sleepiness in Turkish adults with type 2 diabetes. *Journal of Clinical Nursing, 24*(9/10), 1436-1439. doi:10.1111/jocn.12710

Karstoft, K., Christensen, C., Pedersen, B., & Solomon, T. (2014). The acute effects of interval Vs continuous-walking exercise on glycemic control in subjects with type 2 diabetes: A crossover, controlled study. *The Journal of Clinical Endocrinology and Metabolism, 99*(9), 3334-42.

Karthikesalingam, A**.**, Holt, P. J**.**, Moxey, P**.**, Jones, K. G**.**, Thompson, M. M**.**, & Hinchliffe**,** R**.** J. (2010). A systematic review of scoring systems for diabetic foot ulcers. *Diabetic Medicine: A Journal of the British Diabetic Association, 27*(5), 544-549. doi: 10.1111/j.1464-5491.2010.02989.x.

Katsilambros, N., Dounis, E., Makrilakis, K., Tentolouris, N., & Tsapogas, P. (2010). *Atlas of the Diabetic Foot* (2nd ed.). Hoboken: Wiley. ISBN: 9781405191791

Kaye, J. & Raghavan, S. K. (2002). Spirituality in disability and illness. *Journal of Religion and Health, 41*(3), 231-241. doi:10.1023/A:1020284819593

Khan, A. R., Al Abdul Lateef, Z. N., Fatima, S., Al Yousuf, S. A., Khan Afghan, S. Z., Al

 Marghani, S. (2014). Prevalence of chronic complication among type 2 diabetics

 attending primary health care centers of Al Ahsa district of Saudi Arabia: a cross

 sectional survey. *Global Journal of Health Science, 6*(4), 245-53. doi:

 10.5539/gjhs.v6n4p245.

Khan, A., Nase Al Abdul Lateef, Z., Khamseen, M. B., Al Aithan, M., Khan, S., Al Ibrahim, I.,

 & Rahman Khan, A. (2011). Knowledge, attitude and practice of ministry of health

 primary health care physicians in the management of type 2 diabetes mellitus: A cross-

 sectional study in the Al Hasa District of Saudi Arabia, 2010. *Nigerian Journal of

 Clinical Practice, 14*(1). doi.org/10.4103/1119-3077.79241

Khattab, M., Khader, Y. S., Al-Khawaldeh, A., & Ajlouni, K. (2010). Factors associated with

 poor glycemic control among patients with Type 2 diabetes. *Journal of Diabetes and

 Its Complications, 24*(2), 84-89.

Kranke, P., Bennett, M., Martyn-St J., M., Schnabel, A., & Debus, S. (2012). Hyperbaric

 oxygen therapy for chronic wounds. *The Cochrane Database of Systematic Reviews, 4*,

 CD004123.

Kravitz, S. R., McGuire, J. B., & Sharma, S. (2007). The Treatment of Diabetic Foot Ulcers:

 Reviewing the Literature and a Surgical Algorithm. *Advances in Skin & Wound

 Care, 20*(4), 227-237.

Krichbaum, K., Aarestad, V., & Buethe, M. (2003). Exploring the connection between self

 efficacy and effective diabetes self-management. *The Diabetes Educator, 29*(4), 653-62.

Lesiak, A. C., & Shafritz, A. B. (2013). Negative-Pressure Wound Therapy.*Journal of Hand

 Surgery, 38*(9), 1828-1832.

Leung, P. (2007). Diabetic foot ulcers: A comprehensive review. *The Surgeon, 5*(4), 219-231.

Lewis, A. (1953). Health as a social concept. *British Journal Society, 4*(2) 110-115.

Loeb, S. J., Steffensmeier, D., & Kassab, C. (2011). Predictors of self-efficacy and self-rated health for older male inmates. *Journal Of Advanced Nursing, 67*(4), 811-820 10p. doi:10.1111/j.1365-2648.2010.05542.x

Lundberg, P. C, & Thrakul, S. (2013). Religion and self-management of Thai Buddhist and Muslim women with type 2 diabetes. *Journal of Clinical Nursing, 22*(13 14), 1907.

Lyssenko, Jonsson, Almgren, Pulizzi, Isomaa, Tuomi, . . . Groop. (2008). Clinical Risk Factors, DNA Variants, and the Development of Type 2 Diabetes. *The New England Journal of Medicine, 359*(21), 2220-2232.

Macaden, L., & Clarke, C. (2010). The influence of locus of control on risk perception in older South Asian people with Type 2 diabetes in the UK. *Journal of Nursing & Healthcare Of Chronic Illnesses, 2*(2), 144-152. doi:10.1111/j.1752-9824.2010.01054.x

Margolis, J. D., Malay, S., Hoffstad, J. O., Leonard, E. C., MaCurdy, T., Lopez de Nava, K., & Tan, Y., Molina, T., & Siegel, K. (2011). Incidence of diabetic foot ulcer and lower extremity amputation among Medicare beneficiaries, 2006 to 2008: Data point 2. *Agency for Healthcare Research and Quality*. Retrieved from http://effectivehealthcare.ahrq.gov/ehc/products/287/627/Data-Points_2_Diabetic-Foot-Ulcer_Report_02-2011.pdf

Mayberry, L., Egede, S., Wagner, L., & Osborn, E. (2015). Stress, depression and medication nonadherence in diabetes: Test of the exacerbating and buffering effects of family support. *Journal of Behavioral Medicine, 38*(2), 363-371.

Mayberry, L. S., & Osborn, C. Y. (2012). Family support, medication adherence, and

glycemic control among adults with type 2 diabetes. *Diabetes Care, 35*(6), 1239.

Meeuwisse-Pasterkamp, S. H., van der Klauw, M. M., **&** Wolffenbuttel, B. H. (2008). Type 2
diabetes mellitus: Prevention of macrovascular complications.
Expert Review of Cardiovascular Therapy, 6(3):323-341. doi:
10.1586/14779072.6.3.323.

Memish, Z. A., El Bcheraoui, C., Tuffaha, M., Robinson, M., Daoud, F., Jaber, S., & ... Al
Rabeeah, A. A. (2014). Obesity and associated factors--Kingdom of Saudi Arabia,
2013. *Preventing Chronic Disease*, *11*E174. doi:10.5888/pcd11.140236

Merz, C. N., Buse, J. B., Tuncer, D., & Twillman, G. B. (2002). Physician attitudes and
practices and patient awareness of the cardiovascular complications of
diabetes. *Journal of the American College of Cardiology, 40*(10), 1877-1881.

Meybodi, F. A., Pourshrifi, H., Dastbaravarde, A., Rostami, R., & Saeedi, Z. (2011). The
effectiveness of motivational interview on weight reduction and self-efficacy in Iranian
overweight and obese women. *Procedia - Social and Behavioral Sciences, 30*, 1395-
Michigan Diabetes Research Center. (2016). *Diabetes Care Profile*. Retrieved from
http://diabetesresearch.med.umich.edu/peripherals/profs/documents/svi/dcp.pdf

Michigan Diabetes Research Center. (2016). *Diabetes Care Profile scale Formula*. Retrieved
from
http://diabetesresearch.med.umich.edu/peripherals/profs/documents/svi/dcp_formulae.pdf
1398.

Micklethwaite, A., Brownson, C. A., O'Toole, M. L., & Kilpatrick, K. E. (2012). The Business
Case for a diabetes self-management intervention in a community general
hospital. *Population Health Management, 15*(4), 230-235. doi:10.1089/pop.2011.0051

Midhet, F., Al-Mohaimeed, A., & Sharaf, F. (2010). Lifestyle related risk factors of type 2 diabetes mellitus in Saudi Arabia. *Saudi Medical Journal, 31*(7), 768-74.

Ministry of Health. (2013). *Adult Obesity At-A-Glance*. Retrieved from

http://www.moh.gov.sa/Ministry/Statistics/Documents/obesity.pdf

Ministry of Health. (2012). *Dietary Guidelines for Saudis The healthy Food Palm General Directorate of Nutrition.* Retrieved from

http://www.moh.gov.sa/en/Ministry/MediaCenter/Publications/Documents/final%20engli sh%20%20%D8%A7%D9%84%D9%83%D8%AA%D8%A7%D8%A8%20%D8%A7% D9%84%D8%B9%D9%84%D9%85%D9%8A%20%D8%A5%D9%86%D8%AC%D9% 84%D9%8A%D8%B2%D9%8A.pdf

Ministry of Health. (2013). *Guidelines for Diabetes*. Retrieved from

http://static.moh.gov.sa/internet_layouts/MOH/Internet/Guidlines/diabetes.pdf

Ministry of Health. (2014). *Statistical Book Kingdom of Saudi Arabia 2014G/1435H*. Retrieved from

http://www.moh.gov.sa/en/Ministry/Statistics/book/Documents/Statistical-Book-for-the-Year-1435.pdf

Ministry of Health. (2013). *Press Report on the MOH's Efforts Regarding Raising People's Awareness of Diabetes*. Retrieved from

http://www.moh.gov.sa/en/Ministry/MediaCenter/Publications/Pages/Publications-2013-06-09-004.aspx

Ministry of Health. (2011). *Minister of Health Opens the Diabetes Center at Prince Salman*

Bin Abdulaziz Hospital. Retrieved from

http://www.moh.gov.sa/en/Ministry/MediaCenter/News/Pages/NEWS-2011-10-11-002.aspx

Ministry of National Guard Health Affairs. (2016). *King Abdulaziz Medical City in Riyadh*.
Retrieved from http://ngha.med.sa/English/MedicalCities/AlRiyadh/Pages/default.aspx

Ministry of National Guard Health Affairs. (2015). *Pathology & Laboratory*. Retrieved from
http://ngha.med.sa/English/MedicalCities/AlRiyadh/MedicalServices/Lab/Pages/default.aspx

Mohebi, S., Azadbakht, L., Feizi, A., Sharifirad, G., & Kargar, M. (2013). Structural role of
perceived benefits and barriers to self-care in patients with diabetes. *Journal of
Education and Health Promotion, 2*.

Moriyama, M., Nakano, M., Kuroe, Y., Nin, K., Niitani, M., & Nakaya, T. (2009). Efficacy of a
self-management education program for people with type 2 diabetes: results of a 12
month trial. *Japan Journal of Nursing Science*, *6*(1), 51-63.

Morowatisharifabad, M., Mahmoodabad, S., Baghianimoghadam, M., & Tonekaboni, N. (2010).

Relationships between locus of control and adherence to diabetes regimen in a sample of
Iranians. *International Journal of Diabetes In Developing Countries, 30*(1), 27-32.
doi:10.4103/0973-3930.60009

Moura, L. I. F., Dias, A. M. A., Carvalho, E., & De Sousa, H. C. (2013). Recent advances on the
development of wound dressings for diabetic foot ulcer treatment—A review. *Acta
Biomaterialia, 9*(7), 7093-7114.

Mufti, M. (2000). *Healthcare Development Strategies in the Kingdom of Saudi Arabia*.
Hingham: Kluwer Academic.

Munro, S., Lewin, S., Swart, T., & Volmink, J. (2007). A review of health behaviour theories: How useful are these for developing interventions to promote long-term medication adherence for TB and HIV/AIDS? *BMC Public Health, 7*, 104.

Murad, M. A., Abdulmageed, S. S., Iftikhar, R., & Sagga, B. K. (2014). Assessment of the Common Risk Factors Associated with Type 2 Diabetes Mellitus in Jeddah. *International Journal of Endocrinology*, 1-9. doi:10.1155/2014/616145

Nabuurs-Franssen, M., Huijberts, H., Nieuwenhuijzen Kruseman, S., Willems, P., & Schaper, A. (2005). Health-related quality of life of diabetic foot ulcer patients and their caregivers. *Diabetologia, 48*(9), 1906-1910.

National Diabetes Education Program. (2015). *Take Care of Your Feet for a Lifetime: A booklet for people with diabetes.* Retrieved from http://ndep.nih.gov/media/NDEP4_TakeCareOfFeet_4c_508.pdf

National Institutes of Health. (2009). *Diabetic neuropathies: The nerve damage of diabetes.* Retrieved from http://www.niddk.nih.gov/health-information/health-topics/Diabetes/diabetic-neuropathies-nerve-damage-diabetes/Documents/Neuropathies_508.pdf

National Institutes of Health. (2015). *Eating and Diabetes What I need to know about Eating and Diabetes*. Retrieved from http://www.niddk.nih.gov/health-information/health-topics/Diabetes/eating-diabetes/Documents/Eating_Diabetes_508.pdf

National Research Council. (2011). improving health in the United States: The role of health impact assessment / Committee on Health Impact Assessment, Board on Environmental Studies and Toxicology, Division on Earth and Life Studies, National Research Council,

National Research Council of the National Academies. Washington, D.C.: National Academies Press.

Navicharern R. (2012). Diabetes self-management, fasting blood sugar and quality of life among type 2 diabetic patients with foot ulcers. *Journal of the Medical Association of Thailand 95*(2), 156-162.

Nelson, E. A., O'Meara, S., Golder, S., Dalton, J., Craig, D., & Iglesias, C. (2006). Systematic review of antimicrobial treatments for diabetic foot ulcers. *Diabetic Medicine*, 23(4), 348-359. doi:10.1111/j.1464-5491.2006.01785.x

Nolan, C. J., Damm, P., & Prentki, M. (2011). Type 2 diabetes across generations: From pathophysiology to prevention and management. *The Lancet, 378*(9786), 169-181.

Nouwen, A., Ford, T., Balan, A., Twisk, J., Ruggiero, L., & White, D. (2011). Longitudinal motivational predictors of dietary self-care and diabetes control in adults with newly diagnosed type 2 diabetes mellitus. *Health Psychology, 30*(6), 771-779. doi:10.1037/a0024500

Nugent, L., Carson, M., Zammitt, N., Smith, G., & Wallston, K. (2015). Health value & perceived control over health: Behavioural constructs to support Type 2 diabetes self-management in clinical practice. *Journal of Clinical Nursing,24*(15-16), 2201-2210.

Nugent, L., & Wallston, E. (2016). Modified social learning theory re-examined: Correlates of self-management behaviors of persons with Type 2 diabetes. *Journal of Behavioral Medicine, 39*(6), 947-956.

Orem, D. E. (2001). *Nursing concept of practice* (6th Ed.). St. Louis, Missouri: Mosby. ISBN 978-0323008648

Otieno, C. F., Nyamu, P. M., & Atieno-Jalango, G. (2005). Focus on delay as a strategy for care

designs and evaluation of diabetic foot ulcers in developing countries: a review. *East African Medical Journal, 82*(12 Suppl), S204-S208.

Pallant, J. (2010). *SPSS Survival Manual: A Step by Step Guide to Data Analysis Using SPSS* (4th ed.). New York, NY: Open University Press. ISBN-13: 978-0335242399

Parillo, M., & Riccardi, G. (2004). Diet composition and the risk of type 2 diabetes: Epidemiological and clinical evidence. *British Journal of Nutrition, 92*(1), 7-19.

Parkin, C. G., Buskirk, A., Hinnen, D. A., & Axel-Schweitzer, M. (2012). Results that matter: Structured vs. unstructured self-monitoring of blood glucose in type 2 diabetes. Diabetes Research and Clinical Practice, 97(1), 6-15.

Peterson, S. J., & Bredow, T. S. (2009). *Middle range theories application to nursing research* (2nd Ed.). Philadelphia, PA: Wolters Kluwer Health/ Lippincott Williams & Wilkins. ISBN978-0-7817-8562

Pham, D., Fortin, F., & Thibaudeau, M. (1996). The role of the Health Belief Model in amputees' self-evaluation of adherence to diabetes self-care behaviors. *The Diabetes Educator, 22*(2), 126-32.

Pinto, S. L., Lively, B. T., Siganga, W., Holiday-Goodman, M., & Kamm, G. (2006). Using the Health Belief Model to test factors affecting patient retention in diabetes-related pharmaceutical care services.*Research in Social and Administrative Pharmacy, 2*(1), 38-58.

Polit, D. F., & Beck C. T. (2012). *Nursing research: Generating and assessing evidence for nursing practice* (9th ed.). Philadelphia, PA: Lippincott Williams & Wilkins.

Polzer, R. L., & Miles, M. S. (2007). Spirituality in African Americans with diabetes: Self

management through a relationship with God. *Qualitative Health Research., 17*(2), 176-188.

Porth, C. M., & Matfin, G. (2009). *Pathophysiology: Concepts of Altered Health States* (8th ed.). Philadelphia: Walters Kluwer/Lippincott, Williams, & Wilkins.

Powers, M., Bardsley, J., Cypress, M., Duker, P., Funnell, M., Fischl, A., . . . Vivian, E. (2015). Diabetes Self-management Education and Support in Type 2 Diabetes. *Diabetes Care*, *41*(4), 417-430.

Qadi, M., & Al Zahrani, H. (2011). Foot Care Knowledge and Practice among Diabetic Patients Attending Primary Health Care Centers in Jeddah City. *Journal of King Abdulaziz University-Medical Sciences, 18*(2), 55-71.

Rao, N., & Lipsky, B. A. (2007). Optimizing antimicrobial therapy in diabetic foot infections. *Drugs, 67*(2), 195.

Rasheed, P. (1998). Perception of body weight and self-reported eating and exercise behavior among obese and non-obese women in Saudi Arabia. Public Health (Nature), 112(6), 409.

Redman, B. (2003). *Measurement tools in patient education* (2nd ed.). New York : Springer Pub.

Remuzzi, G., Schieppati, A., & Ruggenenti, P. (2002). Nephropathy in Patients with Type 2 Diabetes. *The New England Journal of Medicine, 346*(15), 1145-1151.

Rieger, M.A, Schnepp, W., & Herber, O. R. (2007). A systematic review on the impact of leg ulceration on patients' quality of life. *Health and Quality of Life Outcomes, 5*(1), 44.

Rivera-Hernandez, M. (2015). The Role of Religious Leaders in Health Promotion for Older Mexicans with Diabetes. *Journal of Religion and Health, 54*(1), 303-315.

Robinson, T., Kenealy, T., Garrett, M., Bramley, D., Drury, P., & Elley, C. (2016). Ethnicity and

risk of lower limb amputation in people with Type 2 diabetes: A prospective cohort study. *Diabetic Medicine, 33*(1), 55-61.

Rodriguez, K. (2013). Intrinsic and extrinsic factors affecting patient engagement in diabetes self-management: Perspectives of a certified diabetes educator. *Clinical Therapeutics,* Clinical Therapeutics.

Rosenstock, I. M., Strecher, V. J., & Becker, M. H. (1988). Social learning theory and the health belief model. *Health Education Quarterly*, *15*, 175–183.

Rotter, J. B. (1954). *Social learning theory and clinical psychology*. Englewood Cliffs, NJ: Prentice-Hall.

Rubin, R. R. (2005). Adherence to pharmacologic therapy in patients with type 2 diabetes mellitus. *The American Journal of Medicine, 118*(5), 27–34. doi:10.1016/j.amjmed.2005.04.012

Ryan, C. M., Freed, M. I., Rood, J. A., Cobitz, A. R., Waterhouse, B. R., & Strachan, M. W.J. (2006). Improving metabolic control leads to better working memory in adults with type 2 diabetes. *Diabetes Care, 29*(2), 345-351.

Rygg, L. O., Rise, M., Gronning, K., & Steinsbekk, A. (2011). Efficacy of ongoing group based diabetes self-management education for patients with type 2 diabetes mellitus. A randomized controlled trial. *Patient Education and Counseling, 86*(1), 98-105.

Sabbah, O. K., & Shehri, A. A. (2014). Practice and perception of self management among diabetics in Taif, KSA: Impact of demographic factors. *International Journal of Medical Science and Public Health, 3*(3), 277.

Sabra, A. A., Taha, A. Z., Al-Zubier, A. G., Al-Kurashi, N. Y. (2010). Misconceptions about

diabetes mellitus among adult male attendees of primary health care centers in Eastern Saudi Arabia. *South African Family Practice, 52*(4), 344-349

Sadanand, S., Balachandar, R., & Bharath, S. (2016). Memory and executive functions in persons with type 2 diabetes: a meta-analysis. *Diabetes/Metabolism Research & Reviews, 32*(2), 132-142. doi:10.1002/dmrr.2664

Saleh, F., Mumu, S., Ara, F., Hafez, M., & Ali, L. (2014). Non-adherence to self-care practices & medication and health related quality of life among patients with type 2 diabetes: A cross-sectional study. *BMC Public Health, 14*, 431.

Samuel-Hodge, C. D., Cene, C. W., Corsino, L., Thomas, C., & Svetkey, L. P. (2013). Family diabetes matters: a view from the other side. *Journal Of General Internal Medicine, 28*(3), 428-435. doi:10.1007/s11606-012-2230-2

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

Saurabh, S., Sarkar, S., Selvaraj, K., Kar, S., Kumar, S., & Roy, G. (2014). Effectiveness of foot care education among people with type 2 diabetes in rural Puducherry, India. *Indian Journal of Endocrinology and Metabolism, 18*(1), 106-10.

Saudi Arabian General Investment Authority. (1992). *Basic Law of Governance*. Retrieved from
https://www.sagia.gov.sa/Documents/Laws/Basic%20Law%20of%20Governance_En.pdf

Sawilowsky, S., Blair, R., & Steinberg, R. J. (1992). A More Realistic Look at the Robustness and Type II Error Properties of the t Test to Departures from Population Normality. *Psychological Bulletin, 111*(2), 352-360.

Schnoll, R. A., Martinez, E., Tatum, K. L., Glass, M., Bernath, A., Ferris, D., & Reynolds, P.

    (2011). Increased self-efficacy to quit and perceived control over withdrawal symptoms

    predict smoking cessation following nicotine dependence treatment. *Addictive*

    Behaviors, 36(1), 144-147.

Schulze, M., Hoffmann, K., Manson, J., Willett, W., Meigs, J., Weikert, C., . . . Hu, F. (2005).

    Dietary pattern, inflammation, and incidence of type 2 diabetes in women. *The*

    American Journal of Clinical Nutrition, 82(3), 675-84.

Scollan-Koliopoulos, M., Walker, E., & Bleich, D. (2010). Perceived risk of amputation,

    emotions, and foot self-care among adults with type 2 diabetes.*The Diabetes*

    Educator, 36(3), 473-82.

Serour, M., Alqhenaei, H., Al-Saqabi, S., Mustafa, A., & Ben-Nakhi, A. (2007). Cultural factors

    and patients' adherence to lifestyle measures. The British Journal Of General Practice:

    The Journal Of The Royal College Of General Practitioners, 57(537), 291-295.

Shah, M., Kaselitz, E., & Heisler, M. (2013). The role of community health workers in diabetes:

    update on current literature. Current Diabetes Reports, 13(2), 163-171.

    doi:10.1007/s11892-012-0359-3

Sharifirad, G., Entezari, M., Kamran, A., & Azadbakht, L. (2009). The effectiveness of

    nutritional education on the knowledge of diabetic patients using the health belief

    model. *Journal Of Research In Medical Sciences*, *14*(1), 1-6 6p.

Sharoni, S. A., & Wu, S. V. (2012). Self-efficacy and self-care behavior of Malaysian

    patients with type 2 diabetes: A cross sectional survey. *Nursing & Health Sciences, 14*(1),

    38–45. doi: 10.1111/j.1442-2018.2011.00658.x

Sherman, S., Mrus, J., Yi, M., Feinberg, J., & Tsevat, J. (2006). How do patients with HIV/AIDS

understand and respond to health value questions?*Journal of General Internal Medicine, 21 Suppl 5*, S56-61.

Shi, Q., Ostwald, S., & Wang, S. (2010). Improving glycaemic control self-efficacy and glycaemic control behaviour in Chinese patients with Type 2 diabetes mellitus: randomised controlled trial. *Journal Of Clinical Nursing*, *19*(3/4), 398-404 7p. doi:10.1111/j.1365-2702.2009.03040.x

Shrivastava, S. R., Shrivastava, P. S., & Ramasamy, J. (2013). Role of self-care in management of diabetes mellitus. *Journal of Diabetes and Metabolic Disorders, 12*(1), 14.

Siersma, V., Thorsen, H., Holstein, P. E., Kars, M., Apelqvist, J., Jude, E. B., . . . Schaper, N. C. (2014). Health-related quality of life predicts major amputation and death, but not healing, in people with diabetes presenting with foot ulcers: The Eurodiale study. *Diabetes Care, 37*(3), 694.

Smeltzer, C. S., & Bare, G. B. (2004). *Brunner & Suddarth's Textbook of Medical Surgical Nursing* (10th ed.). Philadelphia: Lippincott, Williams, & Wilkins.

Smith, M. J., & Liehr, P. R. (2003). Middle range theory for nursing. New York, NY: Springer Publishing Co. ISBN 0-8261-1915-8

Spikmans, F. M., Brug, J., Doven, M. B., Kruizenga, H. M., Hofsteenge, G. H., & van Bokhorst-van der Schueren, M. E. (2003). Why do diabetic patients not attend appointments with their dietitian? *Journal of Human Nutrition & Dietetics*, *16*(3), 151-158.

Steinsbekk, A., Rygg, L., Lisulo, M., Rise, M. B., & Fretheim, F. (2012). Group based diabetes

self-management education compared to routine treatment for people with type 2 diabetes

mellitus. A systematic review with meta-analysis. *BMC Health Services Research, 12*(1),

213-231. doi:10.1186/1472-6963-12-213

Stiffler, D., Cullen, D., & Luna, G. (2014). Diabetes Barriers and Self-Care Management.

Clinical Nursing Research, 23(6), 601-626.

Strecher, V. J., Champion, V. L., & Rosenstock, I. M. (1997). The health belief model and health

behavior. In D. S. Gochman (Ed.) *Handbook of health behavior research I: Personal and*

social determinants (pp. 71-91). New York: Plenum Press.

Strickland, B. R. (1978). Internal-external expectancies and health-related

behaviors. *Journal of Consulting and Clinical Psychology, 46*, 1192-1211.

Sweileh, W. M., Zyoud, S.H., Abu Nab'a, R. J., Deleq, M. I., Enaia, M. I., Nassar, S. M., & Al

Jabi, S. W. (2014). Influence of patients' disease knowledge and beliefs about medicines

on medication adherence: Findings from a cross-sectional survey among patients with

type 2 diabetes mellitus in Palestine. *BMC Public Health, 14*, 94.

Sytze, VD. P., Cotter, M. A., Bravenboer, B., & Cameron, N. E. (2013). Pathogenesis of diabetic

neuropathy: Focus on neurovascular mechanisms. *European Journal of*

Pharmacology, 719(1-3), 180-186.

Talbot, F., Nouwen, A., Gingras, J., Gosselin, M., & Audet, J. (1997). The assessment of

diabetes-related cognitive and social factors: The multidimensional diabetes

questionnaire. Journal of Behavioral Medicine, 20(3), 291-312.

Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. *International*

Journal of Medical Education, 2, 53-55.

Trento, M., Tomelini, M., Basile, M., Borgo, E., Passera, P., Miselli, V., Tomalino, M., Cavallo,

F., & Porta, M. (2008). The locus of control in patients with type 1 and type 2 diabetes managed by individual and group care. *Diabetic Medicine, 25*(1), 86–90. doi: 10.1111/j.1464-5491.2007.02319.x

Toobert, D.J., Hampson, S. E., Glasgow, R.E. (2000). The summary of diabetes self-care activities measure: Results from 7 studies and a revised scale. *Diabetes Care, 23*(7), 943-950.

Tromp, D., Brouha, X., Hordijk, G., Winnubst, J., Gebhardt, W., Van der Doef, M., & De Leeuw, J. (2005). Medical care-seeking and health-risk behavior in patients with head and neck cancer: The role of health value, control beliefs and psychological distress. *Health Education Research, 20*(6), 665-675.

Turhan, V., Mutluoglu, M., Acar, A., Hatipoglu, M., Önem, Y., Uzun, G., & ... Görenek, L. (2013). Increasing incidence of Gram-negative organisms in bacterial agents isolated from diabetic foot ulcers. *Journal of Infection in Developing Countries, 7*(10), 707-712. doi:10.3855/jidc.2967

Van der Heijden, M. P., Pouwer, F., Romeijnders, A. C., & Pop, V. J. (2012). Testing the effectiveness of a self-efficacy based exercise intervention for inactive people with type 2 diabetes mellitus: design of a controlled clinical trial. *BMC Public Health*,*12*(1), 331-338. doi:10.1186/1471-2458-12-331

Varma, A. (2011). Reconstructive foot and ankle surgeries in diabetic patients. *Indian Journal of Plastic Surgery: Official Publication of the Association of Plastic Surgeons of India, 44*(3), 390-395.

Vazini, H., & Barati, M. (2014). The Health Belief Model and Self-Care Behaviors among Type 2 Diabetic Patients. *Iranian Journal Of Diabetes & Obesity (IJDO)*, *6*(3), 107-113.

Venkatesh, S., & Weatherspoon, L. (2013). Social and Health Care Provider Support in Diabetes
    Self-Management. *American Journal of Health Behavior, 37*(1), 112-121.
    doi:10.5993/AJHB.37.1.13

Viebahn-Hansler, R., Leon Fernandez, O. S., & Fahmy, Z. (2012). Ozone in Medicine: The Low
    Dose Ozone Concept—Guidelines and Treatment Strategies. Ozone: Science &
    Engineering, 34(6), 408-424. doi:10.1080/01919512.2012.717847

Voigt, A., Madrid, E., Pacheco-Huergo, V., Rastello, A., Castro, D., Navarro-Brito, I., &
    Oyaneder, M. J. (2015). Association of glycaemia with perceived threat of illness in
    patients with type 2 diabetes. *Primary Care Diabetes, 9*(6), 426-431.
    doi:10.1016/j.pcd.2015.03.001

Wagner, F. W. (1987). The diabetic foot. *Orthopedics, 10*(1), 163-172.

Wallston, K. (2015). The God Locus of Health Control (GLHC) Scale. Retrieved from
    http://www.nursing.vanderbilt.edu/faculty/kwallston/The%20God%20Locus%20of%20H
    ealth%20Control%20scale%20items.pdf

Wallston, K. (1992). Hocus-pocus, the focus isn't strictly on locus: Rotter's social learning theory
    modified for health. *Cognitive Therapy and Research, 16*(2), 183-199.

Wallston, K. (2015). Scoring instructions for the MHLC scales. Retrieved from
    http://www.nursing.vanderbilt.edu/faculty/kwallston/scoringmhlc.htm

Wallston, K. (2005). The validity of the multidimensional health locus of control scales. *Journal
    of Health Psychology, 10*(5), 623-631.

Wallston, K. A., Stein, M. J., & Smith, C. A. (1994). Form C of the MHLC Scale: A condition
    specific measure of locus of control. *Journal of Personality Assessment, 63*(3), 534–553.

Wallston, B. S., Wallston, K. A., Kaplan, G. D., & Maides, S. A.. (1976). The

173

development and validation of the health related locus of control (HLC) scale. *Journal of Consulting and Clinical Psychology, 44*, 580-585.

Waters, N., & Holloway, S. (2009). Personal perceptions of the impact of diabetic foot disease on employment. *Diabetic Foot Journal*,*12*(3), 10p-10p 1p.

Wallston, K., Malcarne, A., Flores, V., Hansdottir, L., Smith, L., Stein, I., . . . Clements, M. (1999). Does God Determine Your Health? The God Locus of Health Control Scale. *Cognitive Therapy and Research, 23*(2), 131-142.

Wen, L., Shepherd, M., & Parchman, M. (2004). Family support, diet, and exercise among older Mexican Americans with type 2 diabetes. *The Diabetes Educator, 30*(6), 980-93.

Westman, E. C., Yancy, W. S., Jr, Mavropoulos, J. C., Marquart, M., & McDuffie, J. R. (2008). The effect of a low-carbohydrate, ketogenic diet versus a low-glycemic index diet on glycemic control in type 2 diabetes mellitus. *Nutrition & Metabolism, 5*(36), 36.

Weledji, E. P., & Fokam, P. (2014). Treatment of the diabetic foot? To amputate or not? *BMC Surgery, 14*, 83.

Whitford, D., McGee, H., & O'Sullivan, B. (2009). Reducing health risk in family members of patients with type 2 diabetes: Views of first degree relatives. *BMC Public Health, 9*, 455.

Williams, A., & Manias, E. (2014). Exploring motivation and confidence in taking prescribed medicines in coexisting diseases: a qualitative study. *Journal of Clinical Nursing, 23*(3-4), 471-481. doi:10.1111/jocn.12171

Winkley, Sallis, Kariyawasam, Leelarathna, Chalder, Edmonds, . . . Ismail. (2012). Five-year follow-up of a cohort of people with their first diabetic foot ulcer: The persistent effect of depression on mortality. *Diabetologia, 55*(2), 303-310.

Wong, C. H., Wong, W. W., Lam, C. K., Wan, Y. F., Wong, W. T., Chung, K. L., & ... Fong, D.

T. (2014). Effects of Patient Empowerment Program (PEP) on Clinical Outcomes and

Health Service Utilization in Type 2 Diabetes Mellitus in Primary Care: An

Observational Matched Cohort Study. *Plos ONE, 9*(5), 1-10.

doi:10.1371/journal.pone.0095328

World Cancer Congress. (2017). *Her Royal Highness Princess Reema Bint Bandar Al-Saud.*

Retrieved from ttp://www.worldcancercongress.org/programme/keynote-speakers/hrh-

princess-reema-bint-bandar-al-saud

World Health Organization. (2006). Health System Profile Saudi Arabia. Retrieved from

http://apps.who.int/medicinedocs/documents/s17308e/s17308e.pdf

World Health Organization. (2014). *Promoting physical activity in the Eastern Mediterranean*

Region through a life-course approach. Retrieved from

http://www.hsc.edu.kw/empan/Documents/Promoting%20Phys%20Activity%20in%20E

n.pdf

World Health Organization. (2016). *World Health Day 2016: Diabetes.* Retrieved from

http://www.who.int/campaigns/world-health-day/2016/event/en/

Wu, S., Courtney, M., Edwards, H., McDowell, J., Shortridge-Baggett, L., & Chang, P. (2007).

Self-efficacy, outcome expectations and self-care behavior in people with type 2 diabetes

in Taiwan. *Journal of Clinical Nursing, 16*(11c), 250-257.

Wu, S. V., Huang, Y., Lee, M., Wang, T., Tung, H., & Wu, M. (2013). Self-efficacy, self-care

behavior, anxiety, and depression in Taiwanese with type 2 diabetes: A cross-sectional

survey. *Nursing & Health Sciences*, *15*(2), 213-219 7p. doi:10.1111/nhs.12022

Wu, J., Song, E. K., & Moser, D K. (2015). Type D personality, self-efficacy, and medication

adherence in patients with heart failure—A mediation analysis. *Heart & Lung - The Journal of Acute and Critical Care, 44*(4), 276-281.

Wu, A. M. S., Tang, C. S. K., Kwok, T. C. Y. (2004). Physical and psychosocial factors associated with health-promoting behaviors among elderly Chinese with type-2 diabetes, *Journal of Health Psychology*, *9*(6), 731-740.

Yosef, A. R. (2008). Health beliefs, practice, and priorities for health care of Arab Muslims in the United States. *Journal of Transcultural Nursing, 19*(3), 284-291. doi: 10.1177/1043659608317450.

Zabetian, A., Keli, H. M., Echouffo-Tcheugui, J. B., Narayan, K. V., & Ali, M. K. (2013). Diabetes in the middle East and north Africa.*Diabetes Research & Clinical Practice*, *101*(2), 106-122 17p. doi:10.1016/j.diabres.2013.03.010

Zubair, M., Malik, A., &Ahmad, J. (2012). Incidence, risk factors for amputation among patients with diabetic foot ulcer in a North Indian tertiary care hospital. *Foot (Edinburgh, Scotland), 22*(1), 24-30. Doi: 10.1016/j.foot.2011.09.003

Appendix A

English Version of the General Questionnaire Instructions

The purpose of this study is to learn more about your opinion about type 2 diabetes and how you take care of yourself. There will be three sections. Each section includes some questions that we would like you to answer. **Please make sure that you provide only one answer for each question. If any of the questions make you feel uncomfortable, you do not have to respond to those questions.**

Section One:

- You will have some questions about your view on how well you are able to take care of your diabetes and how much control you have over your health.

- You will have questions about your opinion about diabetes, self-care benefits and barriers, and your family and friends support.

- You will be also asked to provide a short answer to two questions about how diabetes affects your health and its threats.

Section Two:

- You will have some questions about the daily activities that you do to manage diabetes.

Section Three:

- You will have some questions to collect general information about you.

Appendix B

Arabic Version of the General Questionnaire Instructions

تعليمات

الهدف من هذة الدراسة هو لمعرفة المزيد عن رأيك حول النوع الثاني من مرض السكري وعن عنايتك الشخصيه بالمرض. يحتوي هذا الاستيان على ثلاثة اقسام. كل قسم يحتوي على اسئله نود منك الاجابة عليها. **الرجاء التأكد من اختيار اجابة واحدة فقط لكل سؤال. في حالة شعورك بعدم الإرتياح على الإجابه على اي من الاسئله فإنك لست مجبراً على الإجابه عليها.**

القسم الأول
- يحتوي على بعض الأسئلة عن وجهة نظرك بقدرتك على التحكم بمرض السكري ومدى تحكمك بصحتك.

- يحتوي على بعض الأسئلة عن رأيك حول مرض السكري، فوائد و عوائق الرعاية الشخصيه، دعم عائلتك واصدقائك.

- سوف يطلب منك أيضا الإجابه على سؤالين عن تأثير السكري على صحتك و خطره على صحتك.

القسم الثاني
- يحتوي على بعض الأسئلة عن انشطتك اليوميه للتحكم بمرض السكري.

القسم الثالث
- يحتوي على بعض الأسئلة للحصول على معلومات عامه عنك.

Appendix C

English Version of Form C Health Locus of Control & God Locus of Health Control Scale

Section One

Instructions: Each item below is a belief statement about your diabetes, which you may agree or disagree with. Beside each statement is a scale which ranges from strongly disagree (1) to strongly agree (6). For each item we would like you to circle the number that represents the extent to which you agree or disagree with that statement. Please make sure that you answer every item and that you fill in only one circle per item.

Items	Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree
If my diabetes worsens, it is my own behavior which determines how soon I will feel better again.	1 ○	2 ○	3 ○	4 ○	5 ○	6 ○
If I see my doctor regularly, I am less likely to have problems with my diabetes.	1 ○	2 ○	3 ○	4 ○	5 ○	6 ○
If my diabetes worsens, it is up to God to determine whether I will fee l better again.	1 ○	2 ○	3 ○	4 ○	5 ○	6 ○
Whenever my diabetes worsens, I should consult a medically trained professional.	1 ○	2 ○	3 ○	4 ○	5 ○	6 ○
I am directly responsible for my diabetes getting better or worse.	1 ○	2 ○	3 ○	4 ○	5 ○	6 ○
Most things that affect my diabetes happen because of God.	1 ○	2 ○	3 ○	4 ○	5 ○	6 ○

	1	2	3	4	5	6
Whatever goes wrong with my diabetes is my own fault.	O	O	O	O	O	O
God is directly responsible for my diabetes getting better or worse	O	O	O	O	O	O
The main thing which affects my diabetes is what I myself do.	O	O	O	O	O	O
Whatever happens to my diabetes is God's will	O	O	O	O	O	O
I deserve the credit when my diabetes improves and the blame when it gets worse.	O	O	O	O	O	O
Following doctor's orders to the letter is the best way to keep my diabetes from getting any worse.	O	O	O	O	O	O
Whether or not my diabetes improve s is up to God.	O	O	O	O	O	O
If my diabetes takes a turn for the worse, it is because I have not been taking proper care of myself.	O	O	O	O	O	O
God is in control of my diabetes.	O	O	O	O	O	O

Arabic Version of Form C Health Locus of Control & God Locus of Health Control Scale

<div dir="rtl">

القسم الأول

كل عبارة أدناه هي بيان مبسط عن حالتك الصحية التي قد تتفق أو تختلف معها. بجوار كل عبارة مقياس يتراوح بين (1) لا أوافق بشدة و (6) أوافق بشدة. لكل عبارة نود منك أن تظلل الدائرة للمقياس الذي يحدد مدى توافقك او معارضتك للعبارة الموجودة. يرجى التأكد من انك اجبت على كل عبارة وتظليل دائره واحده فقط لكل عبارة

أوافق بشده	أوافق بدرجه متوسطه	أوافق بدرجه قليله	لا أوافق بدرجه قليله	لا أوافق بدرجه متوسطه	لا أوافق ابدا	العبارات	
6 ⃝	5 ⃝	4 ⃝	3 ⃝	2 ⃝	1 ⃝	اذا ساء عندي مرض السكري فـ سلوكي هو الذي سيحدد متى سأشعر بالتحسن مرة أخرى	1
6 ⃝	5 ⃝	4 ⃝	3 ⃝	2 ⃝	1 ⃝	اذا زرت طبيبي بصفه مستمره سوف تقل فرص تعرضي للمشاكل المتعلقه بمرض السكري	2
6 ⃝	5 ⃝	4 ⃝	3 ⃝	2 ⃝	1 ⃝	اذا ساء عندي مرض السكري فالامر متروك لله اذا سأشعر بالتحسن مره اخرى	3
6 ⃝	5 ⃝	4 ⃝	3 ⃝	2 ⃝	1 ⃝	كلما ساء عندي مرض السكري لابد ان استشير اشخاص مدربين طبيا	4
6 ⃝	5 ⃝	4 ⃝	3 ⃝	2 ⃝	1 ⃝	أنا المسؤول المباشر عن مرض السكري لدي وجعله أفضل أو أسوء	5
6 ⃝	5 ⃝	4 ⃝	3 ⃝	2 ⃝	1 ⃝	معظم الأشياء التي تؤثر على مرض السكري هي من الله	6
6 ⃝	5 ⃝	4 ⃝	3 ⃝	2 ⃝	1 ⃝	اي خطأ يحدث في مرض السكري فهو خطأي	7
6 ⃝	5 ⃝	4 ⃝	3 ⃝	2 ⃝	1 ⃝	الله هو المسؤول المباشر عن مرض السكري وجعله أفضل او أسوء	8
6 ⃝	5 ⃝	4 ⃝	3 ⃝	2 ⃝	1 ⃝	الشيء الرئيسي الذي يؤثر على مرض السكري عندي هو ما أفعله بنفسي	9
6 ⃝	5 ⃝	4 ⃝	3 ⃝	2 ⃝	1 ⃝	اي شئ يحدث لمرض السكري هو بمشيئة الله	10
6 ⃝	5 ⃝	4 ⃝	3 ⃝	2 ⃝	1 ⃝	انا استحق التقدير عندما يتحسن عندي مرض السكري و الملامه عندما يسوء عندي مرض السكري	11
6 ⃝	5 ⃝	4 ⃝	3 ⃝	2 ⃝	1 ⃝	اتباع ارشادات الطبيب حرفياً هي افضل طريقه للمحافظه على مرض السكري من ان يصبح اسوء	12
6 ⃝	5 ⃝	4 ⃝	3 ⃝	2 ⃝	1 ⃝	سواءً تحسن عندي مرض السكري ام لم يتحسن فهو امر راجع الى الله	13
6 ⃝	5 ⃝	4 ⃝	3 ⃝	2 ⃝	1 ⃝	اذا ساء عندي مرض السكري فهو بسبب أنني لم اعتني جيداً بنفسي	14
6 ⃝	5 ⃝	4 ⃝	3 ⃝	2 ⃝	1 ⃝	الله الذي يتحكم في مرض السكري	15

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Appendix E

English Version of Part III of the Multidimensional Diabetes Questionnaire (Self-Efficacy

Scale)

Treatment of diabetes involves several self-care activities (e.g. diet, exercise, etc.). People

sometimes find it difficult, or do not see the importance of following one or more of these self-

care activities. We would like to know how this applies to you. Read each question carefully and

circle the number that corresponds best to your situation.

1. How confident are you in your ability to follow your diet?

Not at all confident 0 10 20 30 40 50 60 70 80 90 100 **Very confident**

2. How confident are you in your ability to test your blood sugar at the recommended
   frequency?
____ Check here if measuring of blood sugar levels has not been recommended
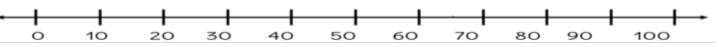
Not at all confident 0 10 20 30 40 50 60 70 80 90 100 **Very confident**

3. How confident are you in your ability to exercise regularly?
____ Check here if you have been advised not to exercise

Not at all confident 0 10 20 30 40 50 60 70 80 90 100 **Very confident**

4. How confident are you in your ability to keep your weight under control?

Not at all confident 0 10 20 30 40 50 60 70 80 90 100 **Very confident**

5. How confident are you in your ability to keep your blood sugar level under control?

Not at all confident 0 10 20 30 40 50 60 70 80 90 100 **Very confident**

6. How confident are you in your ability to resist food temptations?

Not at all confident 0 10 20 30 40 50 60 70 80 90 100 **Very confident**

7. How confident are you in your ability to follow your diabetes treatment (diet, medication,
   blood sugar testing, exercise, and doing foot care and examining your feet regularly)?

Not at all confident 0 10 20 30 40 50 60 70 80 90 100 **Very confident**

Appendix F

Arabic Version of Part III of the Multidimensional Diabetes Questionnaire (Self-Efficacy

Scale)

إن معالجة مرض السكري تشمل عدة نشاطات عناية ذاتية (مثل، اتباع الحمية الغذائية، ممارسة التمارين الرياضية، إلخ) يجد

الناس صعوبة أحياناً، أو لا يرون أهمية لإتباع أحد هذه النشاطات أو أكثر. نود أن نعرف مدى انطباق هذه الفكرة عليك. اقرأ

كل سؤال بعناية <u>وضع دائرة</u> حول الرقم الذي يتلائم بشكل أفضل مع وضعك.

1. كم أنت واثق بقدرتك على الالتزام بنظام الحمية الغذائية؟

| **واثق جداً** | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | **لست واثقاً على الإطلاق** |

2. كم أنت واثق بقدرتك على عمل فحص السكر في الدم بالقدر الموصى به؟
.... ضع اشارة هنا إذا كان عمل فحص مستوى السكر في الدم <u>لم</u> يُوص به لك

| **واثق جداً** | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | **لست واثقاً على الإطلاق** |

3. كم أنت واثق بقدرتك على ممارسة التمارين الرياضية بشكل مستمر (روتيني)؟
.... ضع اشارة هنا إذا نصحت <u>بعدم</u> القيام بتمارين رياضيه

| **واثق جداً** | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | **لست واثقاً على الإطلاق** |

4. كم أنت واثق بقدرتك على الإبقاء على وزنك تحت السيطرة؟

| **واثق جداً** | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | **لست واثقاً على الإطلاق** |

5. كم أنت واثق بقدرتك على الاحتفاظ بمستوى السكر في دمك تحت السيطرة؟

| **واثق جداً** | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | **لست واثقاً على الإطلاق** |

6. كم أنت واثق بقدرتك على مقاومة إغراءات الطعام؟

| **واثق جداً** | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | **لست واثقاً على الإطلاق** |

7. كم أنت واثق بقدرتك على إتباع علاجك للسكري (إتباع الحمية الغذائية، الأدوية،
فحص مستوى سكر الدم، النشاطات الرياضية، العناية بالقدمين وفحصهما باستمرار)؟

| **واثق جداً** | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | **لست واثقاً على الإطلاق** |

Appendix G

English Version of the Health Belief Model Diabetes Scale

For the following items, please choose a response that represent how much you agree with them:

Items	Strongly Disagree	Slightly Disagree	Slightly Agree	Strongly Agree
Perceived Severity				
Diabetes can be a serious disease if not controlled	1 ◯	2 ◯	3 ◯	4 ◯
Diabetes can have negative effects on future health	1 ◯	2 ◯	3 ◯	4 ◯
Perceived Susceptibility				
My diabetes would be worse if I did nothing about it	1 ◯	2 ◯	3 ◯	4 ◯
Healthy diet will prevent diabetes complications (such as foot problem, amputation, eye problem, kidney problem, heart problem).	1 ◯	2 ◯	3 ◯	4 ◯
Exercising will prevent diabetes complications (such as foot problem, amputation, eye problem, kidney problem, heart problem).	1 ◯	2 ◯	3 ◯	4 ◯
Taking medications will prevent diabetes complications (such as foot problem, amputation, eye problem, kidney problem, heart problem).	1 ◯	2 ◯	3 ◯	4 ◯
Perceived Benefits				
I believe my diet will help control my diabetes	1 ◯	2 ◯	3 ◯	4 ◯
I believe exercise will help control my diabetes	1 ◯	2 ◯	3 ◯	4 ◯
I believe taking medications will help control my diabetes	1 ◯	2 ◯	3 ◯	4 ◯
I believe routine medical visits can help me prevent diabetes complications	1 ◯	2 ◯	3 ◯	4 ◯

Statements	Strongly Disagree	Moderately Disagree	Mildly Disagree	Neither Agree Nor Disagree	Mildly Agree	Moderately Agree	Strongly Agree
Perceived Barriers							
Controlling my diabetes will imposes restrictions on my whole life-style	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	6 ◯	7 ◯
Controlling my diabetes will interferes with my work (housework or paid work)	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	6 ◯	7 ◯
It is just not possible to control my diabetes properly and live in a way that is acceptable to me	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	6 ◯	7 ◯
Controlling my diabetes well interferes with my leisure activities	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	6 ◯	7 ◯
Sticking to my diet makes eating out difficult	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	6 ◯	7 ◯
Controlling my diabetes well when I am away from home often causes me embarrassment	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	6 ◯	7 ◯

Short Answer Question for the Concept of Perceived Threats

Please answer the below questions:

- How has diabetes affected your health?

- How can diabetes harm your health?

Appendix H

Arabic Version of the Health Belief Model Diabetes Scale

للعبارات التاليه, الرجاء اختيار الاجابه التي تتوافق معك:

أوافق بشده	أوافق بدرجة قليله	لا أوافق بدرجة قليلة	لا أوافق ابدا	العبارات
				أ: تقدير صعوبة المرض ومضاعفاته
4 ○	3 ○	2 ○	1 ○	قد يكون السكري مرض خطير للصحة اذا لم يعالج كما يجب
4 ○	3 ○	2 ○	1 ○	يمكن ان يؤثر السكري بشكل سيئ على الصحة في المستقبل
				ب: تقدير امكانية الإصابه بمضاعفات مرض السكري
4 ○	3 ○	2 ○	1 ○	مرض السكري عندي يمكن ان يسوء إذا لم اعالجه
4 ○	3 ○	2 ○	1 ○	الحفاظ دائماً على حميه بدون سكر سيمنع تطور مضاعفات السكري (مثل مشاكل بالقدم, بتر الاطراف, مشاكل بالعين, مشاكل بالكلى, مشاكل بالقلب)
4 ○	3 ○	2 ○	1 ○	الحفاظ دائماً على نشاط بدني منظم سيمنع تطور مضاعفات السكري (مثل مشاكل بالقدم, بتر الاطراف, مشاكل بالعين, مشاكل بالكلى, مشاكل بالقلب)
4 ○	3 ○	2 ○	1 ○	الحرص دائماً على تناول ألأدوية سيمنع تطور مضاعفات السكري (مثل مشاكل بالقدم, بتر الاطراف, مشاكل بالعين, مشاكل بالكلى, مشاكل بالقلب)
				ت: تقدير الفوائد الناتجة عن العناية الذاتية بمرض السكري
4 ○	3 ○	2 ○	1 ○	اعتقد ان حفاظي على حمية بدون سكر سيساعد على توازن السكر عندي
4 ○	3 ○	2 ○	1 ○	اعتقد ان ممارستي للرياضه سيساعد على توازن السكر عندي
4 ○	3 ○	2 ○	1 ○	اعتقد انه اذا تناولت ادوية السكري كما يجب سيساعد هذا على توازن السكر عندي
4 ○	3 ○	2 ○	1 ○	اعتقد ان القيام بمراجعة طبية في العيادة يساعدني على ان اكتشف ظهور مضاعفات المرض بشكل مبكر ويحسن احتمالات الشفاء لدي

العبارات	لا أوافق ابدا	لا أوافق بدرجة متوسطة	لا أوافق بدرجة قليلة	محايد	أوافق بدرجة قليلة	أوافق بدرجة متوسطه	أوافق بشده
ث: تقدير العوامل المعيقه للعناية الذاتية بمرض السكري							
السيطرة على مرض السكري لدي سوف يفرض قيوداً على أسلوب حياتي	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	6 ◯	7 ◯
السيطرة على مرض السكري لدي سوف يؤثر على عملي (الأعمال المنزلية أو العمل براتب)	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	6 ◯	7 ◯
من المستحيل السيطرة بشكل جيد على مرض السكري لدي والعيش بطريقة مرضيه لي	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	6 ◯	7 ◯
السيطرة الجيده على مرض السكري لدي سوف يتعارض مع أنشطتي الترفيهية	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	6 ◯	7 ◯
الإلتزام بحميتي الغذائيه يجعل تناول الطعام في الخارج صعب	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	6 ◯	7 ◯
السيطرة الجيدة على مرض السكري لدي عندما أكون خارج المنزل ,عادة ما يسبب لي الإحراج	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	6 ◯	7 ◯

الرجاء الإجابه على الاسئله التالية:

1) كيف يؤثر مرض السكري على صحتك؟

2) كيف يمكن لمرض السكري أن يضر صحتك؟

Appendix I

English Version of Support Received Scale

Q1: My family or friends help and support me a lot to: (Please circle one answer for each item)

Items		Strongly Disagree	Moderately Disagree	Natural	Moderately Agree	Strongly Agree	Does not apply
a	Following my meal plan	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	N/A ◯
b	Taking my medication	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	N/A ◯
c	Taking care of my feet	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	N/A ◯
d	Getting enough physical activity	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	N/A ◯
e	Testing my sugar	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	N/A ◯
f	Handling my feelings about diabetes	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	N/A ◯

Arabic Version of Support Received Scale

يقوم كل من عائلتي واصدقائي بمساعدتي كثيراً على (الرجاء تظليل دائره واحده لكل سؤال):

العبارات		لا أوافق ابدا	لا أوافق بدرجة متوسطه	محايد	أوافق بدرجة متوسطه	أوافق بشدة	لا ينطبق علي
ا	اتباع خطة الطعام	1	2	3	4	5	
		◯	◯	◯	◯	◯	◯
ب	تناول الأدوية	1	2	3	4	5	
		◯	◯	◯	◯	◯	◯
ت	العناية بالقدمين	1	2	3	4	5	
		◯	◯	◯	◯	◯	◯
ث	القيام بالتمارين الرياضية	1	2	3	4	5	
		◯	◯	◯	◯	◯	◯
ج	القيام بفحص السكر	1	2	3	4		
		◯	◯	◯	◯	◯	◯
خ	الإهتمام بمشاعري تجاه مرض السكري	1	2	3	4	5	
		◯	◯	◯	◯	◯	◯

English Version of the Revised and Expanded Summary of Self-Care Activity Scale

Section Two

The questions below ask you about your diabetes self-care activities during the past 7 days. If you were sick during the past 7 days, please think back to the last 7 days that you were not sick.

Please fill in the circle that indicate the number of days you did the activity.

Diet	Number of Days							
1. How many of the last SEVEN DAYS have you followed a healthful eating plan?	0 ○	1 ○	2 ○	3 ○	4 ○	5 ○	6 ○	7 ○
2. On average, over the past month, how many DAYS PER WEEK have you followed your eating plan?	0 ○	1 ○	2 ○	3 ○	4 ○	5 ○	6 ○	7 ○
Exercise								
1. On how many of the last SEVEN DAYS did you participate in at least 30 minutes of physical activity? (Total minutes of continues activity, including walking).	0 ○	1 ○	2 ○	3 ○	4 ○	5 ○	6 ○	7 ○
2. On how many of the last SEVEN DAYS did you participate in a specific exercise session (such as swimming, walking, biking) other than what you do around the house or as part of your work?	0 ○	1 ○	2 ○	3 ○	4 ○	5 ○	6 ○	7 ○
Blood Sugar Testing								
1. On how many of the last SEVEN DAYS did you test your blood sugar?	0 ○	1 ○	2 ○	3 ○	4 ○	5 ○	6 ○	7 ○
2. On how many of the last SEVEN DAYS did you test your blood sugar the number of times recommended by your health care provider?	0 ○	1 ○	2 ○	3 ○	4 ○	5 ○	6 ○	7 ○
Foot Care								
1. On how many of the last SEVEN DAYS did you check your feet?	0 ○	1 ○	2 ○	3 ○	4 ○	5 ○	6 ○	7 ○
2. On how many of the last SEVEN DAYS did you inspect the inside of your shoes?	0 ○	1 ○	2 ○	3 ○	4 ○	5 ○	6 ○	7 ○
3. On how many of the last SEVEN DAYS did you wash your feet?	0 ○	1 ○	2 ○	3 ○	4 ○	5 ○	6 ○	7 ○
4. On how many of the last SEVEN DAYS did you soak your feet?	0 ○	1 ○	2 ○	3 ○	4 ○	5 ○	6 ○	7 ○
5. On how many of the last SEVEN DAYS did you dry between your toes after washing or after wudu?	0 ○	1 ○	2 ○	3 ○	4 ○	5 ○	6 ○	7 ○
Medications								
1. On how many of the last SEVEN DAYS did you take your recommended diabetes medication?	0 ○	1 ○	2 ○	3 ○	4 ○	5 ○	6 ○	7 ○

Arabic Version of the Revised and Expanded Summary of Self-Care Activity Scale

القسم الثاني

الاسئله الوارده ادناه هي عن الانشطه المتعلقه بعنايتك الشخصيه لمرض السكري خلال السبعه الايام الماضيه. اذا كنت مريضا

خلال السبعه الايام الماضيه, يرجى العوده بالذاكره الى اخر سبعه ايام التي لم تكن فيها مريضا.

الرجاء تظليل الدائره للأجابه الصحيحه.

الغذاء								
			الأيام					
7	6	5	4	3	2	1	0	
○	○	○	○	○	○	○	○	1 خلال السبعة أيام الماضيه, كم عدد الأيام التي اتبعت فيها نظام غذائي صحي؟
○	○	○	○	○	○	○	○	2 مامدى إتباعك لنظامك الغذائي خلال الشهر الماضي (كم معدل الأيام خلال الأسبوع)؟
ممارسة الرياضه								
○	○	○	○	○	○	○	○	1 خلال السبعة أيام الماضيه, كم عدد الأيام التي مارست فيها انشطه بدنيه بصفه عامه لمدة 30 دقيقه على الاقل (مجموع الدقائق الكليه للأنشطه بما فيها المشي)؟
○	○	○	○	○	○	○	○	2 خلال السبعة أيام الماضيه, كم عدد الأيام التي في جلسة تمرين رياضي محدد (السباحه , المشي ,الخ) عدا تلك التي تقوم بها في محيط منزلك او التي تكون جزءاً من عملك؟
اختبار نسبه السكر بالدم								
○	○	○	○	○	○	○	○	1 خلال السبعة أيام الماضيه, كم عدد الأيام التي فحصت فيها سكر الدم؟
○	○	○	○	○	○	○	○	2 خلال السبعة أيام الماضيه, كم عدد الأيام التي فحصت فيها سكر الدم حسب العدد المذكور في تعليمات طبيبك؟
العناية بالقدم								
○	○	○	○	○	○	○	○	1 خلال السبعة أيام الماضيه, كم عدد الأيام التي فحصت فيها قدميك؟
○	○	○	○	○	○	○	○	2 خلال السبعة أيام الماضيه, كم عدد الأيام التي فحصت فيها حذائك من الداخل (للتأكد من عدم وجود اشياء تسبب الجروح مثل قطع في الحذاء او نتوءات)؟
○	○	○	○	○	○	○	○	3 خلال السبعة أيام الماضيه, كم عدد الأيام التي غسلت فيها قدميك؟
○	○	○	○	○	○	○	○	4 خلال السبعة أيام الماضيه, كم عدد الأيام التي نقعت فيها قدميك بالماء؟
○	○	○	○	○	○	○	○	5 خلال السبعة أيام الماضيه, كم عدد الأيام التي جففت فيها بين اصابع قدميك بعد الغسيل او الوضوء؟
الدواء								
○	○	○	○	○	○	○	○	1 خلال السبعة أيام الماضيه, كم عدد الأيام التي تناولت فيها علاج السكر؟

Appendix M

English Version of the Background Information

Section Three

The purpose of this section is to collect information about you. Please fill out the circle that

corresponds to your answer.

1) What is your age (in years) ……………………………..

2) Please select your gender
Male ◯ Female ◯

3) What is your Marital Status?
Single ◯ Married ◯ Divorced/Widow ◯

4) Please select your highest education level
No School   Primary School   Secondary school   High school   College

◯   ◯   ◯   ◯   ◯

5) What is the number of years since you were diagnosed with diabetes ……………….

6) Have you had any foot problems due to your being diabetic?
Yes ◯ No ◯

7) Do you have any other health problems besides diabetes?
Yes ◯ No ◯

8) What is the result of your Glycated hemoglobin (HbA1c) as your doctor told you?
…………………….

Appendix N

Arabic Version of the Background Information

القسم الثالث

الهدف من هذا القسم هو للحصول على معلومات عامة عنك. الرجاء تظليل الدائره التي تتوافق مع اجابتك

---

1 **ماهو عمرك (بالسنوات)؟** ....

2 **الرجاء اختيار جنسك؟**

انثى   ذكر

◯   ◯

3 **ماهي حالتك الاجتماعية؟**

متزوج   أرمل او مطلق   اعزب

◯   ◯   ◯

4 **الرجاء اختيار اعلى مستوى تعليمي حصلت عليه؟**

جامعي   ثانوي   متوسط   ابتدائي   غير متعلم

◯   ◯   ◯   ◯   ◯

5 **كم عدد السنوات منذ تشخيصك كمريض سكري؟** ....

6 **هل تعاني من مشاكل بالقدمين بسبب كونك مصاب بمرض السكري؟**

لا   نعم

◯   ◯

7 **هل تعاني من مشاكل صحيه اخرى بالإضافه لمرض السكري؟**

لا   نعم

◯   ◯

8 **ماهي نتيجة اختبار سكر الهيموجلوبين (HbA1c) حسب ما ابلغك به طبيبك؟** ....

Appendix O

English Version of the Permission to Contact Form

Do You Have Type 2 Diabetes?

Or

Do You Suffer From Foot Problems Because of Diabetes?

If your answer is **Yes**

We would like to invite you to participate in a study that examine person's Views on diabetes care and treatments.

Participation will involve answering questions about your personal views about your diabetes treatment and caring for yourself.

If you are interested, please sign below, giving Moudi Albargawi, MS, RN the Study Coordinator, permission to contact you directly.

Thank you for considering this invitation!

Name: _____ Phone #_____

Email: _____

Appendix P

Arabic Version of Permission to Contact Form

<div dir="rtl">

هل لديك النوع الثاني من مرض السكري؟

أو

هل تعاني من مشاكل في القدم بسبب مرض السكري؟

اذا كان جوابك نعم

نود أن ندعوك للمشاركة في دراسة عن رأي الأشخاص حول العناية بمرض السكري وعلاجه

سوف تشمل المشاركة الإجابة على أسئلة عن رأيك حول علاج مرض السكري لديك و طريقة عنايتك لنفسك

إذا كنت مهتما، الرجاء التوقيع أدناه، لإعطاء منسقة الدراسة الإذن للاتصال بك مباشرة موضي البرقاوي MSN،RN

شكرا لأخذك هذه الدعوه بعين الإعتبار

الإسم _____ رقم الجوال او التلفون _____

البريد الإلكتروني _____

</div>

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Appendix Q

Consent Form

Study Title: Influence of Health Belief on Diabetes Self-Care in Saudi Adults	
Principal Investigator: Moudi Albargawi, Dr. Abdulaziz Al Gannass, Dr. Julia Snethen, Dr. Aaron Buseh, and Dr. Anthony Hains	**Study No.:** SP14/134

You are requested to participate in research that will be supervised by (Dr. Abdulaziz Al Gannass) in (King Abdulaziz Medical City, National Guard-Riyadh). The aim of this study is to learn more about the views of persons with type 2 diabetes living in Saudi Arabia and how they take care of themselves. This study will also examine persons with type 2 diabetes view on how well they are able to take care of their diabetes and how much control persons have over their health. Your participation is voluntary and you have the right not to accept filling this survey without giving any reason and this will not affect your current or future medical care in MNGHA You do not have to sign this information sheet only you can choose to agree/disagree; your acceptance to complete the survey will be interpreted as your informed consent to participate. Your responses will be kept anonymous. However, whenever one works with email/the internet there is always the risk of compromising privacy, confidentiality, and/or anonymity. Despite this possibility, the risks to your physical, emotional, social, professional, or financial well-being are considered to be 'less than minimal'. If you have any questions about the research, please contact (Dr. Abdulaziz Al Gannass) (phone number : 8011111 Ext. 15440 or 15489, email: gannassa@ngha.med.sa) or contact Moudi Albargawi through phone number: (00966-507-617876). In case you have enquiries related to your rights as a research subject you can contact the Institutional Review Board on Tel. 8011111 Ext. 14572.	انت مدعو للإنضمام طواعية لدراسة بحثية سوف يشرف عليها (الدكتور عبدالعزيز القناص) في (مدينه الملك عبدالعزيز الطبية بالحرس الوطني بالرياض). الهدف من هذه الدراسة هو لمعرفة المزيد عن آراء الأشخاص المصابين بالنوع الثاني من مرض السكري الذين يعيشون في المملكة العربية السعودية وكيف يعتنون بأنفسهم. وهذه الدراسة أيضاً تهدف لدراسه آراء الأشخاص المصابين بالنوع الثاني من مرض السكري عن مدى قدرتهم على الإعتناء بمرض السكري لديهم ومدى تحكمهم بصحتهم. ان مشاركتك في هذه الدراسة طوعية و لك الحق التام في عدم قبول تعبئه الاستمارة او الانسحاب في اي وقت تشاء بدون ابداء الاسباب و لن يؤثر ذلك على العناية الطبية المقدمة لك حاليا او في المستقبل في الشؤون الصحية بوزارة الحرس الوطني. لا يجب عليك التوقيع على ورقة المعلومات هذه، فقط عليك الاختيار موافق/غير موافق فمجرد قبولك تعبئة هذا الاستبيان يعتبر بمثابة اقرارك بالموافقة على المشاركه في هذا البحث. ستبقى الردود على الاسئلة سرية. ومع ذلك، فأن العمل عن طريق البريد الالكتروني و الانترنت يبقى هناك احتمال لاختراق خصوصية البيانات و سريه المعلومات و لكن و بالرغم من هذه الاحتمالية تبقى الاخطار البدنية و العاطفية و الاجتماعية و المهنية و المالية المترتبة عليك ضمن الحد الادنى من الخطورة. إذا كان لديك أي أسئلة حول هذا البحث، يرجى الاتصال (الدكتور عبدالعزيز القناص) (رقم الهاتف: 8011111 تحويلة: 15440 او 15489 , البريد الإلكتروني : gannassa@ngha.med.sa) او الاتصال بموضي البرقاوي على الرقم (00966-507-617876) في حال كان لديك الاستفسارات المتعلقة حقوقك كموضوع بحث يمكنك الاتصال مجلس المراجعة المؤسسية على هاتف. 8011111 تحويلة. 14572.

☐ Agree to participate
☐ Disagree to participate

☐ موافق على المشاركة
☐ غير موافق على المشاركة

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Appendix R

Hierarchical Multiple Regression Analysis

- To test relationship between significant independent variables and the dependent variable level of adherence to diabetes self-care activities
- Bock 2, 3, 4, 5, and 6 can explain how variables can influence other variables when they were added into the model.

Blocks	Variables	Rational
Block One	Significant demographic variables	To control for their effects.
Block Two	Perceived family and friends support	Family and friends usually influence the person's life and activity.
Block Three	Perceived threats	Findings in the literature showed that people with DMT2 perception of threats influenced their health behaviors. Additionally, a relationship was found between family and friends support and people with DMT2 perception of threats.
Block Four	Self-efficacy	Self-efficacy is a belief unique for the individual, and was found to influence people with DMT2 health behavior. Additionally, findings in the literature showed that there was an association between self-efficacy and people with DMT2 perception of threats.
Block Five	Internal health locus of control God health locus of control Doctor health locus of control	Health locus of control is a belief unique for the individual, and was found to influence people with DMT2 health behavior. Additionally, a significant interaction was found between self-efficacy and health locus of control.
Block Six	Perceived barriers Perceived benefit	These variables are additional factors that can influence the person's activity. Most of these variables can be changed by education.

CURRICULUM VITAE

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Education

- Doctoral of Philosophy in Nursing, College of Nursing, University of Wisconsin Milwaukee, 2017.

- Master of Science in Nursing, Kramer School of Nursing, Oklahoma City University, 2012.

- Bachelor in Nursing, King Saud bin Abdul-Aziz University for Health Sciences, Riyadh, Saudi Arabia, 2008.

Dissertation Title: Influence of Health Beliefs on Diabetes Self-Care in Saudi Adults

Publications:

- **Albargawi, M.,** Snethen, J., Al Gannass, A., Kelber, S. (2016). Perception of Persons with Diabetes Mellitus Type 2 in Saudi Arabia. *International Journal of Nursing Sciences, 3*(1), 39-44. doi:10.1016/j.ijnss.2016.02.007

- **Albargawi, M.,** Snethen, J., Al Gannass, A., Kelber, S. (under review). *Relationship between Person's Beliefs and Diabetes Self-Care Activities.* Manuscript was submitted to the Journal of Vascular Nursing for publication.

- **Albargawi, M**., Snethen, J., Al Gannass, A., & Kelber, S. (2017). Influence of Belief System on Adherence to Diabetes Self-Care Management: Pilot study. *Virginia Henderson Repository*. Retrieved from http://www.nursinglibrary.org/vhl/handle/10755/621372

- **Albargawi, M**., Snethen, J. (PI), Sakunsuntiporn, W., Treisman, P., Andargeery, S., &

  Kelber, S. (2017). Thai Fathers Perception of their Family Health and Wellness

  Needs. *Virginia Henderson Repository*.

- **Albargawi, M.,** Treisman, P., Snethen, J. (PI), Treisman, R., Buseh, A., & Kelber, S. (2016).

  Childhood Overweight Bias: Perceptions of Student Nurses within the Nursing

  Major. *Virginia Henderson Repository*. Retrieved from

  http://www.nursinglibrary.org/vhl/handle/10755/621371

- **Albargawi, M**., Snethen, J. (PI), Alshutwi, S., Yerges, A., Sakunsuntiporn, W., Seal, N.,

  &, Kelber, S. (2015). Global Perspectives of Childhood Obesity: Thai Nurses'

  Knowledge and Attitudes. *Virginia Henderson Repository*. Retrieved from

  http://www.nursinglibrary.org/vhl/handle/10755/621370