

DIABETES KNOWLEDGE, SELF-EFFICACY, SOCIAL SUPPORT, AND DIABETES

SELF-MANAGEMENT AFFECTING TYPE II

DIABETES OUTCOMES IN QATARIS

by

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**Diabetes Knowledge, Self-Efficacy, Social Support, and Diabetes
Self-Management Affecting Type II Diabetes Outcomes in Qataris**

Abstract

by

FATEMAH POULADI

Background: Type II diabetes mellitus (DM) is increasing worldwide, leading to greater health expenses, and its complications were responsible for 4.6 million deaths in 2011 (International Diabetes Federation [IDF], 2011). This study investigates how diabetes knowledge, self-efficacy, social support, and self-management relate to diabetes control. Self-efficacy and social support were examined, respectively, as a mediator and a moderator. The hypothesis is that there is a directional relationship between the concepts of diabetes knowledge, self-efficacy, social support, self-management, and the outcome, glycemic control.

Method: A convenience sample of 259 Qataris with type II diabetes mellitus were recruited from Hamad Medical Corporation's outpatient clinics and Home Healthcare Services (HHCS) in Qatar.

Using a cross-sectional correlational design, correlation/regression coefficient tests were used to examine the relationships among these variables and their effect on the dependent variable, glycemic control. Participants responded to a set of questionnaires independently, via telephone, or in-person interviews. The following instruments were used: the Diabetes Knowledge Test (DKT), Self-Efficacy for Diabetes (SED) scale,

Social Support by Medical Outcomes Study (MOS), the Self-Management Profile for Type 2 Diabetes (SMP-T2D), and the patients' glycemic control was measured by glycosylated haemoglobin (HbA1c). The collected data were entered into a computer database and patient confidentiality was strictly maintained. Pearson correlation coefficients, multiple, and hierarchical multiple regression were used to analyze the relationships among the variable; in addition, the mediating effect of self-efficacy, and the moderating effect of social support were tested.

Results: The study sample's age averaged 50.7 years (SD=13.0). The duration of diabetes averaged 9.30 years (SD=8.1); the average blood glucose was 176.8 mg/dl (SD= 77.8), and the average HbA1c was 8.6% (SD= 2.2). There was no relationship between diabetes knowledge, self-efficacy, social support, self-management and glycemic control for adult Qataris with type 2 diabetes. Furthermore, self-efficacy did not mediate the relationship between diabetes knowledge and self-management, nor did social support moderate the relationship between self-management and HbA1c.

Conclusion: No relationships were found in this sample of Qatari older adults with type 2 diabetes. Future research is needed with larger samples to examine how these and other cultural factors explain glycemic control in this population.

Key words: diabetes, diabetes knowledge, self-efficacy, social support, self-management, glycemic control

Chapter I

Introduction

Chapter one provides an overview of the background and significance of the problem, and the purpose of the study. The conceptual framework guiding the study and its related variables are explained. The theoretical and operational definitions for the study are provided and research questions presented. Finally, the significance of the study is discussed.

The prevalence of type II diabetes is increasing worldwide. Type II diabetes is a chronic disease associated with significant complications (International Diabetes Federation [IDF], 2011; National Diabetes Fact Sheet [NDFS], 2011). In 2011, diabetes mellitus affected 366 million people worldwide, and it is estimated that this number will increase over the years, reaching 552 million by the year 2030 (IDF, 2011). In 2011, 4.6 million deaths were caused by diabetes and its complications. Furthermore, the IDF stated that diabetes mellitus was responsible for at least \$465 billion dollars in medical costs. Koopman (2005) points out that early onset diabetes mellitus has become a global phenomenon that affects an individual's health at an early stage of life. Along these lines the population of Qatar has also been affected with an increase in the prevalence of diabetes. However, little is known about self-management behaviors among Qatari adults with type II diabetes.

Research studies indicate that diabetes is one of the most prevalent contributors to increasing health expenses and death. In addition, diabetic patients are often responsible for much of their own self-management, so they must be able to understand the basic process of the disease and be relied on to monitor their condition and practice

appropriate diabetes management. This kind of self-management involves a number of psychosocial factors, such as knowledge, confidence, and social support. Consequently, the more individuals understand about the disease and the greater their personal and support resources are, the more successfully they should be able to manage their disease and reduce potential complications.

Purpose

The purpose of this study is to examine the relationships between and among the factors of diabetes knowledge, self-efficacy, social support, and diabetes self-management and how they affect diabetes management and outcomes among adult Qatari patients with type II diabetes. The outcome of concern in this study is glycemic control, and it was measured with HbA1c. Furthermore, self-efficacy was tested for any mediating effects between diabetes knowledge and HbA1c/glycemic control. Social support was tested for any moderating effect on the relationship between self-management and glycemic control. To achieve these aims, the participants were assessed for their level of diabetes knowledge, self-efficacy, diabetes self-management, and social support.

Background

Despite the NDFS, IDF, and the World Health Organization (WHO) providing statistics and results from their research studies, there is little data about the diabetic population in Qatar. Nam (2011) stated that culture and language abilities impact individual well-being beliefs, thereby influencing diabetes self-management. However, researchers do not know if Qatar's culture and Arabic language has an impact on diabetes

self-management, specifically on glycemic control, and the factors that influence glycemic control.

According to Whiting, Guariguata, Weil, and Shaw (2011), Qatar was one of the top ten countries in terms of diabetes prevalence in 2011, and it is predicted to remain in the top ten through 2030. The World Health Organization's Eastern Mediterranean Region statistics (2012) estimate that six of the 10 countries with the highest prevalence of diabetes in the world are from the region: Bahrain, Kuwait, Lebanon, Oman, Saudi Arabia and the United Arab Emirates. Shaw, Sicree and Zimmet (2010) pointed out that Saudi Arabia is one of the top ten countries in terms of diabetes prevalence, and it has the highest national prevalence in the Middle East. However, many Persian Gulf states have populations which are homogeneous to that of Saudi Arabia, and so it follows that other Eastern Mediterranean nations would also have a higher-than-average prevalence of diabetes mellitus. The state of Qatar shares a border with Bahrain in the west, Saudi Arabia in the south, and the United Arab Emirates in the east, which means these countries, have similar cultures and lifestyles and therefore they also share the possibility of having a higher prevalence for diabetes. In Qatar, in 2011, 14.1 % of the population had diabetes, and according to the IDF and Whiting et al. (2011), this figure will increase to 21.4% by the year 2030. According to the Qatar Home Healthcare services in the Hamad Medical Corporation, nearly 50% of their patients are diabetic. Although diabetes is a global issue, local factors and individual characteristics affect the management of the disease, and as diabetes becomes more prevalent within the Qatari population, this prompts researchers to investigate and study the issue in order to find solutions to better deal with this growing problem.

Conceptual framework

The conceptual framework of this study is based on Bandura's theory of self-efficacy. Self-efficacy as a theory was developed from Bandura's social learning theory (1977). Self-efficacy is an individual's belief in his or her ability to succeed and make a change in a particular situation. Self-efficacy theory or social cognitive theory assumes the existence of a process of continuous interaction among an individual's personal, behavioral, and environmental factors (Bandura, 1977).

Bandura and Walters (1963), in *Social Learning and Personality Development*, extended their research on social learning theory to include observational learning and vicarious reinforcement. Later, in 1977, Bandura published "Self-Efficacy: Toward a Unifying Theory of Behaviour Change," identifying self-efficacy as a missing factor from his previous theory. According to Bandura (1977), the performance of accomplishments affecting self-efficacy knowledge is based on "personal mastery experiences." Bandura's assumption was that a person's behavior could be changed by adjusting an individual's level of self-efficacy. Initially, Bandura and his colleagues, Adams and Beyer (1977), studied thirty-three participants with snake phobias to test the assumption. The research proved that greater self-efficacy was associated with successful coping with an animal phobia and led to the reduction of fear in other situations. Therefore, Bandura's study concerning snake phobias led him to the development of the self-efficacy theory. Bandura (1977, 1986, & 1995) introduced four principles that were needed for an individual to develop self-efficacy; performance accomplishments, vicarious experience, verbal persuasion, and physiological cues. Therefore, these four informational processes are needed for a person to have the

confidence and ability to perform certain behaviours, and they impact the relationship between an individual's personal, behavioral, and environmental influences (Bandura, 1977, 1986, 1995). First, the individual experiencing a new situation (personal) must obtain relevant information from experts. Next, the individual must respond to the situation by gaining experience from practice and then from a successful role model (behavioral). Lastly, the individual must have support from family, community, and health care providers (environmental) (Heale & Griffin, 2009; Liu, 2012; Robb, 2012; Zulkosky, 2009). The theory explains human behavior in a three-dimensional relationship or interaction among personal, behavioral, and environmental factors (McAlister, 2008).

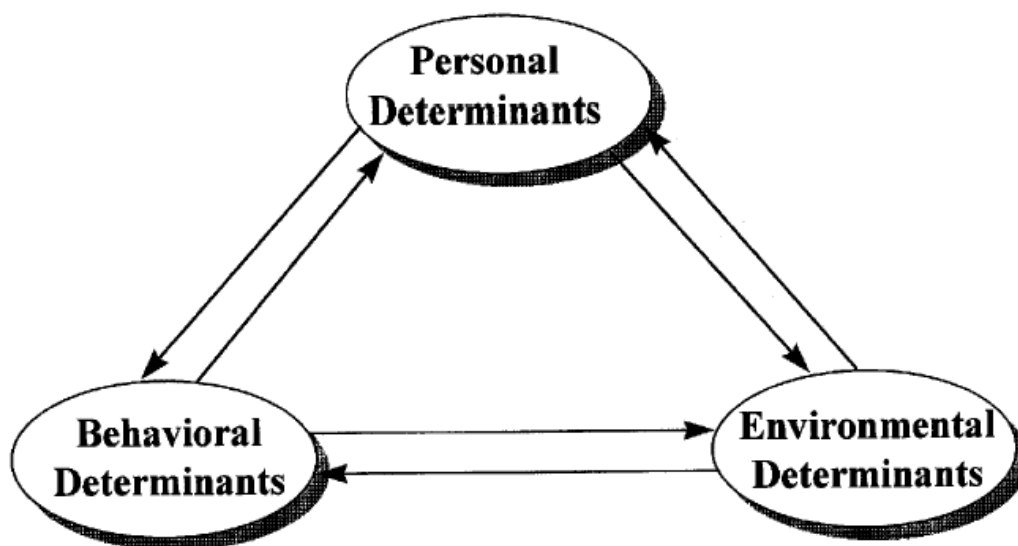


Figure 1: Bandura's Original Model

Use of Self-efficacy in Research

A review of the literature indicates that the concept of self-efficacy has been used widely by multidisciplinary health care professions/disciplines, including nursing, social work, psychology, and nutrition. It has been used in a wide range of different populations, which include adolescents, adults, and the elderly (Cavanaugh et al., 2008; Dewalt et al., 2007; Sarkar et al., 2006; Wallace et al., 2009). In the nursing discipline, it has been used for enhancing education, health promotion, and health behavior choices, as well as patient behavior changes, and it has been widely used for managing chronic diseases such as diabetes (King et al., 2010; Robertson et al., 2013; Shi, Ostwald & Wang, 2010; Wangberg et al., 2008). Researchers have explored the relationship between self-efficacy and desired outcomes such as a decrease in blood glucose to a normal range, and general diabetes control and self-management (Karademas et al., 2006; Kim & McEwen, 2008; Osborn et al., 2010; Rak et al., 2013; Wangberg et al., 2008; Weaver et al., 2014; Zulman et al., 2012).

A person who is involved in his/her own disease management has a better chance of learning about the disease process, is more likely to maintain satisfactory glycemic control and adhere to self-management skills and actions that can delay complications (Sausa, 2003). The majority of researchers and clinicians (Nam, Chesla, Stotts, Lisa, & Janson, 2011) believe that diabetes is a self-care management disease: a diabetic person who is “reliable,” “accountable,” and sufficiently responsible will carry out better diabetes care (Sausa & Zauszniewski, 2005). Therefore, these studies imply that self-efficacy is directly related to self-management among patients with type II diabetes.

A number of psychosocial factors have been associated with diabetes self-care management. For example, an individual's level of diabetes knowledge, diabetes self-efficacy, and social support are concepts that would assist them in responding to and managing their diabetes, thereby leading to the management of glycemic control (Nam, 2011).

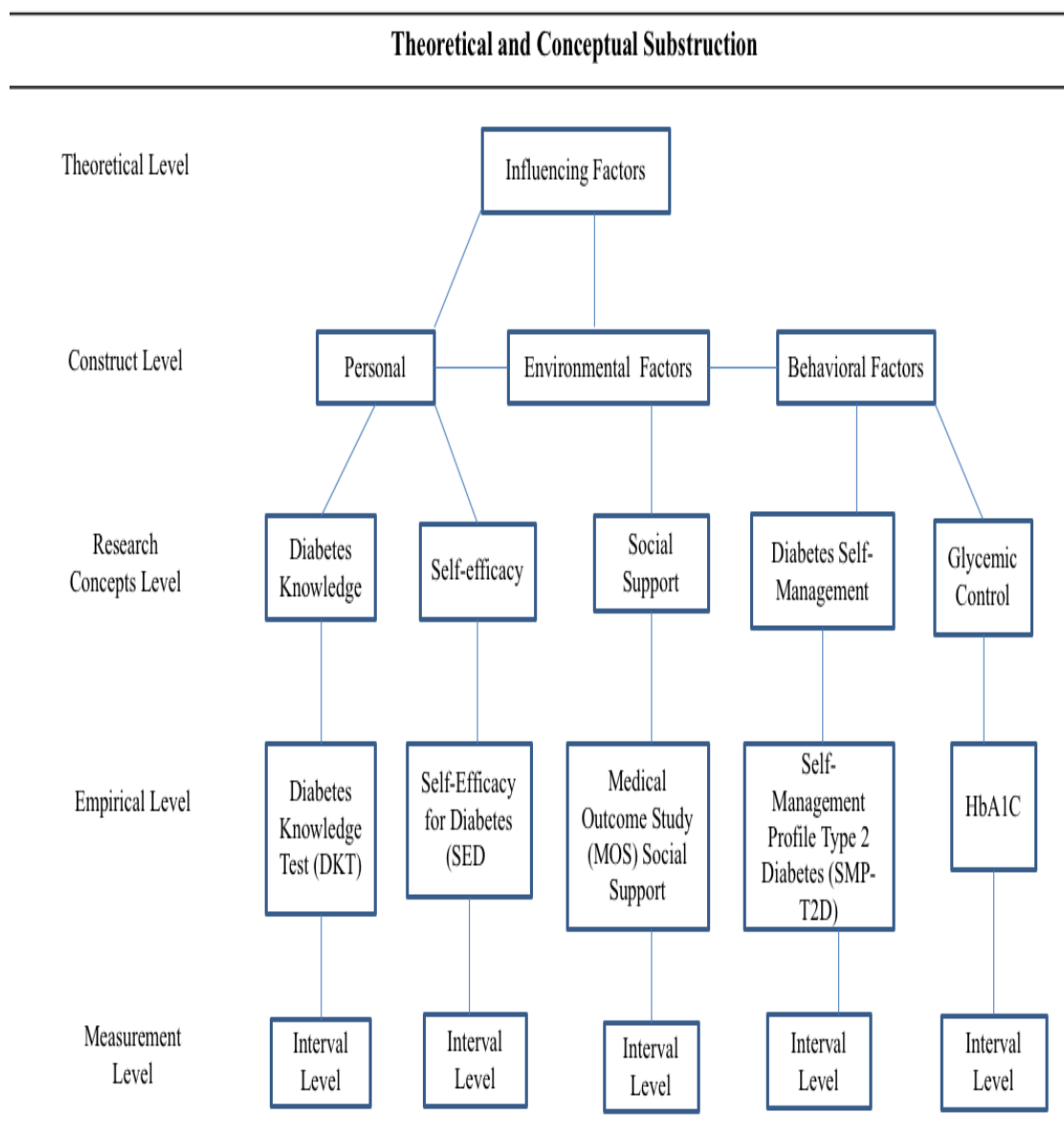
The concept of self-efficacy has been extensively used in nursing research. In a study of diabetes self-care management, self-efficacy was revealed as a person's confidence and ability in terms of personal and environmental resources to perform specific activities (McCullagh & Cook, 2004; Sausa, 2003; Van der Bijl, 1999). Resnick (2004) identified self-efficacy as a middle-range theory. Likewise, self-efficacy is one of the concepts in Pender's middle-range theory: Health Promotion Model (McCullagh & Cook, 2004). Carpenito-Moyet (2009) used self-efficacy in describing or exploring a nursing diagnosis: Self-efficacy is described as "the evaluation of his or her capacity to manage or to change behaviour" (p. 408). As a result, a patient's self-efficacy is found by determining factors in the achievement of the therapeutic regimen.

Diabetes management and control seek to include personal factors such as diabetes knowledge and self-efficacy in addition to environmental factors such as social support, and behavioral factors such as self-management in the daily performance of suggested activities; therefore, self-efficacy theory is relevant for this study. Figure 2 shows that the theoretical substruction has its origin in Bandura's self-efficacy theory.

The substruction starts from a higher stage with the most abstract element and ends with the most specific, which is the measurement level (McQuison & Campbell, 1997). The construct level consists of the personal, environmental, and behavioral

factors from which the research concept is derived. The research concepts are diabetes knowledge and self-efficacy (personal determinants), social support (environmental determinant), and diabetes self-management (behavioral determinant). Diabetes knowledge will be measured with the Diabetes Knowledge Test (DKT), self-efficacy will be assessed by the Self-Efficacy for Diabetes (SED) instrument from the Stanford Patient Education Research Center, social support will be measured by means of the Medical Outcomes Study (MOS), diabetes self-management will be measured with the Self-Management Profile Type 2 Diabetes (SMP-T2D), and HbA1c levels will be obtained from laboratory results.

Figure 2: Theoretical and Conceptual Substruction

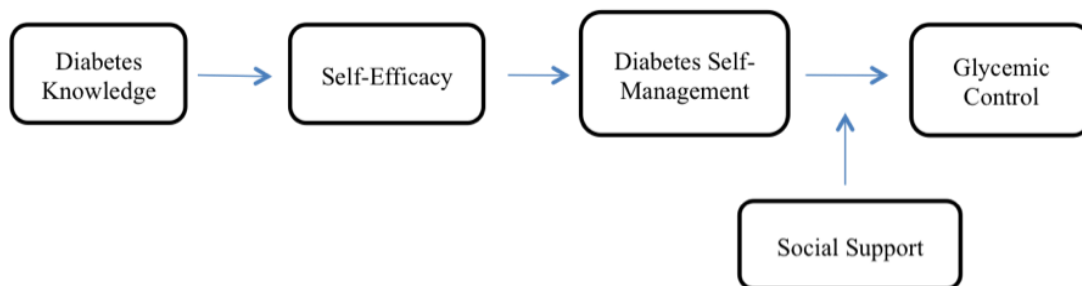


Study Model

Figure 3 shows the study model of the research study. The model examines if self-efficacy has a role as a mediator between diabetes knowledge and self-management and the diabetes outcome (HbA1c) for this study. Moreover, the model investigates if social support has a role as a moderator on the relationship between self-management and

glycemic control. The model was drawn based on a review of the literature. This model investigates whether participants who know about diabetes have better diabetes management performance and glycemic control. It also looks into whether participants with higher self-efficacy have a better outcome. The study model is supported by prior studies that found self-efficacy to be a mediator between the independent variables and the dependent variable (diabetes outcomes) (Cherrington et al., 2010; Dewalt et al., 2007; Dutton & Provost, 2009; Karademas et al., 2006; Kim & Yu, 2010; Osborn et al., 2010; Rak et al., 2013; Rosland et al., 2008; Xu and Toobert, 2008). The physiological measure that will be used is the quarterly HbA1c. Furthermore, individual factors such as age, gender, race, and education may affect the relationship among the concepts (independent variables) and diabetes outcome (dependent variable). In the current study, these individual factors (age, gender, race, and education) are considered to be potential confounders and will be measured as covariates.

Figure 3: Study Model



Covariates: Age, Gender, Race, Education

Theoretical and Operational Definitions

Theoretical definitions for this study were derived from Bandura's definition of the major concepts of the model as well as from research specifically related to the concepts. According to Bandura (1977), self-efficacy is a key principle in social cognitive theory. The internal factor, a major concept of the Bandura (1986) model, includes personal and behavioral factors that determine individual and group behavior and interactions. Self-efficacy, according to Bandura (1986), is one of the personal factors important for self-management and self-care. Self-efficacy combines the cognitive, social, and skills capabilities that an individual possesses to carry out a course of action (Bandura, 1986). Bandura emphasizes "reciprocal determinism" in interaction between individuals and their environment (McAlister, Perry, & Parcel, 2008). In other words, Bandura indicates a three-dimensional relationship or interaction among personal, behavioral, and environmental factors. In 2004, Resnick devised a conceptual model of self-efficacy informational sources that includes performance, verbal persuasion, role modelling, and physiological feedback, which was derived from Bandura's theory. She defined the four informational sources from the domain of experience; (1) direct experience, (2) vicarious experience, (3) judgments by others, and (4) derivation of knowledge by inference. These four informational sources influence the person, the environment, self-efficacy expectations, and outcome expectations, all of which lead to self-management behavior as an end result.

From Bandura's self-efficacy model (1977) and Resnick's research, specific variables were derived (diabetes knowledge, self-efficacy, social support, and diabetes

self-management) and operationalized. In addition to the concepts, one should pay attention to the antecedents and consequences of the concepts.

The antecedents are those factors or events that should take place before the occurrence of the concept (Walker & Avant, 2011). The following antecedents have been derived from the literature. Bandura (1977, 1986) introduced four principles that are needed for an individual to develop self-efficacy. Bandura (1977) affirmed that “expectations of personal efficacy are derived from four key sources of information: performance accomplishments, vicarious experience, verbal persuasion, and physiological cues” (p. 191). As explained earlier, there are four antecedents necessary for the development of self-efficacy: experience, relevant information from professionals, a role model, and social support resources (Heale & Griffin, 2009; Liu, 2012; Robb, 2012; Zulkosky, 2009). Antecedents for the type II diabetes population are: direct and indirect experiences (role modelling), relevant health information, and family, community, and professional provider support. It is not known yet whether or not an individual must have all four antecedents to have enough self-efficacy to carry out an action and achieve a favorable outcome.

According to Walker and Avant (2011), the consequences are events that take place after the occurrence of the concept. The attainment of self-efficacy depends upon the person’s belief about her abilities to perform a task or a particular behavior (Lenz & Shortridge-Baggett, 2002). An individual’s strong belief in the ability to perform a function is a significant predictor regarding choice behavior, expended effort, thought sequence, and “emotional reaction” (Lenz & Shortridge-Baggett, 2002). Therefore, the individual’s self-efficacy belief has an important role with respect to the consequences. A

diabetic person with a high level of self-efficacy belief will accomplish a desirable outcome such as diabetes self-management in general, which results in better glycemic control and a healthy lifestyle through diet maintenance and physical exercise. Alternatively, low self-efficacy results in failure to achieve a desirable outcome, which, in this study, is management of diabetes, specifically glycemic control. The consequences of having high self-efficacy belief in diabetes management for type II diabetes are: improved diabetes self-management and improved clinical outcomes (blood glucose control).

Carper et al. (1978) explored the fact that knowledge can be derived from experience, experiment, and observation; one's beliefs and values; how to be authentic with others; and the significance of the individual's behavior. Therefore, diabetes knowledge is the individual's knowledge about diabetes and his or her experience, his or her self-perception, as well as the decisions the individual has to make and the actions the individual has to take. Diabetes knowledge is related to the knowledge that an individual obtains from diabetes education, experience, observation, self-perception, and self-action that is necessary for making decisions and adopting an attitude that helps one better respond to personal needs (Sausa, 2003). Diabetes knowledge was measured with the Michigan Diabetes Research and Training Centre Instrument (1990), which is called the Diabetes Knowledge Test (DKT).

Self-efficacy is defined as a person's confidence in the personal and environmental resources used to perform specific activities that lead to a desired outcome (Sarkar, Fisher & Schillinger, 2006). In other words, self-efficacy is a belief in one's ability to successfully make a change in a particular situation. Sausa et al. described self-

efficacy as part of a “self-system” that reconciles the relationship between knowledge and action, as well as between action and outcome (2003). Consequently, an individual’s thoughts have a causal influence on behavior (Bandura, 1986, 1995). The instrument used to measure self-efficacy was the Self-Efficacy for Diabetes (SED) test from the Stanford Patient Education Research Center.

Social support is defined as an exchange of resources between at least two persons, aimed at increasing the well-being of the receiver (Shumarker & Brownell, 1984). As a result, social support is present when an individual with diabetes bargains with and for useful/helpful resources among relatives, friends, healthcare providers, or the community. Social support can also be emotional, as with love, caring, encouragement, and education (Sausa, 2003). Social support is “the perception of actual instrumental and expressive care provided by family, friends, other people in the community, and social workers” (Lin, 1986, p.18). Social support is an interaction and exchange of resources between at least two persons, providing love, trust, empathy, caring, actual services, help, recommendations, advice, and information (Shumaker & Brownell, 1984). Social support will be measured with Sherbourne & Stewart’s (1991) Medical Outcome Study (MOS) Social Support Survey.

Self-management is defined as the ability of an individual, his or her family, community, and healthcare providers to control symptoms and treatments, to facilitate lifestyle changes, and to manage the psychosocial, cultural, and spiritual consequences of the individual’s health condition (Richard & Shea, 2011). Self-management, for the purpose of this study, includes: monitoring one’s diet, exercise, blood glucose, and

medication management. Self-management was measured with the Self-Management Profile for Type 2 Diabetes (SMP-T2D).

Research Questions

The research questions for this study are as follows:

1. What is the relationship of diabetes knowledge, self-efficacy, social support and self-management with glycemic control for Qatari adult patients with type II diabetes?
2. Does self-efficacy mediate the relationship between diabetes knowledge and diabetes self-management?
3. Does social support moderate the relationship between self-management and glycemic control?

Significance of the Study to Nursing

The nursing discipline is committed to generating knowledge using nursing science and research. Nursing science is a source of knowledge that influences nursing practice and the health of individuals who seek care from nurses. Historically, there are numerous blueprints and paths that guide nurses involved in nursing science and research. Nursing has a broad meta-paradigm, which includes the person, health, environment, and nursing (Fawcett, 1984; Meleis, 1987); nursing theory, nursing research, and practice have all served as a conceptual basis for obtaining knowledge, in addition to the effect of other disciplines' science (Omery, 1995). Science developed by other disciplines affects nursing practice, so too does nursing science affect other disciplines' practice (psychology, sociology, and physics) (Dean, 1995). Furthermore, the scientific knowledge generated in a practice discipline must have clinical relevance to

be useful to the practitioners or professionals in clinical practice as well as to society (Donaldson, 1995). The nursing discipline is responsible to the people whom they serve in the health setting and in general to all of society: “In order to responsibly fulfill society’s mandate, the profession must generate a relevant, accurate, and reliable knowledge base to guide nursing practice” (Hinshaw, 1989, p.162). Hinshaw addressed how to improve nursing knowledge in the field of nursing, positing that the development of nursing knowledge can be achieved along several pathways that are all important to the scientific nursing community. Hinshaw recommended several avenues for knowledge development: to develop nursing science as a body of knowledge specific to areas of concern in nursing, to develop a cumulative science, and to transfer study results into practice by means of a shared partnership between scientists, practitioners, educators, and administrators (1989). Gaining nursing knowledge is a continuing process; however, it is important to make sure that the knowledge comes from evidence-based research and that it is reflected in our day-to-day nursing practice and care. In addition, Donaldson (1995) pointed out that the aim of nursing research is the development of knowledge for nursing science and practice. This research will add to the growing body of nursing knowledge and science regarding diabetes self-management within the scope of the nursing meta-paradigm.

Although many studies have been conducted on diabetes mellitus in the Middle East, this is the first study in Qatar to examine the relationships between and among the aforementioned concepts. Following Hinshaw’s suggestion to develop a cumulative science, this study is building on the work of previous investigators by using an in-depth literature review on diabetes and related concepts. This study investigates the

relationship between diabetes knowledge, self-efficacy, social support, and self-management and glycemic control. Therefore, gaining understanding about the relationships mentioned and among the concepts and glycemic control will add new knowledge to the cumulative nursing science in a specific area, namely diabetes.

Since nursing is a practice discipline (Donaldson & Crowley, 1978), nursing science is required to facilitate the transfer of knowledge to nursing practice. This research will provide such an interface between nursing science and practice by sharing the findings with nursing administrators, educators, and practitioners.

Nursing and healthcare providers and allies will use this new knowledge as evidence-based practice to guide future care and, potentially, future intervention studies. An innovation of this study is to find out if the relationships between the variables exist in the Qatari population. Another innovation will be illustrating how these relationships interact in a different culture. The important points of this study are to establish knowledge about these relationships for nursing research and to initiate future nursing research in Qatar. Therefore, this study will support the nursing profession's understanding of the relationships and help researchers to develop new interventions to support patients involved in the management of their health problems. According to Chinn & Kramer, "When the knowledge picture is more complete, its value can be more openly assessed and embraced" (1999, p.4). The findings from this research will fill in some parts of the knowledge picture for researchers and will also show the parts that need to expand the research or parts that necessitate future studies. Ultimately, this picture will guide future researchers to develop policy, protocols, and procedures.

Although the Qatari healthcare system has implemented diabetes education for years, diabetes has traditionally been managed by nurses. Thus, there is a need for a systematic educational protocol for all healthcare providers who are involved in patient care. Recently, Qatari diabetes clinic educators have started to organize an educational program with a collaborative partnership with the UK's diabetes educational program. This program is called Diabetes Education Self-Management Ongoing and Newly Diagnosed (DESMOND). This program is an evidence-based educational program that focuses on type II diabetes. The program will help diabetes patients to see how food, a sedentary lifestyle, and low activity influence their health. The program also includes strategies to enable the diabetic patients to identify personal risk factors and plan a set of possible goals to decrease their risk.

Summary

Historically, the World Health Organization has recognized diabetes as a threat to human health. The WHO has attempted to develop plans and has called for prevention and control of the disease. However, data from the WHO and the IDF (International Diabetes Federation) suggests that the prevalence of type II diabetes is on the rise. Moreover, data suggest that the prevalence of diabetes will continue to rise worldwide until 2030. Despite all of the international efforts, complications from diabetes continue, and its cost is a threat to the development of the global economy. Since there is little data about the Qatari diabetes population, this study is proposed to take place in Qatar. The principal aim of this study is to examine the relationship of diabetes knowledge, self-efficacy, social support, and diabetes self-management factors and their effect on diabetes management and outcomes among Qatari diabetic patients. Diabetes is a significant

problem worldwide, and it is prevalent among Qatar Home Healthcare Services patients. Bandura's self-efficacy theory is the conceptual framework guiding this study and its related concepts and patient outcomes. Since the self-efficacy theory is considered to be applicable to situation-specific problems, the theory will be used for adult Qataris with type II diabetes. Additionally, Bandura's self-efficacy theory considers the personal, behavioral, and environmental aspects of individuals, and these aspects are included within the broad nursing paradigm. As a result, self-efficacy theory will be particularly useful for research with the Qatari diabetic population since the research to date has been limited due to the lack of accessible information about this specific population.

The concept of self-efficacy is an important one for Qatari diabetic patients as well as for nurses who work in Qatar. This concept has been widely used for different populations and in different countries. However, this will be the first time that it will be used in Qatar and specifically for a diabetic population. An innovation of this study is to learn if the relationships between the concept of self-efficacy and the other concepts exist in the Qatari population. Another innovation will be illustrating how these relationships interact in a different culture. The most important point of this research is to establish knowledge about these relationships for improving nursing practice in Qatar.

CHAPTER II

Review of Literature

This chapter presents a review of the research literature, both conceptual and empirical, that is relevant to the study. The purpose of this study is to investigate how the relationships of the factors of diabetes knowledge, self-efficacy, social support, and diabetes self-management affect diabetes management and outcomes among Qatari adults with type 2 diabetes. Most of the studies about diabetes have taken place in primary care and diabetic clinic settings. One of the main concerns that affects patients' ability to control their diabetes is understanding the disease and managing the behaviors that lead to greater glycemic control and fewer complications.

This review is arranged into two major sections: the first section presents a discussion about the prevalence of diabetes around the world, particularly in Middle Eastern regions, specifically Qatar; and the second section presents a synthesis of the existing empirical knowledge about diabetes management and care as it pertains to the concepts of diabetes knowledge, self-efficacy, social support, diabetes self-management, and glycemic control. A summary of the papers that were reviewed is provided in tables for each section.

Diabetes Mellitus

Diabetes Mellitus (DM) is a significant health problem in most countries throughout the world (International Diabetes Federation [IDF], 2011; National Diabetes Fact Sheet [NDFS], 2011). Diabetes significantly influences the cardiovascular system, kidneys, eyes, and nervous system with serious sequelae (IDF, 2012; NDFS, 2011; World Health Organization [WHO], 2012). Much literature notes that diabetes is one of the

prevalent causes of death and increasing health care costs (IDF, 2012; WHO, 2012; Zhang, Zhang & Brown, 2010). In 2011, 4.6 million deaths were caused by diabetes and its complications. Furthermore, according to the IDF, in 2011, diabetes was responsible for at least \$465 billion in health expenses. Zhang et al. pointed out that the disease is costly for healthcare systems because diabetic patients have more outpatient visits, use more medication, and are more likely to use the hospital both for emergency and long-term care than people without the disease (2010). The key components to preventing diabetes complications are lifestyle and having a self-care/self-management plan for the disease (Caro-Bautista, Martin-Santos & Morales-Asencio, 2014).

According to the World Health Organization's Eastern Mediterranean Region statistics (2012), six of the ten countries with the highest prevalence of diabetes in the world are from the Eastern Mediterranean region: Bahrain, Kuwait, Lebanon, Oman, Saudi Arabia and the United Arab Emirates. In Qatar, in 2011, 20.2% of the population had diabetes, and, according to the IDF, this figure will increase to 20.4% by the year 2030. According to the Home Healthcare services in Hamad Medical Corporation, nearly 50% of their patients are diabetic.

Qatar is a small country located in the Persian Gulf. Its area is 11,571 km², which is equal to 4,467.6 sq miles. In 2014, Qatar's total population was 2,155,446 million, of which 12% were Qatari citizens and 88% expatriates (Snoj et al., 2013). These demographics show that Qatar has much cultural and ethnic diversity with different norms, morals and ethical values which can affect their health behaviors. Qatar also has some of the highest prevalence in the world for obesity, diabetes, and genetic disorders (Slackman, 2010). Qatar provides extensive social welfare programs to its population,

including free healthcare, free education through university, housing grants and support for low-income families, and disabled individuals also receive education and job training programs. The main differences between Qatari culture and Western culture are that the basic family unit is based on extended family in Qatar. Almost all households have a live-in private maid, cook, and driver who are ex-patriates. Whereas Western culture has a focus on individualism and the nuclear family, families in Qatar have more closely knit extended families and stronger connections in the community in general. Grandfathers and grandmothers enjoy being with their children and grandchildren, and younger generations are taught to value and respect their forebears' wisdom and experience. If there is a health problem for the grandfather or anyone in the family, everyone contributes help and support, including the household staff. Sometimes a private nurse or caregiver will be hired to take care of the ill person. Given the relationship of the family with private employees and their willingness to take on the responsibilities of caring for a relative who is ill, the concept of individual self-management and family self-management training should fit well with Qatari culture.

Qatar is investing in and developing a world-class public health system. In 2011, Qatar launched the National Health Strategy 2011-2016. The plan aims to achieve the goals of the Qatar National Vision 2030. The National Health Strategy's future goals include a comprehensive world-class health care system, an integrated system of healthcare and preventative healthcare, a skilled national workforce, a national health policy, effective and affordable services, partnership in bearing costs, high quality research, and program management in addition to the National Health Strategy 2011-2016 project outcomes (Qatar Supreme Council of Health [SCH], 2013). These strategies

and the Qatar National Vision 2030 are intended to improve and lead Qatar toward wellness and healthier lives for its citizens (SCH, 2013). Moreover, a major organization that is driving the National Health Strategy forward is the Hamad Medical Corporation (SCH, 2013). Hamad Medical Corporation is described in more detail in Chapter III.

Diabetes Knowledge

This section includes a review of twenty-four papers about diabetes knowledge, health literacy, diabetes education, self-efficacy, self-management/self-care, and HbA1c or glycemic control (See Appendix B) (Al-Adsani et al., 2009; Al-Maskari et al., 2013; Al-Qazaz et al., 2011; Al-Shafee et al., 2008; Bains et al., 2011; Berikai et al., 2007; Casagrande & Geiss, 2012; Cavanaugh et al., 2008; Dewalt et al., 2007; Guo et al., 2012; Hartayu et al., 2012; He & Wharrad, 2007; Mancuso et al., 2010; Mbaezue et al., 2010; Osborn et al., 2010; Ozcelik et al., 2010; Powell et al., 2007; Rogvi et al., 2012; Saleh et al., 2012; Samtia et al., 2013; Sarkar et al., 2006; Wallace et al., 2009; Wang et al., 2013; Zuhaid et al., 2012).

One of the most common concepts in these studies is diabetes knowledge. Twelve studies investigated the association of diabetes knowledge and outcomes such as blood glucose level and HbA1c (Al-Adsani et al., 2009; Al-Maskari et al., 2013; Al-Qazaz et al., 2011; Al-Shafee et al., 2008; Berikai et al., 2007; Casagrande & Geiss, 2012; He & Wharrad, 2007; Ozcelik et al., 2010; Rogvi et al., 2012; Samtia et al., 2013; Saleh et al., 2012; Zuhaid et al., 2012;). These studies showed mixed results. He and Wharrad (2007) found that diabetes knowledge was not associated with optimal glycemic control; however, the findings indicate that some specific areas of diabetes knowledge

(such as food substitution and diabetes complications) were significantly associated with optimal levels of glycemic control. Other researchers have found that increased knowledge was associated with better HbA1c levels (Al-Qazaz et al., 2011; Berikai et al., 2007; Rogvi et al., 2012; Samtia et al., 2013). Conversely, knowledge has been found to not be associated with HbA1c in other studies (Al-Maskari et al., 2013), yet lower general knowledge scores are associated with poor diabetes knowledge (Al-Adsani et al., 2009).

Most of the twenty-four studies showed a significant relationship between diabetes knowledge and HbA1c and fasting blood sugar with the exception of the 2013 study by Al-Maskari and colleagues. Participants who received educational interventions showed improvements in knowledge and self-care and better glycemic control (Al-Qazaz et al., 2011; Samtia et al., 2012) as well as better HbA1c level (Samtia et al., 2013). Those who received education achieved the target HbA1c in comparison with participants who did not receive education (Berikai et al., 2007); however, knowledge awareness scores had a negative relation with HbA1c and fasting blood glucose (Ozcelik et al., 2010), and higher education and knowledge of one's HbA1c target were significantly associated with good blood glucose control (Rogvi et al., 2012). Knowledge of HbA1c was highest in non-Hispanic whites and lowest among Mexican Americans in a study in the US (Casagrande & Geiss, 2012). Furthermore, attaining a higher level of education was related to more knowledge (Al-Shafee et al., 2008; Zuhaid et al. 2012). Basic diabetes knowledge and blood glucose monitoring showed a significant association (Saleh et al., 2012), and there was a positive relation between knowledge and the number of contacts with the diabetes education provider, and knowledge and practice (Al-

Maskari et al., 2013). Greater diabetes knowledge correlated with better medication adherence (Al-Qazaz et al., 2011).

Health literacy is another common variable in most of these studies. Five studies examined the association between health literacy and diabetes knowledge (Bains et al., 2011; Mancuso et al. 2010; Osborn et al., 2011; Powell et al., 2007; Wallace et al., 2009). Four of the five studies (Bains et al., 2011; Mancuso et al., 2010; Osborn et al., 2010; Powell et al., 2007) found a significant positive relationship between health literacy and diabetes knowledge. Wallace et al., in an evaluative study, examined the effect of literacy-appropriate diabetes education guides: participants with borderline or inadequate health literacy showed lower knowledge than patients with adequate health literacy (2009).

Two studies have shown positive relationships between health literacy and some of the diabetes self-management activities such as nutrition, glucose monitoring, and medication (Cavanaugh et al., 2008; Mbaezue et al., 2010). Higher diabetes-related numeracy among patients reporting insulin use was related with more accurate adjustment of insulin dose for blood glucose level and carbohydrate intake (Cavanaugh et al., 2008). Furthermore, Cavanaugh found that patients with lower health literacy, numeracy, or educational levels were at higher risk for worse blood glucose control (2008). Moreover, patients with adequate health literacy more often tend to record their blood glucose levels than patients with inadequate health literacy (65% vs. 35%), but there was no significant association between health literacy and the frequency of self-monitoring blood glucose level (Mbaezue et al., 2010).

Five of the studies evaluated the impact of diabetes education on diabetes knowledge, self-management, and outcomes such as HbA1c (Berikai et al., 2007; Guo et al., 2012; Hartayu et al., 2012; Ozcelik et al., 2010; Wallace et al., 2009). All of the intervention studies found that the educational program improved knowledge despite all five programs being different. Moreover, those that measured diabetes outcomes found that there was a positive impact on HbA1c (Berikai et al., 2007; Guo et al., 2012; Ozcelik et al., 2010), along with important changes in patients' knowledge, self-efficacy, activation, and self-management behaviors (Wallace et al., 2009), thereby improving patient adherence to diabetes self-management/self-care (Guo et al., 2012; Hartayu et al., 2012).

Four of these studies explored the relationship between health literacy and self-efficacy (Cavanaugh et al., 2008; Dewalt et al., 2007; Sarkar et al., 2006; Wallace et al., 2009) and found mixed results. For instance, patients with inadequate health literacy had lower scores on mean self-efficacy than patients with sufficient health literacy (Wallace et al., 2009). Additionally, Cavanaugh et al. reported that participants with greater diabetes-related numeracy were more likely to have higher perceived self-efficacy of diabetes self-management skills (2008). Likewise, a study of self-efficacy associated with diabetes self-management across race/ethnicity and health literacy by Sarkar et al. (2006) showed an association between an increase in self-efficacy scores and self-management. There was a significant association between self-efficacy and four of the five self-management domains, which are diet, exercise, self-monitoring blood sugar, and foot care. However, neither study found an association between self-efficacy and medication adherence nor self-efficacy and health literacy (Sarkar et al., 2006). On the

other hand, Dewalt et al. found that there is no relationship between health literacy and trust or self-efficacy (2007).

In summary, patients' level of diabetes knowledge is affected by their overall level of education and standard literacy, their health literacy, and the way(s) in which they may obtain diabetes-related education or training. Lower health literacy levels have been found to be associated with lower levels of baseline knowledge and poorer glycemic control. Educational programs, regardless of population, have generally been found to increase knowledge and have a positive effect on glycemic control. Most of these studies have been time-limited for follow-up, so it is not clear whether the educational gain and improved glycemic control are consistent over the long-term. There is a need for further studies and consistent, ongoing educational programs that can assist patients in attaining long-term improvements in glycemic control. Moreover, there are very few studies based in the Middle East. Future research in the Middle East should go beyond descriptive studies and expand to more in-depth investigations of the relationships of diabetes knowledge and self-management outcomes.

Self-efficacy

This section focuses on the concept of self-efficacy, and it includes twelve articles about self-efficacy, diabetes self-management, and some intervention studies (See Appendix C) (King et al., 2010; Cherrington et al., 2010; Dewalt et al., 2007; Dutton & Provost, 2009; Kim & Yu, 2010; Osborn et al., 2010; Robertson et al., 2013; Rosland et al., 2008; Shi, Ostwald; & Wang, 2010; Wangberg et al., 2008; Xu and Toobert, 2008; Zulman et al., 2012). A number of studies have examined self-efficacy as a mediator

(Cherrington et al., 2010; Kim & Yu, 2010; Osborn et al., 2014; Rak et al., 2013; Weaver et al., 2014; Xu and Toobert, 2008).

Five of the studies examined the association of self-efficacy in relation to diabetes self-management/self-care (King et al., 2010; Robertson et al., 2013; Shi, Ostwald & Wang, 2010; Wangberg et al., 2008; Zulman et al., 2012), three of which used educational interventions to evaluate that association (Robertson et al., 2013; Shi, Ostwald & Wang, 2010; Wangberg et al., 2008). Positive relationships between self-efficacy and self-management/self-care were found in two of these studies (Wangberg et al., 2008; Zulman et al., 2012). More specifically, these studies found that greater self-efficacy is associated with improvements in one or more of the self-management/self-care domains (diet, exercise, foot care, and HbA1c or glycemic control) (King et al., 2010; Robertson et al., 2013; Shi, Ostwald & Wang, 2010; Zulman et al., 2012). Moreover, problem solving was independently related to self-efficacy, and healthy eating and calories expended in physical activity were also strongly associated with self-efficacy (King et al., 2010). Furthermore, Wangberg et al. suggested that self-efficacy has a moderating effect on the educational intervention for diabetes self-care behaviors (2008).

Three studies explored the relationship of self-efficacy and diabetes outcomes (Osborn et al., 2010; Rak et al., 2013; Weaver et al., 2014) and found mixed results. Furthermore, Rak et al. suggested that strategies, such as health literacy, that enhance self-efficacy might contribute to improving a patient's health and outcomes (2013). Two of the three studies reported that self-efficacy was correlated with self-reported HbA1c and reduced HbA1c (Osborn et al., 2014; Weaver et al., 2014).

Eight studies assessed the mediating effect of self-efficacy between independent variable(s) and diabetes outcome (Cherrington et al., 2010; Dewalt et al., 2007; Dutton & Provost, 2009; Kim & Yu, 2010; Osborn et al., 2010; Rak et al., 2013; Rosland et al., 2008; Xu and Toobert, 2008). Diabetes self-efficacy was a mediator between depressive symptoms (Cherrington et al., 2010), as well as between health literacy and numeracy (Osborn et al., 2010) and blood sugar control; additionally, self-efficacy was a mediator between health literacy and physical and mental health status (Kim & Yu, 2010). Furthermore, knowledge and social support affected diabetes management through self-efficacy (Xu & Toobert, 2008), and self-efficacy mediated the effect of family and friend support on diabetes meal planning and checking feet (Rosland et al., 2008). Lastly, Dutton and Provost found that self-efficacy mediated the physical activity intervention on physical activity changes (2009).

On the other hand, the results of two studies revealed that self-efficacy has no mediating effect on outcomes (Dewalt et al., 2007; Rak et al., 2013). Rak et al. found that self-efficacy did not show a mediating effect on the relationship of health literacy and employment outcomes among patients with diabetes (2013). Additionally, a study by Dewalt et al. showed that the role of self-efficacy is not shown to be a mediator between health literacy and diabetes outcomes (2007).

In summary, self-efficacy has been shown to positively affect diabetes self-management/self-care and glycemic control in most of the studies done with persons with diabetes. Self-efficacy has been tested as a mediator, and the preponderance of studies show a mediating effect. However, none of the studies were done in the Middle East where there may be differences in the relationships between self-efficacy, diabetes self-

care, and glycemic control because of differences in terms of the health care system, health education, culture, and beliefs. Overall, more studies are needed that explore the nuances of the impact of self-efficacy as a mediator between independent variables and diabetes outcomes.

Social Support

Social support is the third concept of this study, and this section discusses the literature relevant to this concept (See Appendix D). Research evidence suggests that greater levels of social support are associated with improvements in self-care/self-management and some of the diabetes-related outcomes. Thirty-five studies, with a wide array of methodologies, such as randomized controlled trials/interventions, cross-sectional and pilot studies, all investigated the relationships of different kinds of social support with diabetes management (Bond et al., 2010; Chesla et al., 2010; Chew et al., 2011; Chlebowy et al., 2006; Choi et al., 2009; Comellas et al., 2010; Dale et al. 2008; Fisher et al., 2012; Fortmann et al., 2011; Frosch et al., 2011; Gensichen & Korff, 2009; Gleeson-Kreig et al., 2008; Heisler et al., 2010; Ingram et al., 2007; Kanbara et al., 2008; Kang et al., 2010; Khan et al., 2013; King et al., 2010; Mayberry et al., 2014; McEwen et al., 2010; Nicklett et al., 2010; Oftedal et al., 2011; Okura et al., 2009; Osborn et al., 2010; Pereira et al. 2008; Rees et al., 2010; Rosland et al., 2008; Seidel & Franks, 2012; Smith & Paul, 2011; Storm & Egede, 2012; Tang et al., 2008; Trief et al., 2011; Van Dam et al., 2005; Vaccaro et al. 2014; Wolever et al., 2010). Types of social support investigated include family and friend support, spousal support, web-based and media support, peer-related support, physician support, and support from other health providers.

Social support from family and friends is a typical variable in most of these studies. Thirteen studies examined the association between family and friend social support and a patient's diabetes regimen, medication adherence, diabetes self-care/self-management (diet, physical activities, self-monitoring of blood glucose), psychological and behavioral outcomes (coping with the disease), as well as diabetes-related clinical outcomes such as HbA1c levels (Choi et al., 2009; Ingram et al., 2007; Kanbara et al., 2008; Kang et al., 2010; King et al., 2010; Mayberry et al., 2014; Nicklett et al., 2010; Osborn et al., 2010; Oukra et al., 2009; Pereira et al. 2008; Rosland et al., 2008; Tang et al., 2008; Vaccaro et al. 2014). Eleven of these studies found positive associations between family and friend support and one or more diabetes self-care/self-management outcomes, specifically better HbA1c or blood glucose control (Choi et al., 2009; Ingram et al., 2007; Kang et al., 2010; King et al., 2010; Mayberry et al., 2014; Nicklett et al., 2010; Osborn et al., 2010; Oukra et al., 2009; Pereira et al. 2008; Rosland et al., 2008; Tang et al., 2008). Additionally, Osborn et al. identified social support as a mediator between health literacy and glycemic control (2010). Increases in emotional social support significantly enhanced "active coping for the disease" and controllability of health; as a result, helplessness decreased significantly (Kanbara et al., 2008). Furthermore, participants who got support from their children had a significantly higher score in perceived availability of social support (Kanbara et al., 2008). On the other hand, more negative support from family is associated with less adherence to taking suggested medication (Tang et al., 2008); obstructive family behaviors were related to lower adherence to self-care behaviors and worse HbA1c (Mayberry et al., 2014), and lastly, family support is not directly related to glycemic control (Vaccaro et al., 2014).

Five articles examined the influence of peer support on diabetes management outcomes (Comellas et al., 2010; Dale et al., 2008; Fisher et al., 2012; Heisler et al., 2010; Smith & Paul, 2011). Two of the five studies found that participants with peer support had reductions in HbA1c (Fisher et al., 2012; Heisler et al., 2010); additionally, the participants showed improvements in diet, symptom management, BMI (Fisher et al., 2012), and physical activities (Comellas et al., 2010). Contrary to these articles, however, Smith and Paul (2011) found that peer support no longer contributed to significant differences in HbA1c at a 2-year follow up.

Two of the studies examined web- and media-based supports as influences on diabetes management (Bond et al., 2010; Gleeson-Kreig et al., 2008). A significant difference was found for a web-based support intervention in terms of psychosocial well-being, quality of life, and self-efficacy (Bond et al., 2010), and media-based support, in addition to personal and community support, was also significantly related to the diabetes outcome of physical activity (Gleeson-Kreig et al., 2008).

Three of the studies investigated the effect of spousal support on diabetes management outcomes such as patient diet (Seidel & Franks, 2012), physical activity (Khan et al., 2013), and HbA1c values (Trief et al., 2011). Improved dietary adherence was found among males who received spousal support (Seidel & Franks, 2012); spousal support had a positive effect on daily physical exercise (Khan et al., 2012) and improvement in glycemic control in all three groups (Trief et al., 2011).

Seven studies reported the effect of physician, non-physician healthcare providers, and community support and interventions (Fortmann et al., 2011; Frosch et al., 2011; Gensichen & Korff, 2009; McEwen et al., 2010; Oftedal et al., 2011; Rosland et

al., 2008; Wolever et al., 2010). The results of four studies showed positive relationships between physician, non-physician healthcare provider, and community support, and one or more diabetes self-care/self-management domains outcomes such as diet, exercise, foot care (Frosch et al., 2011; McEwen et al., 2010; Oftedal et al., 2011; Rosland et al., 2008), and decreases in HbA1c (Fortmann et al., 2011; Frosch et al., 2011; Gensichen & Korff, 2009; Wolever et al., 2010). Furthermore, improvements in self-reported adherence, exercise frequency, stress, and perceived health status were related to a support intervention (Wolever et al., 2010). However, no changes were observed in levels of HbA1c and BMI in relation to a social support intervention (McEwen et al., 2010).

Four of the studies were literature reviews related to social support: a narrative review (Dale et al., 2008); a meta-analysis of randomized controlled trials (Chesla et al., 2010); and the remaining two were systematic reviews (Storm & Egede, 2012; Van Dam et al., 2005). Social support had a positive influence on diabetes outcomes (Chesla et al., 2010; Storm & Egede, 2012; Van Dam et al., 2005), and peer support resulted in better disease management and outcomes (Dale et al., 2008). Of note, Chesla et al. (2010) found evidence that family support was superior to usual medical care.

No significant relationship was found between social support and one or more diabetes outcomes in four other studies (Chew et al., 2011; Chlebowy et al., 2006; Kang et al., 2010; Rees et al., 2011). Three of these studies found no significant correlation between social support and HbA1c or diabetes self-care behaviors (Chew et al., 2011; Chlebowy et al., 2006; Kang et al. 2010). In addition, Rees et al. reported that Latinos

showed no significant relationship between social support and controlling weight, exercising, controlling calories, and lower diastolic blood pressure (2011).

In summary, this literature review showed that evidence for a relationship between social support and diabetes management varies in terms of the types of support that participants receive. However, the vast majority of the findings reported that social support has a significant positive effect on diabetes outcomes. One area of social support that needs further exploration is how different means of getting support (via telephone, via formal support programs, or via inter-active media) are received by different populations across cultures. Moreover, the idea that family support is not necessarily positive can be investigated to show what means of support lead to positive outcomes, and what kinds of support (family interference) may be obstructive or create obstacles to the patient's achievement of self-care goals. Specifically, since social support is strongly connected to culture, it will be important to expand studies to the Middle East so that insights can be gained about how different types of support (family, peer, caregiver, medical professional) impact diabetes self-management and outcomes.

Self-management/Self-care

This section explores the literature relevant to the concept of diabetes self-management/self-care. Research evidence demonstrates that self-management and self-care behaviors are critical for diabetes management and control. Additionally, researchers suggest that diabetes self-management education and support play a crucial role in tackling health beliefs and improving diabetes management and control. This section covers twenty-six studies about the relationships among health literacy, self-efficacy, social support, self-management knowledge, self-management

training/education, self-management/self-care behaviors, diet, physical activities, foot care, and HbA1c or glycemic control (See Appendix E) (Ahola & Groop, 2013; Al-Khawaldeh & Al-Hassan, 2012; Bains et al., 2011; Bastiaens et al., 2009; Castro & O'Toole, 2009; Clark et al., 2008; Davies et al., 2008; Fortmann et al., 2011; Gao et al., 2013; Johnson et al., 2014; Jordan et al. 2010; Kennedy et al., 2013; ; Khunti & Gray, 2012; Nouwen & Balan, 2011; Nyunt et al., 2010; Parker et al., 2012; Pun & Coates, 2009; Schillinger et al., 2009; Sonsona et al. 2014; Tang et al., 2008; Tang & Funnel, 2010; Walker & Steven, 2010; Wang et al., 2013; Wattanakul et al, 2011; Wilkinson & Whitehead, 2014; Zulman et al., 2012).

Almost all of these studies include the common concept of self-management/self-care behaviors. Thirteen studies have found that better HbA1c or glycemic control or blood glucose monitoring are related to improvements in diabetes self-management (Al-Khawaldeh & Al-Hassan, 2012; Davies et al., 2008; Fortmann et al., 2011; Gao et al., 2013; Johnson et al., 2014; Jordan et al., 2010; Nouwen & Balan, 2011; Nyunt et al., 2010; Tang et al., 2008; Tang & Funnel, 2010; Walker & Steven, 2010; Wang et al., 2013; Zulman et al., 2012), but three studies found no significant association between self-management/self-care behaviors and HbA1c or glycemic control (Bains et al., 2011; Khunti and Gray, 2012; Wattanakul et al., 2011).

Ten studies have employed educational interventions as a means of improving diabetes self-management/self-care behaviors. Among the different types of education or interventions examined were group self-management education (Bastiaens et al., 2009; Castro & O'Toole, 2009), a diabetes self-management program (Davies et al., 2008; Khunti & Gray, 2012; Parker et al., 2012; Schillinger et al., 2009), an intervention to

improve adherence to self-management behavior (Walker & Steven, 2010), and interventions to support diabetes self-management (Fortmann et al., 2011; Kennedy et al., 2013; Tang & Funnel, 2010). Six of these studies found a positive relationship between self-management education and improvements in BMI and one or more of the self-care/self-management behaviors (Castro & O'Toole, 2009; Fortmann et al., 2011; Khunti & Gray, 2012; Schillinger et al., 2009; Tang & Funnel, 2010; Walker & Steven, 2010). A significant increase in self-management knowledge and techniques was found in addition to declines in depression (Parker et al., 2012). Similarly, the participants in intervention groups showed weight loss, changes in illness belief or understanding of diabetes and had lower depression at 12 months (Davies et al., 2008). Educational support resulted in improved self-efficacy (Schillinger et al., 2009). In contrast, Kennedy et al. reported no significant differences between the intervention and control groups for any of the primary diabetes outcomes (2013).

Six studies reported the association between diabetes self-management behaviors and self-efficacy (Al-Khawaldeh and Al-Hassan, 2012; Gao et al., 2013; Nouwen & Balan, 2011; Schillinger et al., 2009; Wattanakul et al., 2011; Zulman et al., 2012). Three of these studies found a positive association between self-efficacy and diabetes self-management behaviors (Al-Khawaldeh and Al-Hassan, 2012; Schillinger et al., 2009; Wattanakul et al., 2011). Diabetes self-efficacy was found to be the best predictor of compliance with self-management behaviors (Wattanakul et al., 2011). In addition, there was a strong correlation between self-efficacy and diabetes-related emotional distress (Zulman et al., 2012), and changes in self-efficacy were significantly correlated to improvements in dietary self-care (Nouwen & Balan, 2011). In contrast, self-efficacy

did not have a direct effect on HbA1c, and diabetes self-care mediated the effect of self-efficacy and patient-provider communication on HbA1c (Gao et al., 2013).

Three of these studies investigated the relationship of self-management behaviors and social support (Gao et al., 2013; Tang et al., 2008; Wattanakul et al., 2011). Two of these studies found self-management behaviors to be positively associated with social support (Tang et al., 2008; Wattanakul et al., 2011). Social support has an indirect effect on HbA1c through self-care, which indicates that self-care is a mediator between these two variables (Gao et al., 2013).

Four studies investigated the influence of self-management among specific low-income, ethnic groups and/or minorities in the United States (Bains et al., 2011; Johnson et al., 2014; Jordan et al., 2010; Sonsona et al., 2014). Diabetes self-care was associated with significant differences in the prevalence of each of the self-care domains (blood glucose monitoring, exercising, eating healthily, checking foot, and not smoking) by race/ethnicity (Johnson et al., 2014). Bains et al. reported that no significant correlations were found between health literacy and four of the diabetes self-care domains (HbA1c, diet, exercise, and foot care) among low-income minority populations (2011). Filipino American participants who were older and had lived in the United States longer demonstrated optimum self-care behavior in comparison to participants who were younger and had been in the United States for less time; males with higher levels of education were more engaged in exercise (Jordan et al., 2010). Moreover, Filipino Americans were well involved in diabetes self-management, and they are likely to have significantly greater diabetes self-management versus the general population (Sonsona et al., 2014).

Although many studies found positive relationships for the effectiveness of an intervention on self-management and diabetes outcomes, four studies found no significant associations among the above-mentioned variables (Bains et al., 2011; Kennedy et al., 2013; Khunti and Gray, 2012; Wattanakul et al., 2011). Self-management behavior had no significant association with glycemic control (Wattanakul et al., 2011); there was no difference in the primary outcome HbA1c value between the intervention and control groups (Khunti and Gray, 2012), none of the self-care behaviors (diet, exercise, HbA1c, and foot care) were significantly related with health literacy (Bains et al., 2011), and there were no statistically significant differences between the intervention and control groups in terms of diabetes self-management outcomes (Kennedy et al., 2013).

Three of the studies were literature reviews of articles related to barriers to or issues with self-management/self-care behaviors (Ahola & Groop, 2013; Clark et al., 2008; Pun & Coates, 2009; Wilkinson & Whitehead, 2014). To achieve successful diabetes self-management, various factors should be considered: individual-related factors (knowledge, health literacy, self-efficacy, depression, coping, and problem-solving and empowerment); or environment-related factors (social support, provider factors, socio-economic factors, access to nutritious foods, exercise opportunities) that either improve or impede good self-management (Ahola and Groop, 2013). Patients are unable to obtain good outcomes because of barriers to self-care (Pun & Coates, 2009). Self-care is affected by a person's capabilities of "communication", "education", "personal factors", "provider's issues", and "support" (Wilkinson & Whitehead, 2014).

In summary, diabetes self-management is essential for optimal glycemic control and delaying complications resulting from type II diabetes. Although developing diabetes self-management skills and knowledge are essential to individuals with diabetes, psychosocial, physical, socioeconomic, cultural, and environmental factors should also be considered. Despite the fact that the findings suggest that self-management training programs and interventions are promising in terms of improving and maintaining diabetes self-management, ongoing research is necessary to design effective educational and support-based programs for ethnic groups and cultures. Longitudinal research is also needed to evaluate the long-term effect of the educational programs/interventions. The type and amount of self-management performed by adults with type II diabetes in Qatar is unknown. This study will be the first to examine this issue.

Summary

Many studies are relevant to understanding diabetes management and related concepts such as diabetes knowledge, self-efficacy, social support, and self-management/self-care behaviors. Although evidence shows a growing body of research in this field in the United States and Western countries, few studies have been done in Middle Eastern countries. For the most part, studies have reported either significant associations or improvements in diabetes knowledge and diabetes outcomes, specifically HbA1c. Additionally, most of the research on diabetes knowledge, health literacy, and self-efficacy, and self-management has found a significant positive relationship between these variables. However, there were a few studies that showed diabetes knowledge was not associated with HbA1c/glycemic control (Al-Maskari et al., 2013; He & Wharrad, 2007).

Most researchers would agree that having self-efficacy is vital for patients with chronic diseases such as diabetes. According to the researchers, since self-efficacy is based on individuals' abilities and confidence and affects individuals' performance and behavior, it can determine their success in diabetes self-management (Mohabi et al., 2013). In terms of the concept of self-efficacy, most of the studies found either significant relationships or improvements between self-efficacy diabetes outcomes or self-management/self-care behaviors, particularly HbA1c/glycemic control. Some of these studies found a mediating effect for self-efficacy between the independent variables and diabetes outcomes (Cherrington et al., 2010; Karademas et al., 2006; Kim & YU, 2010; Xu and Toobert, 2008). In contrast to Western countries, no research was found from countries in the Middle East that has studied the effects of self-efficacy on the variables for this study and diabetes outcomes.

Research evidence suggests that greater levels of social support are associated with improvements in diabetes self-management/self-care and diabetes-related outcomes. Khunti and colleagues reported that a need for ongoing support, along with education, is necessary for managing diabetes and obtaining optimal clinical outcomes and self-management (2012). There is a widespread body of studies about the concept of social support from family and friends, the media, internet-based support, telephone support as well as support from healthcare providers and peer support. The most commonly studied variable among all of the sources in these studies of social support is family and friend support. Most studies found that positive and strong family and friend social support improves diabetes self-management/self-care and diabetes outcomes. However,

obstructive family behaviors were related to lower adherence to diabetes outcomes (Mayberry et al., 2014).

Other kinds of social support that were associated with positive outcomes were physician and other healthcare provider support, peer support, and spousal support. Most of the studies support the effectiveness of physician and healthcare provider support because that improves the patients' diabetes self-management and outcomes. Most peer support studies found improvements in disease management, self-management, and diabetes outcomes (diet, HbA1c, exercise, BMI, and symptom management). Only one of these studies does not support the implementation of peer support (Smith & Paul, 2011). Most of the studies on spousal support found improvements in HbA1c, diet, physical activities, and problem solving.

For the past several decades, the increased number of people with longer life expectancy and the growing numbers of individuals with chronic conditions have brought awareness to health care providers that it is important to involve patients in their own care and to pay attention to concepts such as self-management/self-care. Healthcare providers are responsible for assessing patients' learning needs and their levels of health literacy, and then educating and guiding them toward self-management. Parcker et al. concluded that self-management is an element that can help both health care providers and patients with chronic conditions to improve their health outcomes (2011).

One of the most common investigations in these studies focused on self-management/self-care education and/or interventions aimed to improve the diabetes outcomes of HbA1c, diet, exercise, and adherence to diabetes management regimes. Another significant association that was found in the literature was between self-

management/self-care and self-efficacy. Additionally, there was significant improvement in self-management/self-care behaviors in relation to social support.

Although many of these studies found improvements in diabetes outcomes and self-management/self-care behaviors, many researchers suggested that ongoing education is necessary. In order to have optimal diabetes self-management, self-management education should be continuous and focus on providing education tailored for the individual and have a patient-centered approach (Hunt & Grant, 2014). Furthermore, Kennedy et al. concluded that it is necessary to understand what is needed to establish an effective self-management support program. The delivery of the training within the primary care setting and utilizing different modes of training may enhance the effectiveness of the training programs (2013).

The majority of research related to diabetes management and pertinent to the concepts proposed in this study reported similar mixed results. Most of the studies reviewed reported a positive relationship between and/or among the concepts of diabetes knowledge, self-efficacy, social support, and diabetes self-care management. In contrast, few studies have been done in Middle Eastern countries in this field. Of twenty-four studies related to the concept of diabetes knowledge and patients with type II diabetes, six studies were from Middle Eastern countries: one each from Kuwait, Oman, Turkey, the United Arab Emirates, and two from Pakistan. These studies aimed to assess or evaluate diabetes knowledge among people in the population who have type II diabetes. Furthermore, of twenty-six articles related to self-management, only one article was from the Middle East, specifically, Jordan. That study evaluated the relationship of diabetes management self-efficacy, and diabetes self-management behaviors. This study will be

the first to investigate the relationship among the aforementioned concepts in the State of Qatar.

CHAPTER III

Research Design and Methods

This chapter presents the methodology used in this research study. The study's research design, sample, sample selection procedure, determination of sample size, variables and measures, instruments, means of data management, data analysis, and human subject protections will be described. The purpose of this study was to investigate how the relationships among diabetes knowledge, self-efficacy, social support, and diabetes self-management affect diabetes management and diabetes outcomes among Qatari adults with type II diabetes.

Design

The proposed study used a cross-sectional, correlational design to examine the relationships among diabetes knowledge, self-efficacy, social support, and self-management and their effects on diabetes outcomes. Some of the benefits to using this type of design include the fact that it requires meeting with the participants only a single time, and there is not a great deal of expense involved in administering this study. Moreover, since this is the first time this kind of research is being conducted in Qatar, a cross-sectional descriptive correlational design is appropriate to test theoretical and empirical relationships among the variables (LoBiondo-Wood & Haber, 2006). According to LoBiondo-Wood and Haber (2006), a longitudinal design helps researchers to collect more information about diabetes management at different points in time. However, for this initial study, it is neither suitable nor feasible to collect data at different points in time due to time constraints, the need for more resources, and financial limitations. An experimental/quasi-experimental design was also ruled out because

further understanding of the relationships among the variables in the Qatari culture is needed before any intervention can take place (LoBiondo-Wood & Haber, 2006).

Setting

Participants were selected from the Hamad Medical Corporation (HMC), which includes Home Healthcare Services (HHCS), Hamad and Al Wakra outpatient diabetes clinics in Qatar. This corporation is the biggest healthcare provider facility in Qatar. Approximately 50% of the 700 clients admitted to the HHCS are diabetic as are the 550 patients who visit the outpatient diabetes clinics monthly. The HHCS has a mix of clients from Qatar, along with a few other Arabic nationalities (e.g. Palestinian, Jordanian), as well as Iranians, Indians, and Pakistanis. The outpatient diabetes clinics also treat diverse nationalities.

The Hamad Medical Corporation (HMC) was established in 1979, and today HMC manages eight specialized hospitals, five of which are specialist and three are community hospitals: Hamad General Hospital, Rumailah Hospital, Women's Hospital, Heart Hospital, National Center for Cancer Care and Research, Al Khor Hospital, Al Wakra Hospital and The Cuban Hospital. In addition, HMC manages the National Ambulance and Home Healthcare Services. For more than three decades, as principal healthcare provider HMC has been the only public healthcare provider in the state of Qatar. HMC's plan has been to deliver safe, effective, and compassionate care and services to its clients. Hamad Medical Corporation is affiliated with Weill Cornell University New York and the Institute for Healthcare Improvement and Partners Healthcare, Boston.

The presence of private hospitals has increased in Qatar, and some of these are Sidra Hospital, Al-Ahli Hospital, Doha Clinic, and Al-Emadi Hospital. Usually patients with diabetes are referred to HMC's diabetes clinics. In addition, there are 21 primary health care centers under the Primary Health Care Corporation (PHCC) located in the north, central and western regions. As Qatar's National Health Strategy comes to fruition in the coming years, both the HMC hospitals and the private hospitals will work toward the common goal of providing world-class healthcare for all.

Sample Selection

A convenience sample was selected from the HMC diabetes outpatient clinics and Home Healthcare Services in Qatar. A convenience sample is made up of participants who meet the entry criteria and are easily accessible to researchers; moreover, it is cost-effective and poses few logistical difficulties (Hulley, Cummings, Browner, Grady & Newman, 2007).

Determination of Sample Size

Sample size was calculated by using G*Power program (Faul, Erdfelder, Buchner, & Lang, 2009) to determine the minimum number of participants needed for this correlational study. According to Cohen et al., to determine sample size a researcher needs power, significance/alpha, and effect size (1988). Linear multiple regression was used to determine sample size in G* power program. Table 1 provides the estimated effect size of the reviewed studies. Although the effect sizes in these studies were provided as R^2 , the linear multiple regression-required f^2 . To convert R^2 to f^2 the formula of $f^2 = R^2 / 1 - R^2$ was used (Cohen et al., 1992). The sample size calculation was

derived from a power level of 0.95, an alpha level of .05, and $f^2 = 0.04$, which determined that the study needs 390 participants (Corty, 2007).

Table 1

Estimated Effect Size

Study	Sample Size	Relationship Examined	Effect Size r	f^2	R^2
Wattanakul et al.	N=197	Self-efficacy and Self-management	0.32	0.121	0.108
Sausa et al.	N=141	Diabetes Knowledge and Self-efficacy	0.24	0.062	0.058
Wattanakul et al.	N=197	Social Support and Self-management	0.29	0.095	0.087
Beard & Clark	N=83	Self-care and Understanding HbA1c	0.35	0.14	0.125
$f^2 = R^2 / 1 - R^2$			Mean f^2	0.10	0.09

The inclusion criteria call for adults with type II diabetes with or without diabetes complications, as well as subjects with controlled or uncontrolled diabetes. Subjects with limited literacy will be included. Persons age 20 years and above will be included. Participants in this study should be able to speak and understand either English or Arabic. Participants who have been diagnosed with psychomotor delay and intellectual impairment were included, except for those who were unable to give informed consent or answer instruments, alongside people with dementia, as these kinds of impairments could

interfere with engagement in self-care management (Orem, 1995). In addition, exclusion criteria are adults on an insulin pump and pregnant women who have gestational diabetes.

Subject Recruitment

Qatar National research approval and the required Case Western Reserve University Institutional Review Board (IRB) approvals were obtained. The researcher explained the eligibility criteria to the Home Healthcare Services and outpatient diabetes clinic research assistants so that the assistants would be able to identify subjects who meet the inclusion criteria. The researcher also trained the research assistants in the process of recruitment and data collection. The research assistants received training about the study, its basis in theory, its aims, instruments, and processes as well as guidance for resolving problems. After the subjects agreed to participate in the study, the research assistants obtained consent and explained the nature of the research and addressed any ethical concerns. Data were then collected either in person (via a face-to-face interview). This method is most feasible for Qatar's society, as opposed to telephone interview or mailing questionnaires, because there are no mailing system and addresses in Qatar. Qatar has one mail office, and residents who have a mailbox within that office must collect their mail from their office mailbox. The chosen method for data collection must be suitable to the research problem, setting, and population (LoBiondo-Wood, 2006). The subjects responded to the research questionnaires, except for those who could not answer the questions because of illiteracy or an inability to read the questionnaires and write the answers. In these cases, the researcher recorded the answers.

The researcher contacted the medical and nursing departments of endocrinology of HMC diabetes outpatient clinic and explained the study and presented the study to

staff. The researcher presented a power point presentation that explained the purpose, significance, conceptual framework, and research model and data collection procedure. The researcher got permission from HMC IRB and prior to the presentation the researcher informed the physicians and diabetes educators in the HMC outpatient clinics and home healthcare services about the study. All of the research assistants completed the Collaborative Institutional Training Initiative (CITI) certification prior to data collection. The researcher gave training to the research assistants, which included a day of presentation and later a discussion session about the purpose and advantages of the study, inclusion and exclusion criteria, considering the confidentiality and privacy of the participants during their time with subjects, how to approach and enroll eligible participants. The research assistants were given a small scenario as an example, and demonstrated how to fill out the instruments and answer questions of participant for clarification of the question or phrases. The research assistants demonstrated how to code the participants file and questionnaires, how to arrange tables with the name and code related to the participant in a notebook and how to manage when a participant wants to withdraw from the study.

All of the research assistants were nurses employed by Hamad Medical Corporation, and they were currently working in the outpatient clinic department (Hamad General, Al-Wakra hospital, and Home Healthcare Services) from where participants were enrolled into the study. The research assistants were usually diabetes educators and part of their job was doing the data collection; however, in this study, as a token of appreciation for their support in collecting the data, when they finished data collection, some money was funded to them. The research assistants were not informed about the

payment until the end of their data collection. All patients were approached by research assistants during their clinic visit in an examine room and were informed about the study. Once a patient's eligibility was confirmed their informed consent obtained, face-to-face interviews took place and research assistants supported and helped the participant when patient had a need for explanation to understand the question, phrases or a word.

Additionally, during an initial visit with each of the participants, the research assistant explained the study's purpose, the ethical concerns, and the expected level of cooperation, and the research assistant assured those individuals that their voluntary participation in the study would not affect the level of care they received. Furthermore, if any participant wanted to withdraw from the study at any time, their decision would not affect the care they receive from HMC. Data collection took place in three ways: the participants could take the research packet home and complete it independently then return it to the research assistant during a scheduled appointment; the research questions could be presented and the answers recorded via a phone interview conducted by the research assistants; or if the participants could not answer all of the questions independently, they may have received help from the research assistants. The data collection occurred in a private available exam room. Approximately one hour was needed to complete the study's questionnaires/scales. The researcher continued collecting data until the estimated sample size (N=259 participants) was achieved. Data collection occurred over four months from June to September 2017. No compensation was provided to participants for their time as in Qatar it is not common to provide any kind of gift.

A preliminary pilot study was done to evaluate instrument clarity and consistency and to learn how much time should be estimated for the study. This pilot study was valuable because it afforded the researcher the opportunity to learn if the participants had any suggestions and to detect the need for revisions to improve the data collection procedure. To calculate the sample size for this pilot study, 10% of the final study size was used. The pilot sample size included 10 participants who were not part of the main study. The pilot study did lead to changes in the above protocol. Specifically, the researcher learned that the best way to collect data from the participant was to gather the data in a face-to-face manner. Additionally, the researcher learned that each participant needed between 1-2 hours to complete the questionnaire.

Data Collection

Demographic Variables

Participants' demographic data were obtained in order to describe the sample. According to Orem et al. (1995) demographic variables are basic factors that potentially influence an individual's other factors such as personal and environmental factors. These demographic variables could affect the other variables in the study; hence it is essential that they be considered. A demographic questionnaire was used to collect the information.

Demographic variables, including age, gender, race, religion, marital status, employment status, and education were collected from participants. The department from which each patient was recruited was recorded (HMC diabetes clinic, or HHCS). The ages of the participants were measured in years. Diabetes related health information was obtained from participants and/or from their medical files. The diabetes-related

information included family history of diabetes, years with diabetes/duration of the disease, last blood glucose and glycosylated haemoglobin HbA1c levels. Additionally, other diagnoses that patient might have had, such as high blood pressure, cardiac problems, kidney problems, digestive and gastro problems and mental health diagnoses were noted.

Measures/Instruments

The main dependent variable in this study is glycemic control, which is considered to be one of the diabetes outcomes or diabetes management results. The independent variables are diabetes knowledge, self-efficacy, social support, and self-management. The variables were measured as follows:

Glycemic Control

To assess a patient's glycemic control, the most recent HbA1c value was recorded. By measuring glycosylated haemoglobin (HbA1c) health providers are able to see an overall picture of what the individual's average blood glucose level was over the past 3 months. The HbA1c is an estimated average of blood glucose levels that is calculated from the average erythrocyte lifespan. The American Diabetes Association (ADA) has recommended that HbA1c is a good indicator for monitoring the effectiveness of self-management behaviors (2011). The study obtained a participant's recent HbA1c from the patient's medical record. The Hamad Medical Corporation (HMC) laboratories conduct the HbA1c tests for all patients who are from both HHCS and the diabetes outpatient clinics. Additionally, the HMC laboratories follow the recommended standards for point-of-care, and there is an HMC point-of-care committee that makes sure all of the departments within the corporation follow that standard. To evaluate the

reliability of the HbA1c values, the researcher referred to the Hamad Medical Corporation lab for their HbA1c standard index table and point-of-care protocol.

Diabetes Knowledge

Diabetes knowledge was measured with the instrument developed by the Michigan Diabetes Research and Training Centre (1990), which is called the Diabetes Knowledge Test (DKT).

Psychometric Properties of the DKT

The Diabetes Knowledge Test (DKT) is a twenty-three-item test, which is divided into two subscales: a general test and an insulin test. The general test subscale has fourteen items (questions # 1 to 14) that are suitable for testing the diabetes knowledge of adults with type II and type I diabetes mellitus. The subsequent items, from fifteen to twenty-three, belong to the insulin test subscale, which includes nine items. This study used only the first 14 questions because the rest of the questions are more suitable for Type 1 diabetes. The DKT is made up of multiple-choice questions that each have only one correct answer. The total test score is between zero and twenty-three, with the general subscale ranging from zero to fourteen, and the insulin subscale ranging from zero to nine. Higher scores indicate greater diabetes knowledge. The validity and reliability of the test was supported by Fitzgerald et al. (1998). Fitzgerald examined the DKT by comparing two different samples: a community sample and a health department sample. Fitzgerald (1998) stated that Cronbach's coefficient alpha was used to calculate scale reliability for the general test in the community sample, $\alpha = .70$, and for the insulin use test, $\alpha = .74$. Hence, the reliability of the diabetes knowledge tests was supported in both the community and health department samples (Fitzgerald, 1998).

The content validity of the Diabetes Knowledge Test (DKT) has been established by a panel of experts in diabetes from different disciplines such as medicine, nursing, nutrition, and psychology (Fitzgerald et al. 1998). Moreover, the validity of the research instrument was determined with two different samples by comparing the different groups: a community sample (N=312) and a health department sample (N=499) scores. The scores are calculated according to diabetes type and treatment, educational level, and diabetes education received. For diabetes type and treatment scores, both the community sample and the health department center sample, individuals with type I diabetes mellitus scored higher than individuals with type II diabetes mellitus on the general test subscale and the insulin use test subscale. In some of the scores by educational level, for both samples, individuals with higher educational levels scored higher than individuals with lower educational levels on both the general test scale and insulin-use test scale. In examining diabetes education, both the community sample and the health department center sample, individuals who had diabetes education scored higher than those who did not have diabetes education on both the general test subscale and on the insulin-use test subscale.

To measure the reliability of the translated Arabic version of the DKT, internal consistency was used. Internal consistency measures the “degree to which each of an instrument’s items measure the same characteristic” (Higgins et al., 2006). Cronbach’s alpha was used to analyze the data for consistency. The validity of the instrument was measured by construct-content validity and by using literature review to evaluate the concept/instrument (Higgins et al., 2006). The DKT has proven to be a reliable instrument for measuring diabetes knowledge among adult diabetic populations for

decades. The researcher therefore decided to use the DKT scale to measure the diabetes knowledge of adult Qatari patients with type II diabetes.

Self-efficacy

Self-efficacy is a belief in one's ability to successfully make a change in a particular situation. Sousa (2003) described self-efficacy as part of a "self-system" that reconciles the relationship between knowledge and action, as well as between action and outcome. In other words, self-efficacy is defined as a person's confidence in the personal and environmental resources used to perform specific activities that lead to a desired outcome (Sarkar, Fisher & Schillinger, 2006). Consequently, an individual's thoughts have a causal influence on behavior (Bandura, 1986, 1995). Self-efficacy was measured with the Self-Efficacy for Diabetes (SED) instrument from the Stanford Patient Education Center, 1996. This instrument measures multiple components of an individual's ability to perform the necessary tasks and manage his/her diabetes.

Psychometric Properties of the Self-efficacy for Diabetes (SED)

The Self-efficacy for Diabetes (SED) instrument is an 8-item questionnaire which measures how confident individuals are in doing certain activities; and it measures an individual's abilities to manage daily diabetes self-management/self-care behaviors, including diet, physical activity, medication adherence, and blood sugar monitoring. The questions have an observed range from 1 to 10: a higher number indicates higher self-efficacy. The SED is a reliable scale. The scale has an internal consistency reliability of 0.83 (Stanford Patient Education Research Center, 1996); no information was provided for the instrument's validity. The reliability for the instrument was tested using internal consistency: a Cronbach's alpha statistical test was used. Construct-content validity and

literature review were used to evaluate the validity of the Self-Efficacy for Diabetes scale.

Social Support

Social support is the perception of actual instrumental and expressive care provided by family, friends, other people in the community, and social workers (Lin, 1986, p.18). Social support is an interaction and exchange of resources between at least two persons, providing love, trust, empathy, caring, actual services, help, recommendations, advice, and information (Shmaker & Brownell, 1984). Social support was measured with Sherbourne and Stewart's (1991) Medical Outcome Study (MOS) Social Support Survey.

The MOS measures different resources that diabetic patient's access to seek help and support. These resources include emotional and physical support, educational support, someone who has a close relationship with the patient, and someone who provides support when the patient is sick. As compared to other instruments, the current study used the MOS for measuring social support because the questions are more relevant to the Qatari culture.

Psychometric Properties of the MOS

In 1991, Sherbourne & Stewart, interested in the functioning aspects of social support, developed the Medical Outcome Study (MOS). The MOS, made up of fifty items, is based on support items and dimensions identified in the literature review. A pilot study and a later study were conducted among adults at an outpatient health clinic in Southern Illinois (Sherbourne, 1991). Based on these two studies, the final number of scale items was decreased to twenty with four subscales (emotional or informational,

tangible, affectionate, and positive social interaction), which were supported by multi-trait scaling analyses. The four subscales were internally consistent and distinct from each other. The new scale contained twenty items with four subscales in which one item (amount of structural support) was not scored. The nineteen items that were scored used a five-point Likert-type scale in which 1= none of the time and 5= all of the time. A higher score indicated more functional social support (Sherbourne, 1991).

Shelbourne and Stewart (1991) reported that a panel of experts in southern Illinois had determined the content validity of the MOS survey and a pilot study was conducted among adults at an outpatient health clinic. Six behavioral scientists established the items' face validity, resulting in a final scale with 37 items. Based on a pilot study, the final scale was developed, and it consists of 19 functional supports. In addition, psychometric properties of the MOS were determined based on the responses of 2987 patients with chronic diseases (hypertension, diabetes, coronary artery disease, and depression). According to Shelbourne and Stewart (1991), convergent validity showed that the instrument survey score was negatively correlated with loneliness, and positively associated with marital and family functioning, and with mental health.

The reliability was tested and had $\alpha = .97$, and validity showed that the MOS score was negatively correlated with loneliness ($r = 0.53$ to -0.69 and $p < 0.01$), and positively related to marital and family functioning ($r = 0.38$ to 0.57 and $p < 0.01$) and mental health ($r = 0.36$ to 0.45 and $p < 0.01$). The reliability of the MOS was tested by using internal consistency and Cronbach's alpha. The instrument's validity was evaluated by construct validity.

Self-management/Self-care

Self-management is defined as the ability of a person, in conjunction with family, community, and health care professionals, to manage well her or his symptoms, treatments, and lifestyle changes, along with the psychosocial, cultural, and spiritual consequences of chronic diseases (Wilkinson & Whitehead, 2009). The Self-management Profile for Type 2 Diabetes (SMP-T2D) was used to assess self-management.

The Self-management Profile for Type 2 Diabetes was developed and validated in order to assess multiple dimensions and domains of self-management and to create a brief enough instrument for use in research and clinical trials (Peyrot et al., 2012). The SMP-T2D consists of 18 items assessing 12 constructs that include the level and perceived ease of performance in five key domains of the American Association of Diabetes Educators' Self-care Behaviors (AADE7) (blood glucose monitoring, medication-taking, healthy eating, being physically active, and coping). Seven items measure the difficulty of performing the behaviors for the five keys of the AADE7 domains and the two constructs (ease of weight management, confidence with ability to manage diabetes) (Peyrot et al., 2012). The final item, coping, measures the consequences of coping such as "amount of diabetes-related frustration and worry about future health" (Peyrot et al., 2012, p. 11). Peyrot et al. (2012, p. 11) indicated that the ease of coping item refers to "coping with frustration and worry related to your diabetes." Moreover, in the development phase for each of the five behaviors and ease of managing weight, an additional item of "How important is it for you right now to..." was added (Peyrot et al., 2012). Peyrot et al.

indicated that total scores for the SMP-T2D are converted to a 0-100 scale, and a higher score indicates better self-management (Peyrot et al., 2012).

Psychometric Properties of the SMP-T2D

The establishment of content validity of the SMP-T2D was based on a systematic literature review of diabetes self-management to identify concepts from the available literature. Four focus groups were utilized to assess the relevance of identified concepts and to find new concepts; interviews were conducted with 49 patients with type II diabetes plus an expert panel in epidemiology and diabetes care (Peyrot et al., 2012). The instruments were validated by two studies that involved 240 patients with type II diabetes in which study 1 administered the SMP-T2D with a re-test after one week, and study 2 administered the SMP-T2D with a 24-week SMP-T2D follow-up after a change in medication (Peyrot et al., 2012).

According to Peyrot (2012), construct validity was determined through correlations between measures that indicate constructs that were associated to be more strongly (convergent) or more weakly (discriminant) related. Construct validity was more strongly correlated with measures of the lifestyle domains: frequency and perceived ease of eating healthy, physical activity and coping than with the measure of medical regimen domain: frequency and perceived ease of medication and monitoring glucose. In addition, construct validity was more strongly correlated with confidence in ability to manage diabetes and ease of managing weight than with frequency and perceived ease of medication taking, glucose monitoring, eating healthy and physical activity (Peyrot, 2012).

The results showed that all items in the SMP-T2D measures indicated internal consistency with a median Cronbach's alpha = 0.80 ($\alpha = 0.71$ to 0.87) for study 1 and 2 (Peyrot et al., 2012). Readability analysis showed that there was a Flesch-Kincaid Grade level score of 7.0 and those patients needed 3-5 minutes to complete the SMP-T2D (Peyrot et al., 2012). The test-retest reliability showed an interpolated median of $r = 0.83$ for study 1 after a week; all hypotheses described were confirmed (ease and behaviors measures) and had strong associations with 81% of concordance between both studies, and they showed convergent and discriminant validity (Peyrot et al., 2012). Six of the SMP-T2D measures showed significant improvements for study 2 (Peyrot et al., 2012). The median floor effects were 2.5% for both studies, and the median-ceiling effects were 33.0% for both (Peyrot et al., 2012). Furthermore, the result of multiple regression analysis indicated changes in trial outcomes from the baseline to completion of the study, and independent relationships between changes in SMP-T2D measures were seen (Peyrot et al., 2012). The researcher measured the reliability of SMP-T2D using internal consistency, and it was tested by Cronbach's alpha. Additionally, the validity of the instrument was tested using construct validity.

As each of the instruments/measures discussed originated in English, and the current study is to be conducted in Qatar, the researcher used HMC's standard translation procedure and ensured reliability and validity for all components of the study. First, an independent translator translated the original English scale to Arabic. Second, another independent translator translated the Arabic scale back into English. Third, for reliability and validity, the translated Arabic-to-English scale was compared to the original English scale. The translator should be familiar with the study's content in both languages. In

this process of translating the instruments, the translator for English to Arabic and the back translators worked independently (Wang et al., 2006). HMC's employee translator checked the instruments and approved them to be used for the study.

Data Management

Prior to data coding and data entry, all questionnaires/instruments were completed and checked for the accuracy of the written information by the researcher and research assistants. Immediately after the data coding was done, all information was entered into a spreadsheet and, for statistical purposes, was imported to SPSS to avoid data entry error and any possible mistakes. Initially, all of the data were collected on paper forms and once the data had been entered into the spreadsheet, it was backed up, and the back-up was securely stored on the computer. In order to identify any missing data or outliers, the researchers transcribed the data shortly after the data collection. Furthermore, early entry of data into a computer allowed the researcher to run a preliminary analysis and data validation check (Hulley et al., 2007). After data cleaning, the researcher repeated the database back-up. Additionally, the researcher used "double data entry to ensure the fidelity of the transcription" (Hulley et al., 2007, p. 261). Double data entry allows researchers to identify errors and mistakes. The researcher checked all of the data collection and test for any missing values, inconsistencies, and outliers. Any data errors found were referred to the research assistants for correction.

The researcher used a computer and a document coding system to store and assure the security of the data. The results of the study have been written in a way that does not identify the participants and all results and findings are being reported in aggregate, with no means of identifying individual participants in the study. Furthermore, the

data/information is being stored in a locked file drawer or a fingerprint-protected computer. Only the researcher has access to this information/data, and it is coded and protected. Five years after the completion of the study, a paper-shredding machine will be used to destroy the data, and computerized files will be deleted in compliance with national policy.

Data Analysis

Since the study is using a correlational design and is based on the research questions, correlation/regression coefficient tests have been used. After entering the data in a spreadsheet, the data were imported to the Statistical Package for Social Sciences (SPSS) for analysis. Data were analyzed using descriptive statistics for subject and demographic variables. Descriptive statistics were also used to present the data through tables, graphs, means, medians, modes, and standard deviations (Corty, 2007). The researcher has run the frequencies to identify any abnormal distributions. Statistical testing has been used to identify any missing data and outliers. The covariates to be controlled are age, gender, race, and education. These covariates have been included in the regression equation.

To test the assumptions of multiple regressions, each of the aforementioned variables were tested for normality, and partial residual plot (linearity) (Field, 2009). Homoscedasticity was tested using standardized residual scatter plots, and random scattering (Field, 2009). Multicollinearity is another test that is used with multiple regression. Multicollinearity occurs when two or more independent variables are highly correlated. The variance inflation factor (VIF) and tolerance are two tests that can detect multicollinearity for each independent variable (Field, 2009; Tabachnick & Fidell, 2007).

A VIF level of $r = .90$ and above for two variables, and a tolerance level of less than $.10$ indicate the presence of multicollinearity (Field, 2009; Tabachnick & Fidell, 2007).

Additionally, critical residual assumptions that cannot be violated are: the assumptions of independence error and zero mean. The independence error occurs when the value of one variable does not impact another (the residual terms should be independent or uncorrelated), and it has been tested using the Durbin-Watson test, and its acceptable range is from 1.5 to 2.5 (Field, 2009; Tabachnick & Fidell, 2007). The assumption of independence error is often violated by time and distance (Tabachnick & Fidell, 2007). Moreover, error was tested to see if the residuals in the model are random, normally distributed variables with the mean of zero (Field, 2009).

Data Analysis Process by Research Question:

1. What is the relationship of diabetes knowledge, self-efficacy, social support, and self-management with glycemic control for Qatari adult patients with type II diabetes?

To find the answer to this first study question, a Pearson's correlation coefficient was used since the question asks about the relationship between the variables of diabetes knowledge, self-efficacy, social support, and self-management with regard to glycemic control.

2. Does self-efficacy mediate the relationship between diabetes knowledge and diabetes self-management?

The researcher used a multiple regression to answer question number two. Since the question asks about mediating effect, a multiple regression was used to explore the answer (Bennett, 2000). The researcher used three regression equations to test if self-

efficacy had a mediating effect. The first equation tests if diabetes knowledge (the independent variable) was a significant predictor of self-efficacy (the mediator). The second equation tests if diabetes knowledge (the independent variable) was a significant predictor of glycemic control (the outcome variable). The third equation included both diabetes knowledge (the independent) and self-efficacy (mediator variables) with glycemic control (the outcome variable) (Bennett, 2000).

In case the mediating effect of self-efficacy was not found, a hierarchical regression with four stages was conducted. The independent variables were entered into the hierarchical regression equation in the order chosen by the researcher based on previous tests or work (Field, 2007). In the first stage, diabetes knowledge was entered. In the second stage, self-efficacy was added to the regression. For the third stage, the researcher entered social support, and finally, self-management was added to the hierarchical regression equation.

3. Does social support moderate the relationship between self-management and glycemic control?

A moderator is “an independent variable that affects the strength and/or direction of the association between another independent variable and outcome variable” (Bennett, 2000). Since question 3 is asking about the moderating effect of social support, a hierarchical multiple regression was used to explore the answer. The strategy was to test for interaction. The first step of the regression was to enter the independent variable (self-management) and the moderator variable (social support) into the model as predictors of the outcome variable (glycemic control) (Bennett, 2000). In another step, an interaction term that is the product of the two independent variables representing the

moderator effect would be entered. If the study found that the interaction term explained a significant amount of variance in glycemic control (the dependent variable), the findings would show that the moderator effect of social support was present.

Human Subjects Protection

Respecting the rights of the person is an essential ethical obligation for any researcher. The personal dignity and autonomy of the individual must be addressed, and proper informed consent should be obtained. This means that the person is free to make the decision to participate in the study. In order to be consistent with regard to human subject protection, the researcher provided a set of training sessions for the research assistant staff. To maintain the confidentiality and the privacy of the participants, the researcher used a computer and a document coding system. Each participant was assigned a unique identification number/ID to maintain the subject's confidentiality. All of the information about the participants was stored in a computer database spreadsheet. The stored data has been updated whenever necessary. The data was monitored and statistical analyses such as descriptive correlation coefficients and multiple regressions were used. The researcher ensured that the coding system protected the private health information of the participants.

It was expected that the researcher assistants would interview each participant, and at that time, also discuss and explain the human subject protection as well as describe the study's potential risks and anticipated benefits. The benefits are great for both the Qatari diabetic patients and the researchers. This research can help to identify possible risks and develop policy to reduce those risks in future studies. Furthermore, a scientific approach can prove valuable to Qatari researchers in terms of developing more evidence-

based practices. There were minimal risks for those who participated in this study since the participants did not receive any form of intervention. Moreover, according to Hulley, Cummings, Browner, Grady, and Newman, one of the researcher's risk reductions can be related to "maintenance of confidentiality" (2007, p.231). The researcher stored all of the data/information in a locked file drawer or a fingerprint-protected computer. Only the researcher has access to this information.

Payment is often considered one of the rights of participants as compensation for their time and effort when taking place in this kind of research study (Hulley et al., 2007). Since payment to a research participant is new in Qatar, talking about compensation might be a difficult task for the researchers and assistants who work with the Qatari participants. According to the researchers in Qatar mostly because Qatar has universal health system, giving compensation to the participants is not practiced.

The researcher has made sure using the coding system as mentioned above protects the health information of the participants. Additionally, some of these individuals might have felt pressure to participate because of the healthcare staff providing care for them. Therefore, the researcher assured the participants that refusal to participate in or withdrawal from the study would not affect their future healthcare needs. The participants got a handout describing how to contact/refer to the research team if they encountered a problem regarding their diabetes or have additional questions about the study.

Chapter IV

Results

The primary aim of this study was to investigate how diabetes knowledge, self-efficacy, social support, and self-management affect diabetes control in Qatari adults. In addition, a second aim of the study was to examine self-efficacy and social support, respectively, as a mediator and a moderator. A convenience sample was chosen from the Hamad Medical Corporation's outpatient diabetes clinics and Home Healthcare Services.

In this chapter, the results are presented. Details of data management and the data analysis procedures are provided. A description of the sample is provided first, followed by the preliminary testing of the study variables for the assumption for regression/the statistical tests, and then analyses of the research questions are presented.

Data Exploration

The sample included 259 diabetic patients from the Hamad and Al-Wakra hospitals' out-patient diabetes clinics and Home Healthcare Services. Initial data screening was conducted for accuracy and normalcy in preparation for further statistical analysis. Descriptive statistics were performed to describe the characteristics of the sample. Frequencies and histograms were used to examine the study variables and assumptions of the statistical tests for distributions, outliers, out of range values, and missing data. The results showed that there were no out of range values or outliers. The statistical test of normality and its shapes of their distribution were visually tested, and the frequencies of the study variables were normally distributed. There was missing data for the duration/onset of diabetes, as well as for the outcome variables of HbA1c. For the demographic questions, 5 (1.9%) cases had missing data for the onset of diabetes; 4 (1.5

%) cases were missing answers for HbA1c, and 2 (0.7%) cases did not have blood glucose data. Since the missing data were only a small percentage of the results, replacing the missing data for such values was deemed unnecessary.

Sample Characteristics

Characteristics of the sample presented in Table 6 are categorical variables (gender, race/ethnicity, marital status, occupation, education, family history of diabetes, history of heart problems and high blood pressure, history of lung problems, history of kidney problems, digestive or gastro problems, any surgeries, and other health problems). Table 7 presents the continuous variables (time of diagnosis/duration of diabetes, the last blood glucose reading, and HbA1c levels). Two hundred fifty-nine participants were recruited. There were 211 participants recruited from the HMCs Al-Wakra outpatient diabetes clinic, and 48 were from the Hamad outpatient clinic and Home Healthcare Services.

The majority of the participants were Arab (74%). Non-Arabs and others (African, Asian and British) together comprised 25.9% of the population, and two thirds of the participants were male (63%) and most were married (85.7%). Over half (n=135, 52%) had some college education. Seventy-three participants (28.2%) worked for the government, and 27% worked for private non-government companies. One hundred eighty-nine had a family history of diabetes (73%), 41.7% had a history of heart problems and high blood pressure, and a small percentage had kidney disease, digestive/gastrointestinal problems, lung problems, or a mental disorder.

The study sample had an average age of 50.7 years (SD=13.0). The duration of diabetes averaged 9.3 years (SD=8.1); the average blood glucose was 176.8 mg/dl (SD=77.8), and the average HbA1c was 8.6% (SD= 2.2).

Table 2

Sample Characteristics for Categorical Variables

Variable	Sample Size N=259	Percentage (%)
Gender		
Male	164	63.3
Female	95	36.7
Marital status		
Married	222	85.7
Not Married	18	7
Others	19	7.3
Race/Ethnicity		
Arab	192	74.1
Non-Arab	67	25.9
Education		
Never attended school	14	5.4
Grade 1 through 8	40	15.5
Grade 9 through 11	15	5.8
GED*/High School Diploma	55	21.2
13-15/College	57	22
16 or more	78	30.1
Occupation		
Government Employed	73	28.2
Non-Government Employed	70	27
Housewife	43	16.6
Retired	24	9.3
Self-Employed	28	10.8
Others	21	8.1
Family History of Diabetes		
Yes	189	73
No	70	27
History of Heart Problems and High Blood Pressure		
Yes	108	41.7
No	151	58.3
History of Kidney Disease		
Yes	29	11.2
No	230	88.8
History of Digestive/Gastro Problems		
Yes	27	10.4
No	232	89.6

History of Lung Problems			
Yes	8	3.1	
No	251	96.9	
History of Mental Health Problems			
Yes	6	2.3	
No	253	97.7	

Note. GED= General Educational Development

Table 3

Sample Characteristics for Continuous Variables

Variable	N	Min-max	Mean	Median	SD
Age	258	21-85	50.7	51	12.9
Duration of Diabetes	254	21-37	9.3	8	8.1
HbA1C	255	4.20-15.1	8.6	8.2	2.2

SD = Standard Deviation

Min = Minimum

Max = Maximum

Descriptive Statistics for the Study's Variables

Descriptive statistics for the study's variables are presented in Table 4. The distribution of the scores of diabetes knowledge, social support, self-efficacy, and self-management were all normally distributed with no skewness or kurtosis in the normality plot. All the variables had means and medians close to each other, and the mean was the best measure of central tendency because there were no outliers or extreme scores. The diabetes knowledge test showed that the mean was 9.2. This study used only the first 14 questions because the rest of the questions are more suitable for Type 1 diabetes.

Table 4

Descriptive Statistics for the Study's Variables (N= 259)

Variable	Min-Max	Mean	Median	SD	Possible Range
Diabetes Knowledge Test	3-13	9.2	9	1.9	0-14
Medical Outcome Study Social Support Survey	19-95	69.6	73	18.9	0-95
Self-Efficacy	14-80	51.9	52	13	0-80
Self-Management	33-118	86.0	86	13.9	0-118

SD = Standard Deviation

Min = Minimum

Max = Maximum

Internal Consistency of the Estimate of Reliability

All of the instruments that were used for the study were computed for their internal consistency of the estimates of reliability. Table 5 presents the Cronbach's alphas for the study's instruments. All of the research instruments were reliable except the diabetes knowledge test, which was 0.26, and self-management, which was 0.66.

According to Nunnally & Burnstein, the minimum recommended Cronbach's alpha is .70 (1994).

Table 5

Internal Consistency of the Estimates of Reliability for Study Research Instruments (N = 259)

Research Instrument	Alpha	95% Confidence Interval
Diabetes Knowledge Test (DKT)	0.26	0.1 - 0.39
Medical Outcome Study Social Support Survey	0.96	0.95 - 0.97

(MOS)		
Self-Efficacy for Diabetes	0.80	0.76 - 0.84
Self-Management Profile for Type 2 Diabetes (SMP – T2D)	0.66	0.59 - 0.72

Testing the Assumptions of Regression

Data were tested for the regression assumptions of multicollinearity, variance inflation factor (VIF), the Durbin-Watson test, and normality. Multicollinearity is a test that is generally performed using regression analysis. When independent variables are highly correlated and duplicative, multicollinearity appears. To detect multicollinearity, the researcher tests the tolerance for each dependent variable. A tolerance that is more than 0.10 is considered absent of multicollinearity. In all the regression analyses for this study, the tolerance was never below 0.75, which indicated that none of the independent variables were highly correlated with other independent variables. In addition, the variance inflation factors were all more than 1.00, and are therefore considered acceptable. Furthermore, the critical residual assumptions that could not be violated were the assumptions of independent error and zero mean. An independent error occurs when the value of one variable does not impact another (the residual terms should be independent or uncorrelated), and this was tested using the Durbin-Watson test. The test's acceptable range is from 1.5 to 2.5 (Field, 2009; Tabachnick & Field, 2007). The Durbin-Watson range for this study was 1.85 to 1.88, indicating that there was no violation of the assumption of independence. Zero mean was assured by examination of the regression output to determine that the assumption was met. All of the regression test variables were

normally distributed and no influential case was noticed on the plots, thereby indicating homoscedasticity.

Correlation and hierarchical regression were used to test the study questions. Pearson's correlation was performed in order to estimate the relationship between the independent variables (diabetes knowledge, social support, self-efficacy, and self-management) and the dependent variable (HbA1c). In the regression analysis, testing was done for the coefficient of determination (R^2 , Adjusted R^2 and R^2 changes), the regression significance (F and F changes) and the standardized regression coefficient (β).

Correlations: Testing the Interrelationship among the Study Variables

Since the study was exploratory in nature, the Pearson correlation test was performed to examine and identify any univariate relationships among the independent and dependent variables. The results of the correlations are presented in Table 6. According to the accepted guidelines for correlation coefficients, any value in the interval between +1 and -1 indicates a linear correlation (Ratner, 2009). Values between -0.3, 0 and +0.3 were considered weak relationships; values between 0.3 and 0.7 (-0.3 and -0.7) indicate moderate relationships, and values between 0.7 and 1.0 (-0.7 and -1.0) indicate strong relationships (Ratner, 2009).

Interrelationships between the independent variables are presented first. Based on the correlation guideline variables, duration of diabetes has a weak relationship with gender ($r=0.15$, $p<0.05$), and with race/ethnicity ($r=0.17$, $p<0.01$). Age and education had a weak negative correlation ($r = -0.33$, $p<0.01$), while age and duration/onset of diabetes had a moderate positive correlation ($r = 0.43$, $p<0.01$). Diabetes knowledge had a weak positive relationship with gender ($r=0.13$, $p<0.05$). Additionally, diabetes knowledge had

a weak positive relationship with education. Social support had a weak positive correlation with diabetes knowledge ($r=0.14$, $p<0.05$). Self-efficacy had a weak negative correlation with race/ethnicity ($r=-0.22$, $p<0.01$), a weak positive relationship with education ($r=0.24$, $p<0.01$), and a weak positive correlation with social support ($r=0.19$, $p<0.01$). Self-management had a weak positive relationship with education ($r=0.14$, $p<0.05$), and a weak positive relationship with social support ($r=0.15$, $p<0.05$). Self-management had a moderate positive relationship with self-efficacy ($r=0.47$, $p<0.01$). The primary interest is HbA1c, which had a weak negative correlation with age ($r=-0.16$, $p<0.01$). There were no significant relationships between the other study variables and HbA1c.

Table 6

Correlation Matrix for Demographic and Major Variable (N = 259)

Variable	1	2	3	4	5	6	7	8	9	10
1. Gender	1									
2. Race/ Ethnicity	0.12	1								
3. Education	-0.12	-0.10	1							
4. Duration of Diabetes	0.15*	0.17**	-0.12	1						
5. Age	0.00	0.10	-0.33**	0.43**	1					
6. Diabetes Knowledge	0.13*	0.07	0.15*	0.00	-0.07	1				
7. MOS Social Support	0.12	0.02	0.07	0.04	0.02	0.14*	1			
8. Self- Efficacy	-0.11	-0.22**	0.24**	-0.08	-0.05	0.04	0.19**	1		
9. SMP – T2D	-0.05	-0.05	0.14*	-0.09	-0.07	0.06	0.15*	0.47**	1	
10.HbA1c	-0.01	-0.05	-0.01	0.09	-0.16**	-0.10	-0.09	-0.11	-0.09	1

Notes: *. Correlation is significant at the 0.05 level (2-tailed). **. Correlation is significant at the 0.01 level (2-tailed).

MOS= Medical Outcome survey Social Support

SMP-T2D= Self-management Profile Type 2 Diabetes

HbA1C= Glycated Haemoglobin A1c

Research Question 1

The first aim of the study was to answer the question: What is the relationship of diabetes knowledge, self-efficacy, social support and self-management with glycemic control for Qatari adult patients with type II diabetes? The degree to which the variables were related to one another was tested by linear regression. The results of the regression analysis are presented in Table 7. The dependent variable in the study was HbA1c. The predictor variables were diabetes knowledge, self-efficacy, social support, and self-

management. In the regression analysis of the effect of the independent variables on the dependent variable (HbA1c), the overall results were $R^2=0.024$, $Adj R^2=0.009$, $F(1.56)$ and the p value for the overall F was $p=0.19$. The results showed that none of the independent variables predicted the dependent variable HbA1c.

Table 7

Regression Analysis of DKT, SE, MOS and Self-Management on HbA1C

Source of Variation	Standardized Coefficients Beta	p	95% Confidence Interval for B
Diabetes Knowledge Test	- 0.07	0.19	- 0.24 - 0.05
Self- Efficacy	- 0.05	0.32	-0.04 - 0.01
Medical Outcome Survey	- 0.006	0.42	-0.02 - 0.01
Self-Management	- 0.042	0.55	-0.03 - 0.02

Adj= Adjusted, Dependent variable= HbA1C, independent variables: DKT, SE, MOS, SM

DKT= Diabetes Knowledge Test

SE= Self- Efficacy

MOS= Medical Outcome Survey Social Support

HbA1C= Glycated Haemoglobin A1C

Research Question 2

The second research question was: Does self-efficacy mediate the relationship between diabetes knowledge and diabetes self-management? Hierarchical regression was performed to determine if self-efficacy does, in fact, mediate this relationship. According to Baron and Kenny:

“First, the independent variable must affect the mediator in the first equation; second, the independent variable must be shown to affect the dependent variable in the second equation; and third, the mediator must affect the dependent variable in the third equation. If these conditions all hold in the predicted direction, then

the effect of the independent variable on the dependent variable must be less in the third equation than the second. Perfect mediation holds if the independent variable has no effect when the mediator is controlled.” (p. 1176)

There was no significant relationship between diabetes knowledge (independent variable) and self-efficacy (mediator) according to the correlation table with ($r=.04$). Thus the first condition was not met and there is no mediation effect.

Research Question 3

The third research question was Does social support moderate the relationship between self-management and glycemic control? Hierarchical multiple regression was used to analyze the moderating effect of social support on the relationships between self-management and glycemic control. In the first step, the independent variable (self-management) and the moderating variable (social support) were entered into the model as predictors of the outcome variable (HbA1c). In the second step, the product or interaction of the two independent variables was tested for a moderating effect (Baron & Kenny, 1986; Bannett, 2000). The results are represented in Table 8. There was no statistically significant relationship between self-management and social support on glycemic control found in step 1, and no influence from the interaction term from step 2 was found. Thus, there was no moderation.

Table 8

Testing Whether Social Support Moderates the Relationship between Self-Management and Glycemic Control (HbA1c)

Source of Variation	Step	R	R ²	Adj. R ²	R ² Change	F	F Change	SC β	P
Self-Management	1	0.090	0.008	0.004	0.008	2.066	2.07	-0.09	0.152
MOS Social Support Effect on SM and HbA1c (interaction term)	2	0.117	0.014	0.006	0.005	1.735	1.40	-0.075	0.24
								-0.079	0.21

Adj= Adjusted, Dependent Variable=HbA1C, Independent Variables: MOS and SM, SC β =Standardized Coefficients Beta

MOS=Medical Outcome Survey Social Support

SM= Self-Management HbA1C= Glycated Haemoglobin A1c

Post Hoc Power Estimate

A post hoc power analysis was done for the sample size of N=259, an alpha level of .05, and effect size r of 0.19 in which the G power calculated a power level of 0.87.

The final power was adequate to detect an effect if there was one. In other words, the sample size was large enough to detect any significant relationships.

Summary

The sample population included 259 participants with type 2 diabetes from the Hamad Medical Corporation (Hamad General, Alwakra hospital diabetes outpatient clinic and Home Healthcare Services diabetic patients). The data were analyzed by using statistical correlation (Pearson r) and hierarchal regression to answer the study questions. The majority of the participants in this study were Arab (74%), most of them were male

(63%), and 52% of them had some college education. One hundred eighty-nine had a family history of diabetes (73%). The average age for the sample was 50.7 years; the average HbA1c was 8.6%. Data were examined for regression assumptions of multicollinearity, variance inflation factor (VIF), the Durbin-Watson test, and normality, and there were no violations of these assumptions.

There was no relationship between diabetes knowledge, self-efficacy, social support, self-management and glycemic control for adult Qatari patients with type 2 diabetes. Furthermore, self-efficacy did not mediate the relationship between diabetes knowledge and self-management. Finally, social support did not moderate the relationship between self-management and HbA1c.

CHAPTER V

Discussion

This exploratory study had three aims: (1) to examine whether diabetes knowledge, self-efficacy, social support, and self-management can predict glycemic control as measured by HbA1c levels, (2) to test if self-efficacy has a mediating effect on the relationship between diabetes knowledge and self-management, and (3) to test if social support has a moderating effect on the relationship between self-management and HbA1c. The findings of this research are discussed and compared to the findings of other published research studies. Finally, the strengths and limitations of the current study, as well as implications for nursing research, practice, and theory development will be examined and discussed.

Interrelationships and Correlations among the Study Variables

To determine whether diabetes knowledge, self-efficacy, social support, and self-management have an association with the outcome, glycemic control (HbA1c), correlations were run. There was no significant associations between HbA1c and diabetes knowledge, self-efficacy, social support or self-management. As mentioned in Chapter II, there has been an increase in the publication of international research aimed toward understanding diabetes management. These studies examine the relationship between education, diabetes knowledge, and self-management. According to Samtia (2013), participants who received an educational intervention had better glycemic control as measured by HbA1c levels. Additionally, Berikai (2007) found that those who received diabetes education improved their HbA1c levels. In contrast, the few studies that took place in the Middle-East were similar to the current study in that they found no

correlation between diabetes education and increasing diabetes knowledge and HbA1c management (Al-Maskari et al., 2013; He & Wharrand, 2007). An issue in Qatar is that the diabetes education is not implemented systematically and therefore standard protocols and quality improvement are needed to ensure that patients receive the evidence based education.

Self-efficacy was another concept measured to explore if there was a correlation with HbA1c. Many researchers consider self-efficacy to be vital for patients with chronic diseases such as diabetes. Mohabi (2013) stated that self-efficacy can be defined as a person's abilities and confidence in self-management, which can affect an individual's performance and behavior. The literature on the relationship between self-efficacy and glycemic control is unclear. While two studies reported that self-efficacy was associated with self-reported HbA1c and the reduction of HbA1c (Osborn et al., 2014; Weaver et al., 2014), two other studies found that there was no significant correlation between self-efficacy and HbA1c (Beckerley et al. 2013; Chag, Lin, Chao & Chen, 2014).

No statistically significant association was found between self-efficacy and HbA1c in the current study. Some possible explanations include measurement error and cultural differences. It is possible that the tools used to measure self-efficacy are more relevant to Western culture than to Arabic and Middle-Eastern cultures. Another possible explanation might be the difference between Muslim and Western cultures in aspects such as faith. Specifically, the Quran (78-81) reads: "He who created me, and guides me. He who feeds me, and waters me. And when I get sick, He heals me. He makes me die, and then revives me" (Surah The Poets). Thus, according to the Islamic faith, everything in life is controlled by the will of Allah (God) rather than human nature or human desires.

Since everything is believed to be predetermined, there is a greater acceptance of one's fate because it is the will of Allah (God). Hence, in the Islamic belief system, disease and illness are controlled by the will of Allah, who has the power to cure illness. In other words, Allah gives people curiosity and the ability to ask questions, understand science, and develop interventions, and it is through this divine gift that Allah has endowed mankind with the capacity to make scientific discoveries and to develop medical interventions to manage and possibly to cure illness and disease. In this way, health challenges and illness can be understood to be tests from Allah, and one's faith will influence their illness and their progress toward recovery. In many ways, it could be said that in the Islamic faith, a stronger, more direct link is understood between an individual and Allah. Whereas, in Western, Judeo-Christian culture, the belief that an individual's faith and trust in God is generally understood in a more abstract, intangible way.

Another explanation may be related to Arabic food and culture in regions such as the Middle East and countries like Qatar. Food preparation and people's overall lifestyles are very different between Western and Arabic countries. There is easy access to food due to the privilege that Qataris live in: online ordering, personal cooks for a family, and frequent family gatherings, especially during the evening, are commonplace. Generally speaking, Qatari food contains high carbohydrate levels and includes staples such as rice, breads, pasta, and sweetened hot drinks. Another possible explanation can be the Qatari lifestyle in that almost every family has a housemaid, cooks, and drivers, which can decrease the activities of individuals. Additionally, it is not common for Qataris to walk outside or exercise.

In this study we found that there was a weak relationship between self-efficacy and self-management. However, possibly concerning a holistic framework is vital in nursing research as a tool to understand and discuss the results according to the interaction(s) between a person's behavioral, personal, and environmental factors as pointed out in self-efficacy theory (Bandura et al., 1986). However, personal efficacy develops through a series of four stages that are necessary for personal development, confidence, and the ability to perform certain behaviors (Bandura, 1977, 1986, 1995). First, the individual experiences a new situation (personal); next, the person must respond to the situation in two ways by gaining experience from both practice and learning from and observing a successful role model (behavioral); lastly, the individual must have support from family, community, and their healthcare provider (environmental) (Heale & Griffin, 2009; Liu, 2012; Robb, 2012; Zulkosky, 2009).

Furthermore, considering self-efficacy theory, the healthcare provider should pay close attention to an individual's psychological, physiological, sociocultural, and spiritual development in relation to the person's state of illness, as these aspects of a person's whole being influence the person's performance across all behaviors (Newman & Fawcett, 2002). Future studies can consider using different variables such as community pattern and spiritual practices because in Qatari society these variables are very important and affect the way individuals act and react.

Social support was another concept examined in this study. A systematic literature review demonstrated a variable correlation between social support and diabetes management depending on the type of social support measured. In this study, no significant relationship was found between social support and HbA1c levels.

Family support is not thought to be directly related to glycemic control; nevertheless, obstructive family behaviors are often associated with lower adherence to self-care and worse HbA1c levels (Vaccaro et al., 2014; Mayberry et al., 2014). Obstructive family behaviors could include the preparation of foods that are not appropriate for a diabetic person or family members who do not acknowledge the person's illness or encourage better self-care behavior. Three more studies found no significant correlation between social support and HbA1c (Chew et al., 2011; Chlebowy et al., 2006; Kang et al., 2010). While prior studies generally took place in regions other than the Middle East, most found no relationship between classic social support and HbA1c management. More research has to take place in this area to understand the relationships of this concept and diabetes outcomes across different regions and cultures.

The foundations of Qatari culture are based on an Islam and a tradition where social support networks between close relatives, extended family, and friends are essential to the health and well-being of the individual. These networks operate to provide physical, mental, and emotional support to the members of the family. In this instance the lack of significant findings could be related to the fact that over time, cultural traditions have changed and social support networks are no longer the same as they were in past. Secondly, it could be that over time the influence of social support networks may be less pronounced because of long-term exposure. Furthermore, it may also be apparent that the more time a person has had the diagnosis of diabetes, the more complacent the person may become in managing and monitoring glucose. Hence, there is little to no change or possibly a decline in the management of their diabetes. Furthermore, another reason could be the diverse population living in Qatar. According to Dsouza (2016), only

12% of the population in Qatar is Qataris. Hence, diverse cultural norms might affect health management.

In considering how social networks have changed over the years, it is important to delineate between some important concepts. As indicated, family networks have been the main source of support for individuals in Qatari culture. A family social network consists almost exclusively of an individual's immediate and extended family, and will also bring in relations through marriage. In contrast, the advent of new technologies and the explosion of online social networking have re-defined the idea of a person's peer group and the understanding of peer support has evolved in kind. Peer support was defined as support provided to an individual from a group of friends and acquaintances that share much in common with the individual in terms of age, racial or ethnic background, and often education levels and cultural norms. Some studies have shown that subjects with peer support showed a reduction in HbA1c (Fisher et al., 2012; Heisler et al., 2010). Contrary to these articles, however, Smith and Paul found that peer support no longer contributes to significant differences in HbA1c at a 2-year follow up (Fisher et al., 2012; Heisler et al., 2010; Smith et al., 2011). In many cases, peer groups today tend to be broader, and an individual may have many more friends or peers and their experiences may be quite different, but those friendships are generally not as deeply held or valued, and so over time, the impact of peer support may not be as strong or long-lasting as it once was.

Research evidence indicates that self-management behaviors are critical for diabetes control and management. In this study there was no significant relationship between self-management and HbA1c. This result was surprising as the majority of the

literature suggests that there is a clear relationship (Bains et al., 2011; Khunti and Gray, 2012; Wattanakul et al., 2011). Participants' levels of diabetes self-management were based on questionnaires and self-rated reports, which were not examined or observed; subsequently, their actual diabetes management practices might be underestimated or overestimated, and there may have been some biases that could not be confirmed. Object measures of self-management are superior to self-report measures. Future research using objective measures such as daily glucometer readings or adherence to medications are needed.

Although this research found no significant relationship between the major variables and HbA1c, this might be due to a bias involving the patients who are referred to Hamad Medical Corporation diabetes clinics. For the most part, more difficult cases are referred to HMC clinics from the Primary Health Center; these patients already have little control of their diabetes; they have complications, and they often have more than one chronic condition or co-morbidity. The participants who were involved in this research are from these difficult cases. Therefore, from the outset, they challenged with overcoming many barriers to their diabetes management, and this can impact the study results. In other words, because these patients are very ill when they come to the clinic, it is more likely that they have high HbA1c levels, which may influence the relationships between the independent variables and the dependent variable, HbA1c, to become insignificant.

Furthermore, the instruments were administrated by professional research assistants, but we do not have data on how much time was spent collecting the data for each of the participants. Also, it is very important to know if the participants in this

research got the questionnaires at the beginning of their visit or at the end. Usually, diabetes clinics are very busy, and by the end of their visit patients are tired and may just have answered the questions randomly, or it is possible that a participant did not understand the questions and guessed the answers. Due to these concerns about possible selection bias and participants being unable to complete the study questionnaires accurately, an ongoing study is necessary to assess educational and support-based programs. Or a similar study could take place in primary health centers to explore the differences in the kind of patients they get in comparison to HMC's clinics. The type and amount of diabetes self-management performed by adults with type II diabetes in Qatar is still unknown, and the psychosocial, physical, socioeconomic, cultural, and environmental factors faced by these patients should also be considered.

Mediating Effect of Self-Efficacy

There was no significant relationship between diabetes knowledge (independent variable) and self-efficacy (mediator) as demonstrated by Pearson correlation $r = 0.04$. Consequently, the first condition, the existence of the relationship between diabetes knowledge and self-efficacy (mediator), was not met; as a result, there is no mediating effect of self-efficacy between knowledge and glycemic control. Although some research has assessed the mediating effect of self-efficacy between independent variable(s) and diabetes outcomes (depressive symptoms, diabetes meal planning, checking feet, health literacy and/or numeracy, physical and health status), none of these studies examined the mediating effect of self-efficacy on the independent variable, diabetes knowledge, and HbA1c. The relationship between knowledge and self-efficacy could possibly be explored by looking into the differences in terms of the healthcare system, health

education, culture, and beliefs that people have in the Middle East, specifically in Qatar. Although many studies have examined the relationship between knowledge and self-efficacy in Western and Far East countries, more studies are needed to explore the nuances of the impact of self-efficacy in the Middle East, including in Qatar.

Social Support Moderates the Relationship between Self-Management and HbA1c

Social support had no moderating effect on the relationship between self-management and HbA1c. There were no studies that have previously examined the moderating effect of social support on the relationship between self-management and HbA1c. One cross-sectional design study was recently done in Thailand and found that high social support moderates the relationship between diabetes self-management activities and HbA1c (Thiojampa & Mavan, 2017).

There is limited evidence on the moderating effect of social support on the relationship between self-management and HbA1c in the Qatar region; thus it is difficult to explain the reasons for the results found in this study. One of the possible explanations might be the presence of classical social support in Qatar. Many researchers have found that the traditional social support structure (family and friends) does not affect diabetes self-management; as a result, social support is not moderating the relationship of self-management and HbA1c in Qatar.

Limitations

This study was limited by the subject selection as it used a convenience sample, and the data collection methods (e.g. self report) also limited the findings of the study and reduced the accuracy of the participants' responses to the research questionnaires. Only the first portion of the diabetes knowledge instrument was used in the present study, and

even with that consideration, the instrument's diabetes knowledge questions do not reflect the current situation of diabetes management in Qatar. As well, the internal consistency reliability was also low. Another limitation was the cross-sectional design of the study and the use of HbA1c. A longitudinal design using daily glucometer readings may have revealed patterns of importance in self-management of diabetes. A third limitation is the use of instruments developed and validated in the Western culture.

Implications for Nursing Practice, Research, and Healthcare Providers

Nursing is a discipline committed to producing knowledge through nursing science and research. Nursing knowledge is a source of knowledge that influences nursing practice and the health of the individuals who demand care from nurses. The scientific knowledge generated in a practicing discipline must have clinical relevance to be useful to the practitioners or professionals in clinical practice as well as society at large (Donaldson, 1995). Hinshaw recommended developing nursing science as a body of knowledge specific to the areas of concern in nursing as well as developing a cumulative science, wherein the transfer of study results to practice takes place by means of a shared partnership between scientists, practitioners, educators, and administrations (1989). Following Hinshaw's suggestion to develop a cumulative science, this study is building on the work of previous investigators by using an in-depth literature review on diabetes knowledge, self-efficacy, social support, self-management, and glycemic control. Therefore, this research has brought together the relationship among the concepts (diabetes knowledge, self-efficacy, social support, self-management, and HbA1c) and new knowledge to the cumulative science of nursing in a specific area, which is diabetes in Qatar. This study has generated an interface between nursing science and practice.

Future research is needed to identify better measurement of the concepts or other factors that are related to glycemic control in the Qatar culture. The results of this study definitely fill in parts of the knowledge picture for researchers, and this study also provides some insight into the need to expand the research or go into greater detail in specific areas of understanding that necessitate future studies. For example if in the future it is found that self-efficacy is more influential than social support for women, the resources could be dedicated to developing strategies and techniques for helping women enhance their self-efficacy with the goal of achieving better control over HbA1c levels. Ultimately, this picture will guide future researchers to develop policy, protocols, and procedures. Finally, the most important point of this study was to establish knowledge about these relationships for nursing research in the region and particularly in Qatar. This knowledge can serve as a starting point for additional studies about these factors in Qatar and can provide a framework for more research into diabetes and glycemic control across the Middle East.

In the future, there is need for studies to understand what educational interventions are needed to improve diabetes self-management behaviors in Qatar. In addition, understanding of what type of support and follow-up from medical staff and healthcare providers are crucial. Recently, a self-management education program has been established in Qatar. It is called Diabetes Education Self Management for Ongoing and Newly Diagnosed (DESMOND). Exploratory research is needed on the essential components needed to improve glycemic control. Moreover, even though this program exists in the HMC, there is still a need for a systematic, multidisciplinary team to develop, coordinate, and provide diabetes education for patients throughout Qatar.

In terms of social support and diabetes self-management, further exploration is needed with respect to how different means of getting support (via telephone, via formal support programs, or via inter-active media) are received by different populations across cultures. Moreover, the idea that family support is not necessarily positive can be investigated to show what means of support lead to positive outcomes, and what kinds of support (family interference) may be obstructive or create obstacles to the patient's achievement of self-care goals. Specifically, since social support is strongly connected to culture, it will be important to expand studies to the Middle East so that insights can be gained about how different types of support (family, peer, caregiver, medical professional) impact diabetes self-management and outcomes. Furthermore, the sample of the study was culturally diverse, which could affect the results because all of the participants were following their own cultures which can be considered a barrier to diabetes self-management. In the future, this study could be done in a way that could capture the percentage of native Qataris as well as the percentage(s) of the origins of different Arabic speaking participants along with non-Arabic speaking subjects. Additionally, considering data collection about behavioral characteristics such as smoking and exercise could prove useful and provide insights into how diabetes education could be better tailored to this population. For example, educating participants about the dangers of smoking may impact their overall attitudes toward health and this could influence their diabetes self-management as well.

Summary

Overall, the study demonstrates that further research needs to be done, as this is considered a baseline to the relationship between diabetes knowledge, self-efficacy,

social support, self-management, and how they relate to managing hbA1c. In order to determine what factors are related to glycemic control in Qatar, future studies may need to start with qualitative methods using focus groups to fully understand the cultural norms, values and spiritual aspects of the Qatar population. Only when we have instruments that are sensitive to distinctions can have reliable findings that can better guide us to creating more effective strategies. It is important to conduct research in and across various cultures because belief systems, values, and common practices, particularly dietary norms, may be quite different, and it is important to develop an understanding of the nuanced ways in which patient education and training may be best implemented based on cultural norms and expectations. Perhaps it would be different to work with a 50-year-old female patient in the U.S. or a European country as opposed to a 50-year-old female from Qatar. Future research can aid in learning which methods work best in which cultures, and how best to aid patients in achieving greater glycemic control.

Appendix A:

Study Instruments

- Demographic Questionnaire
- Michigan Diabetes Research and Training Center's Diabetes Knowledge Test (DKT)
- Stanford Patient Education Research Center Self-Efficacy for Diabetes (SED)
- Medical Outcome Study (MOS): Social Support Instrument
- The Self-management Profile for Type 2 Diabetes (SMP-T2D)

Demographic Data Information:

Patient is from: _____HMC _____PHCC

Who is answering the questionnaires? _____ Patient _____Interviewer

Fill the blanks or make a check mark by choosing the best correct answer

1. Subject ID code number: _____
2. Today's date: _____
3. What is your age? _____
4. What is your gender?
_____Male
_____Female
5. How do you describe yourself? (Please check the one option that best describes you)
 - Arab
 - Non-Arab
 - Asian
 - American /European
 - African
 - Hispanic or Latino
 - Others
6. What is your marital status?
_____ Married
_____ Not married
_____ Separated/divorced

_____ Widowed

7. Are you currently:

_____ Government employed

_____ Non-government employed

_____ Self-employed

_____ A student

_____ Retired

_____ Unable to work

_____ Others _____

8. What is highest year of school you completed?

_____ Never attended school

_____ Grade 1 Through 8

_____ Grades 9 through 11

_____ 12 GED/ High school graduate

_____ 13-15 /College

_____ 16 or more

9. Do you have family history of diabetes? Please If yes specify

_____ Yes _____

_____ No

10. When have you been diagnosed with diabetes?

11. What was your last blood glucose?

12. What was your last glycosylated haemoglobin HbA1c level? _____

13. Do you have any heart problems or high blood pressure? Please If yes specify

_____ Yes _____

_____ No

14. Do you have any lung problems? Please If yes specify

_____ Yes _____

_____ No

15. Do you have any kidney problems? Please If yes specify

_____ Yes _____

_____ No

16. Do you have any digestive or gastro problems? Please If yes specify

_____ Yes _____

_____ No

17. Do you have any mental health problems? Please If yes specify

_____ Yes _____

_____ No

18. If you have any other health problem or surgery in the past that is not mentioned in the above questions, please list it/them here.

بيانات المعلومات الديموغرافية

المريض من: _____ مؤسسة حمد الطبية _____ مؤسسة الرعاية الصحية الأولية

من الذي يجيب على الاستبيانات؟ _____ المريض _____ المقابلة

الرجاء ملء الفراغات أو وضع علامة (√) لاختيار أفضل إجابة صحيحة

- 1 رقم الكارد ID البطاقة _____
- 2 - تاريخ اليوم _____
- 3- كم عمرك؟ _____
- 4- نوع الجنس؟
ذكر _____
أنثى _____
- 5- كيف تصف نفسك؟ (يرجى اختيار احدى أفضل وصف لكم) .
-العربية
-غير العربية
الآسيوية
-الأمريكي /الأوروبي
-الأفريقية
-اسباني أو لاتيني
-أخرى _____
- 6 - ما هي حالتك الزوجية ؟
متزوج _____
غير متزوج _____
من فصل/مطلق _____
ارمل _____
- 7- هل أنت حالياً :
موظف حكومي _____
غير موظف حكومي _____
موظف شخصي _____
طالب _____
متقاعد _____
غير قادر على العمل _____
أخرى _____
- 8- كم أعلى سنة اكملته بالمدرسة؟
لم اذهب للمدرسة _____
الصف 1 إلى 8 _____
الصفوف من 9 إلى 11 _____
خريج المدرسة الثانوية /GED 12 _____
كلية / 13-15 _____
أو أكثر 16 _____
- 9- هل لديك تاريخ عائلي لمرض السكر؟ من فضلك إذا كان الجواب نعم حدد
نعم _____
لا _____

10- متى تم تشخيصك لمرض السكر؟

11- كم كان آخر مقدار جلوكوز الدم؟

12 ماذا كان آخر الهيموجلوبين السكري في الدم مستوى HbA1c؟

13- هل لديك أي مشكلة في القلب أو ضغط الدم؟ من فضلك إذا كان الجواب نعم حدد.

نعم _____

لا _____

14- هل لديك أي مشكلة بالرئة؟ من فضلك إذا كان الجواب نعم حدد.

نعم _____

لا _____

15- هل لديك أي مشكلة في الكلى؟ من فضلك إذا كان الجواب نعم حدد

نعم _____

لا _____

16- هل لديك أي مشكله بالجهاز الهضمي أو الجهاز الهضمي؟ من فضلك إذا كان الجواب نعم حدد.

نعم _____

لا _____

17- هل لديك أي مشكلة العقلية؟ من فضلك إذا كان الجواب نعم حدد..

نعم _____

لا _____

18. إذا كان لديك أي مشكلة صحية أو أجريت لك عملية جراحية في الماضي التي لم يرد ذكرها في الأعلى،

الرجاء ذكر القائمة هنا

Michigan Diabetes Research and Training Center
Diabetes Knowledge Test

1. The diabetes diet is:
 - a. the way most American people eat
 - b. a healthy diet for most people
 - c. too high in carbohydrate for most people
 - d. too high in protein for most people

2. Which of the following is highest in carbohydrate?
 - a. Baked chicken
 - b. Swiss cheese
 - c. Baked potato
 - d. Peanut butter

3. Which of the following is highest in fat?
 - a. Low fat milk
 - b. Orange juice
 - c. Corn
 - d. Honey

4. Which of the following is a “free food”?
 - a. Any unsweetened food
 - b. Any dietetic food
 - c. Any food that says “sugar free” on the label
 - d. Any food that has less than 20 calories per serving

5. Glycosylated hemoglobin (hemoglobin A1) is a test that is a measure of your average blood glucose level for the past:
 - a. day
 - b. week
 - c. 6-10 weeks
 - d. 6 months

6. Which is the best method for testing blood glucose?
 - a. Urine testing
 - b. Blood testing
 - c. Both are equally good

7. What effect does unsweetened fruit juice have on blood glucose?
 - a. Lowers it
 - b. Raises it
 - c. Has no effect

8. Which should not be used to treat low blood glucose?
 - a. 3 hard candies

- b. 1/2 cup orange juice
 - c. 1 cup diet soft drink
 - d. 1 cup skim milk
9. For a person in good control, what effect does exercise have on blood glucose?
- a. Lowers it
 - b. Raises it
 - c. Has no effect
10. Infection is likely to cause:
- a. an increase in blood glucose
 - b. a decrease in blood glucose
 - c. no change in blood glucose
11. The best way to take care of your feet is to:
- a. look at and wash them each day
 - b. massage them with alcohol each day
 - c. soak them for one hour each day
 - d. buy shoes a size larger than usual
12. Eating foods lower in fat decreases your risk for:
- a. nerve disease
 - b. kidney disease
 - c. heart disease
 - d. eye disease
13. Numbness and tingling may be symptoms of:
- a. kidney disease
 - b. nerve disease
 - c. eye disease
 - d. liver disease
14. Which of the following is usually not associated with diabetes:
- a. vision problems
 - b. kidney problems
 - c. nerve problems
 - d. lung problems
15. Signs of ketoacidosis include:
- a. shakiness
 - b. sweating
 - c. vomiting
 - d. low blood glucose
16. If you are sick with the flu, which of the following changes should you make?
- a. Take less insulin

- b. Drink less liquids
 - c. Eat more proteins
 - d. Test for glucose and ketones more often
17. If you have taken intermediate-acting insulin (NPH or Lente), you are most likely to have an insulin reaction in:
- a. 1-3 hours
 - b. 6-12 hours
 - c. 12-15 hours
 - d. more than 15 hours
18. You realize just before lunch time that you forgot to take your insulin before breakfast. What should you do now?
- a. Skip lunch to lower your blood glucose
 - b. Take the insulin that you usually take at breakfast
 - c. Take twice as much insulin as you usually take at breakfast
 - d. Check your blood glucose level to decide how much insulin to take
19. If you are beginning to have an insulin reaction, you should:
- a. exercise
 - b. lie down and rest
 - c. drink some juice
 - d. take regular insulin
20. Low blood glucose may be caused by:
- a. too much insulin
 - b. too little insulin
 - c. too much food
 - d. too little exercise
21. If you take your morning insulin but skip breakfast your blood glucose level will usually:
- a. increase
 - b. decrease
 - c. remain the same
22. High blood glucose may be caused by:
- a. not enough insulin
 - b. skipping meals
 - c. delaying your snack
 - d. large ketones in your urine
23. Which one of the following will most likely cause an insulin reaction:
- a. heavy exercise
 - b. infection
 - c. overeating

d. not taking your insulin

اختبار المستوى المعرفي لمرض السكري: نسخة منقحة من مركز متشغن للابحاث والتدريب في مجال السكري

1. النظام الغذائي لمرض السكري هو:
 - الطريقة التي يأكل بها معظم العرب
 - النظام الغذائي صحي لمعظم الناس
 - النظام الذي يحتوي على نسبة عالية من الكربوهيدرات لمعظم الأشخاص
 - النظام الذي يحتوي على نسبة عالية من البروتين لمعظم الأشخاص
2. أي من الأغذية التالية يحتوي على نسبة عالية من الكربوهيدرات؟
 - الدجاج المشوي
 - جبن شيدر
 - بطاطس مشوية
 - زبدة الفول السوداني
3. أي من الأطعمة التالية يحتوي على نسبة عالية من الدهون؟
 - حليب قليل الدسم (2%)
 - عصير برتقال
 - ذرة
 - عسل
4. أي من الأطعمة التالية يعتبر خالي من الكربوهيدرات؟
 - الأطعمة الغير محلاة
 - أي طعام عليه علامة خالي الدهون
 - أي طعام عليه علامة خالي من السكر
 - أي طعام يحتوي على أقل من 20 سعر حراري
5. اختبار خضاب الدم السكري (الهيموغلوبين الغليكوزيلاتي) هو احد الاختبارات التي تقيس متوسط مستوى السكر في الدم قبل:
 - يوم
 - أسبوع
 - 6 الي-12 أسابيع
 - 6 أشهر
6. ماهي افضل الطرق التالية لفحص سكر الدم في المنزل؟
 - فحص البول
 - فحص الدم
 - كلاهما جيد
7. ما هو تأثير عصير الفاكهة الغير محلاة على مستوى السكر في الدم؟
 - يخفض منه
 - يساهم في ارتفاعه
 - ليس له تأثير
8. أي من التالي لا يجب استخدامه لعلاج سكر الدم المنخفض؟
 - ثلاث حبات من التمر
 - نصف كوب عصير برتقال
 - كوب مشروب غازي خالي من السكر
 - كوب حليب قليل الدسم

9. بالنسبة للشخص المتحكم بمعدل جيد للسكري، ما هو تأثير التمارين الرياضية على مستوى سكر الدم؟

- تقلل منه
- تساهم في زيادته
- ليس لها تأثير

10. ماهو تأثير العدوى الاكثر احتمالاً على سكر الدم :

- ارتفاع في سكر الدم
- انخفاض في سكر الدم
- لا تؤثر عليه

11. أفضل وسيلة لرعاية قدميك

- الاهتمام بها و غسلها يوميا
- التدليك بالكحول يوميا
- نقعها لمدة ساعة يوميا
- شراء حذاء بمقاس أكبر من المعتاد

12. تناول أطعمة ذات دهون أقل تقلل من خطورة الإصابة بـ :

- امراض الاعصاب
- أمراض الكلى
- أمراض القلب
- أمراض العين

13. الشعور بالوخز و التتميل ربما يكون أعراض لـ:

- أمراض الكلى
- أمراض الأعصاب
- أمراض بالعين
- أمراض بالكبد

14. أي مما يلي عادتنا لا يرتبط بمرض السكري:

- مشاكل بالرؤية
- مشاكل بالكلى
- المشاكل العصبية
- مشاكل بالرئة

Self-Efficacy for Diabetes

We would like to know how confident you are in doing certain activities. For each of the following questions, please choose the number that corresponds to your confidence that you can do the tasks regularly at the present time.

- | | |
|---|--|
| 1. How confident do you feel that you can eat your meals every 4 to 5 hours every day, including breakfast every day? | not at all totally
confident 1 2 3 4 5 6 7 8 9 10 confident |
| 2. How confident do you feel that you can follow your diet when you have to prepare or share food with other people who do not have diabetes? | not at all totally
confident 1 2 3 4 5 6 7 8 9 10 confident |
| 3. How confident do you feel that you can choose the appropriate foods to eat when you are hungry (for example, snacks)? | not at all totally
confident 1 2 3 4 5 6 7 8 9 10 confident |
| 4. How confident do you feel that you can exercise 15 to 30 minutes, 4 to 5 times a week? | not at all totally
confident 1 2 3 4 5 6 7 8 9 10 confident |
| 5. How confident do you feel that you can do something to prevent your blood sugar level from dropping when you exercise? | not at all totally
confident 1 2 3 4 5 6 7 8 9 10 confident |
| 6. How confident do you feel that you know what to do when your blood sugar level goes higher or lower than it should be? | not at all totally
confident 1 2 3 4 5 6 7 8 9 10 confident |
| 7. How confident do you feel that you can judge when the changes in your illness mean you should visit the doctor? | not at all totally
confident 1 2 3 4 5 6 7 8 9 10 confident |
| 8. How confident do you feel that you can control your diabetes so that it does not interfere with the things you want to do? | not at all totally
confident 1 2 3 4 5 6 7 8 9 10 confident |

Scoring

The score for each item is the number circled. If two consecutive numbers are circled, code the lower number (less self-efficacy). If the numbers are not consecutive, do not score the item. The score for the scale is the mean of the six items. If more than two items are missing, do not score the scale. Higher number indicates higher self-efficacy.

Medical Outcomes Study: Social Support Survey Instrument

People sometimes look to others for companionship, assistance, or other types of support.

How often is each of the following kinds of support available to you if you need it?

Circle one number on each line.

	None of the time	A little of the time	Some of the time	Most of the time	All of the time
Emotional/informational support					
Someone you can count on to listen to you when you need to talk	1	2	3	4	5
Someone to give you information to help you understand a situation	1	2	3	4	5
Someone to give you good advice about a crisis	1	2	3	4	5
Someone to confide in or talk to about yourself or your problems	1	2	3	4	5
Someone whose advice you really want	1	2	3	4	5
Someone to share your most private worries and fears with	1	2	3	4	5
Someone to turn to for suggestions about how to deal with a personal problem	1	2	3	4	5
Someone who understands your problems	1	2	3	4	5
Tangible support					
Someone to help you if you were confined to bed	1	2	3	4	5
Someone to take you to the doctor if you needed it	1	2	3	4	5
Someone to prepare your meals if you were unable to do it yourself	1	2	3	4	5
Someone to help with daily chores if you were sick	1	2	3	4	5
Affectionate support					
Someone who shows you love and affection	1	2	3	4	5
Someone to love and make you feel	1	2	3	4	5

wanted					
Someone who hugs you	1	2	3	4	5
Positive social interaction					
Someone to have a good time with	1	2	3	4	5
Someone to get together with for relaxation	1	2	3	4	5
Someone to do something enjoyable with	1	2	3	4	5
Additional item					
Someone to do things with to help you get your mind off things	1	2	3	4	5

القيام بمسح الدعم الاجتماعي (MOS social support questionnaire)

يتطلع بعض الناس أحيانا الي الناس الآخرين للرفقة أو المساعدة أو أي انواع أخرى من الدعم.كم من المرات يكون أي من الأنواع التالية من الدعم متاحة لك إذا أحتجت لها؟ ارسم دائرة حول رقم واحد من كل خط.

لا أجد أحدا	أجده في قليل من الأحيان	أجده في بعض الأحيان	أجده في معظم الأحيان	أجده في كل الأحيان	
					الدعم العاطفي / إعلامي
1	2	3	4	5	شخص يمكن أن تعتمد عليه ليصغي إليك عندما تحتاج الي التحدث
1	2	3	4	5	شخص ليقدم لك معلومة تساعدك علي فهم وضع ما.
1	2	3	4	5	شخص ليقدم لك نصيحة جيدة حول أزمة ما
1	2	3	4	5	شخص تثق فيه أو يمكن أن تتحدث معه عن نفسك أو مشاكلك
1	2	3	4	5	شخص تحتاج فعلا إلي نصيحته
1	2	3	4	5	شخص يمكن أن تقاسمه معظم همومك ومخاوفك الخاصة
1	2	3	4	5	شخص يمكن تتجه إليه لمقترحات عن كيف تتعامل مع مشكلة شخصية
1	2	3	4	5	شخص يتفهم مشاكلك
					الدعم الملموس
1	2	3	4	5	شخص يمكن أن يساعدك في قضاء حوائجك عند اضطرارك للالتزام السرير
1	2	3	4	5	شخص يمكن أن يأخذك إلى الطبيب عند الحاجة
1	2	3	4	5	شخص يمكن أن يعدلك وجباتك عندما تكون غير قادر على القيام بذلك
1	2	3	4	5	شخص يمكن أن يساعدك في أعمالك اليومية الروتينية عندما تكون مريضا
					الشعور بالحنان والالفة
1	2	3	4	5	شخص يظهر لك الحب والعاطفة
1	2	3	4	5	شخص يحبك ويجلك تشعر بأنك شخص مرغوب فيه
1	2	3	4	5	شخص يعانقك ويحتضنك
					التعامل الاجتماعي الإيجابي
1	2	3	4	5	شخص تقضي معه وقتا طيبا
1	2	3	4	5	شخص تلجأ إليه للاسترخاء والراحة
1	2	3	4	5	شخص تفعل معه شيئا ممتعا
					بند إضافي
1	2	3	4	5	شخص تصرف معه أشياء تساعدك علي صرف انتباهك من الأشياء الأخرى

Content of the Self-Management Profile for Type 2 Diabetes (SMP-T2D)

1. How many days during the past week (last 7 days) did you miss taking your diabetes medications as prescribed? {0–7, reverse scored}

2. How many days during the past week (last 7 days) did you miss monitoring your blood sugar? {0–7, reverse scored}

3. How many days during the past week (last 7 days) did you eat foods not healthy for your diabetes? {0–7}

4. During the past week (last 7 days), how many days did you eat more food than you were supposed to? {0–7, reverse scored}

5. How many days during the past week (last 7 days), did you do at least some light physical activity (such as walking, light gardening)? {0–7}

6. How many days during the past week (last 7 days), did you do at least 30 minutes of moderate physical activity (such as pushing a vacuum cleaner, riding a bicycle, playing golf)? {0–7}

7. How many days during the past week (last 7 days), did you do at least 20 minutes of vigorous physical activity (such as running or participating in strenuous sports)? {0–7}

8. During the past week, how much difficulty did you have with: {A great deal, A lot, Moderate, A little, No}

a. monitoring your blood sugar?

b. giving yourself your diabetes medications as your doctor instructed?

c. managing your weight?

d. periods of uncontrolled eating?

e. feeling hungry?

f. food cravings?

g. being physically active?

h. coping with frustration and worry related to your diabetes?

9. During the past week (last 7 days), how frustrated have you been with trying to manage your diabetes? {Not at all, Slightly, Moderately, Very, Extremely}

10. During the past week (last 7 days), how worried have you been about your future health because of your diabetes? {Not at all, Slightly, Moderately, Very, Extremely}

11. Overall, how confident have you felt during the past week (last 7 days) about being able to manage your diabetes? {Not at all, Slightly, Moderately, Very, Extremely}

12. How important is it for you right now to: {A Lot, Moderate, Little, No}

- a. monitor your blood sugar?
- b. take your diabetes medications as your doctor instructed?
- c. manage your weight?
- d. manage your diet?
- e. manage your physical activity?
- f. manage frustration and worry related to your diabetes?

NOTE: Question 12 was not included in the version of the SMP-T2D used in Study 2.

محتوى الملف الإدارة الذاتية للنوع 2 من مرض السكري (SMP-T2D)

1. كم عدد الأيام التي لم تتناول أدوية السكري فيها كما كان مقرراً خلال الأسبوع الماضي (7 أيام الماضية) ؟ {0-7}،
 2. كم عدد الأيام التي لم تراقب فيها نسبة السكر في الدم خلال الأسبوع الماضي (7 أيام الماضية) ؟ {0-7}،
 3. كم عدد الأيام التي تناولت فيها أغذية غير صحية للسكري خلال الأسبوع الماضي (7 أيام الماضية) ؟ {0-7}،
 4. هل تناولت من الطعام أكثر من حاجتك خلال الأسبوع الماضي (آخر 7 أيام) ؟ {0-7}،
 5. كم عدد الأيام التي مارست فيها قليلاً من النشاط البدني الخفيف (مثل المشي او البستنة الخفيفة)؟ خلال الأسبوع الماضي (7 أيام الماضية)، {0-7}،
 6. كم عدد الأيام التي مارست فيها ما لا يقل عن 30 دقيقة النشاط البدني المعتدل (مثل دفع مكنسة كهربائية، ركوب الدراجات، لعب الغولف)؟ خلال الأسبوع الماضي (7 أيام الماضية)، {0-7}،
 7. كم عدد الأيام التي مارست فيها ما لا يقل عن 20 دقيقة من النشاط البدني القوي (مثل الجري أو المشاركة في الألعاب الرياضية الشاقة)؟ خلال الأسبوع الماضي (7 أيام الماضية) {0-7}،
 8. خلال الأسبوع الماضي، اختر الوصف المناسب لمدى مستوى الصعوبة التي واجهتها مع المتطلبات التالية :
{بقدر كبير جداً، بكثرة، باعتدال، بقلة، من غير صعوبة}
- ا. مراقبة نسبة السكر في الدم؟
 - ب. تناول أدوية السكري الخاص بك وفقاً لتعليمات الطبيب؟
 - ج. إدارة وزنك؟
 - د. فترات تناول الطعام غير المنضبط؟
 - هـ. الشعور بالجوع؟
 - ذ. الرغبة الشديدة للطعام؟
 - ز. ممارسة النشاط البدني؟
 - ح. التعامل بالإحباط والقلق المرتبطة بمرضك السكري؟
9. ما مدى الإحباط الذي شعرت به وانت تحاول إدارة داءك السكري؟ خلال الأسبوع الماضي (آخر 7 أيام)،
{لم أحبب على الإطلاق، بقلة، باعتدال، بكثرة، بقدر كبير جداً}

10. كيف كان مدى القلق لديك حول صحتك في المستقبل بسبب مرض السكري لديك خلال الأسبوع الماضي (7 أيام الماضية)، ؟ {لم أقلق على الإطلاق، بقلة، باعتدال، بكثرة، بقدر كبير جدا}

11. عموماً، ما مدى الثقة التي شعرت بها خلال الأسبوع الماضي (7 أيام الماضية) عن كونك قادر على إدارة مرضك السكري؟ {لست واثقا على الإطلاق، بقلة، معتدلاً، بكثرة، بقدر كبير جدا}

12. ما مدى الأهمية التي تراها في الوقت الحالي لاتخاذ اللازم نحو: {غير مهم، مهم قليلاً، مهم، مهم بكثرة}

ا. مراقبة نسبة السكر في دمك؟

ب. أخذ أدوية السكري الخاص بك وفقاً لتعليمات الطبيب؟

ج. إدارة والتحكم بوزنك؟

د. إدارة النظام الغذائي الخاص بك؟

هـ. إدارة النشاط البدني الخاص بك؟

ذ. إدارة الإحباط والقلق المرتبطان بمرضك السكري؟

Appendix B:

Literature Review of Diabetes Knowledge

Author	Year	Purpose	Design	Sample	Measurement	Result
Al-Adsani et al.	2009	To investigate the level of diabetes knowledge in a population with type 2 diabetes (T2D) and a high prevalence of illiteracy, to identify the main gaps in the knowledge and to study the determinants of the knowledge score.	Cross-sectional survey	Involved 24 diabetes clinics and Kuwaiti adults with T2D (n = 5114) Kuwait	Diabetes Knowledge: Michigan Diabetes Knowledge Test(DKT).	<p>- Their mean score for the total knowledge test was 58.9%. Knowledge deficits were apparent in the questions related to diet and self-care.</p> <p>-Only 9.7% of patients scored “good” in total DKT, 6.3% scored “good” in general knowledge and 6.1% scored “good” in insulin knowledge.</p> <p>-Knowledge of diabetes in a T2D population with a high prevalence of illiteracy was poor. Limited family income and lack of self-care are other predictors of knowledge deficits.</p> <p>-Participants who were older, and with lower educational levels, limited family income, negative family history of diabetes or were smokers had significantly lower knowledge scores.</p> <p>-The scores were also lower in those who had shorter disease duration and fewer complications, were taking insulin, had less frequent insulin injections, performed less glucose monitoring and had lower HbA1c levels.</p> <p>-Education, family income, glucose monitoring and presences of complications were independent determinants of the knowledge score.</p>
Al-	2013	To assess	Cross-	Patients	(KAP) = to assess	Analysis showed a

Maskari et al.		present knowledge, attitudes, and practices of patients towards the management of diabetes.	sectional survey	with diabetes from outpatients clinics in Tawam and Al-Ain city United Arab Emirates (UAE) N=575	knowledge, attitude and practice, UAE using a modified instrument, adapted, with permission, from the Diabetes Research Training Center of Michigan. Socio-demographic data	positive correlation between patients' knowledge and the number of contacts with a diabetic educator in the last two years. -The majority of patients (72%) had a negative attitude towards having diabetes. However, only 6% expressed a 'negative attitude' towards the importance of DM care, notably of controlling blood sugar levels and body weight, as well as compliance with medications - There was a weak, but statistically significant, correlation between the level of knowledge and practice and also between attitudes and HbA1c was not statistically significantly correlated with any of the three scores. - Reported blood sugar control and monitoring were generally poor. Only 27% of patients had good glycemic control.
Al-Qazaz et al.	2011	To investigate any association of knowledge and medication adherence with glycemic control in patients with type 2 diabetes mellitus	A cross-sectional study	A convenience sample of n=505 adult patients with type 2 diabetes attending the Diabetes Outpatients Clinic, Hospital Pulau Penang Malaysia	-Diabetes knowledge: Michigan Diabetes Knowledge Test and Morisky Medication Adherence Scale - Patients' medical records were reviewed for hemoglobin A1C (HbA1C) levels	- Significant correlations were found between the three variables (HbA1C, knowledge, and adherence) - A significantly higher score for knowledge and adherence ($P < 0.05$) was found in those patients with lower HbA1C - Patients' knowledge about diabetes is associated with better medication adherence and better glycemic control. - MDKT scores correlate significantly with MMAS scores ($r = 0.456, P < 0.01$).

Al-Shafae et al.	2008	Aimed to evaluate the knowledge and perception of diabetes in a sample of the Omani general population, and the associations between the elements of knowledge and perception, and socio-demographic factors.	Survey study	Patients with diabetes Sultan Qaboos University Muscat, Oman N=563	The final survey instrument contained 24 items, subdivided into 5 sections. The third section was intended solely for diabetic participants and covered their diabetic history and glycemic control status. Knowledge regarding diabetes definition, risk factors, signs and symptoms, and complications was examined in the fourth section. The last section concentrated on the perceived risk of developing diabetes, as well as the participant's perception regarding diabetes prevalence, prevention, and community awareness.	Knowledge of diabetes was suboptimal. -The percentages of correct responses to questions on diabetes definition, classical symptoms, and complications were 46.5%, 57.0%, and 55.1%, respectively. -A higher level of education, a higher household income, and the presence of a family history of diabetes were found to be positively associated with more knowledge. -There is lack of awareness of major risk factors for diabetes mellitus - This study has demonstrated that significant numbers of Omanis lack the knowledge and perceptions required to prevent and cope with the increasing prevalence of diabetes in Oman
Bains and Egede	2011	To assess association among health literacy, diabetes knowledge, and self-management	Cross-sectional survey	Type II diabetic patients in primary care clinic in the USA, n=125, 65 years and older: 49% Female: 72.5%	Health Literacy (HL): Rapid Estimate of Adult Literacy in Medicine (REALM-R) Mediating variables: Diabetes Knowledge: Diabetes Knowledge Questionnaire (DKQ) Self-management:	HL was significantly associated with knowledge Knowledge was significantly associated with glycemic control. HL was not significantly associated with SM or HbA1c.

					Summary of Diabetes Self-Care Activities (SDSCA)	
Berikai et al.	2007	To investigate whether the gain in the knowledge of the targets of diabetes care after receiving diabetes self-management education (DSME) predicts the achievement of target A1C levels ($\leq 7\%$) at 6 months.	Retrospective study of adult diabetic subjects who received DSME in the American Diabetes Association–certified Diabetes Center of John H. Stroger, Jr. Hospital of Cook County between 2001 and 2004.	Patients with diabetes USA N=155	A simple five-item questionnaire (found in an online appendix, “ABC test,” at http://dx.doi.org.10.2337/dc06-2026) on glycemic control, blood pressure, and LDL cholesterol targets, as recommended by the American Diabetes Association	Overall, A1C decreased from $10.1 \pm 2.3\%$ at baseline to $7.7 \pm 1.9\%$ at 6.4 2.1 months follow-up with 39.4% achieving the target A1C levels of $\leq 7\%$. The target A1C achievement was higher in knowledge gainers versus non-gainers. Our results showed that the gain in the knowledge of the targets of diabetes care after receiving DSME independently predicted the achievement of target A1C levels. The difference in the target A1C achievement rate between knowledge gainers and non-gainers was significant in the low baseline knowledge group but not in the high baseline knowledge group.
Casagrande & Geiss	2012	To examine the prevalence of knowledge of A1C, blood pressure, and LDL cholesterol (ABC) levels and goals among people with diabetes, its variation by patient characteristics, and whether	A stratified multistage probability cluster survey The 2005–2008 National Health and Nutrition Examination	Patients with diabetes who self-reported in the 2005–2008 National Health and Nutrition Examination Survey USA N=1,233	Participants who reported having diabetes were asked to report the number of times their A1C was tested in the past year, to which respondents could report they had not heard of A1C. A1c was blood derived. Blood pressure was measured using a standardized mercury sphygmomanome	Eighty-two percent of participants had heard of the measure A1C. Knowledge of A1C level was greatest in non-Hispanic whites and lowest in Mexican Americans, greater with increasing education, and greater in people with higher income.

		knowledge was associated with achieving levels of ABC control recommended for the general diabetic population.	Survey		ter -LDL cholesterol was derived from total cholesterol, triglyceride levels, and HDL cholesterol in participants who fasted properly	
Cavanagh et al.,	2008	Examine association between numeracy and diabetes control.	Cross-sectional survey	Patients with DM1 or DM2 in primary care and diabetes clinics in the USA (n=398) Median age: 55 Female: 51% Type 2 diabetes: 86 Duration diabetes: 9 years	Health Literacy: Diabetes Numeracy Test (DNT) - Knowledge: Diabetes Knowledge Test (DKT) - Self-efficacy (self-report) Self-Management: Summary of Diabetes Self-Care Activities (SDSCA) Other: Diabetes control (HbA1C)	Lower DNT scores were associated with: - Lower median DKT - Lower self-efficacy of SM - Adjustment of insulin dose - Adjustment of carbohydrate intake. Participation in dietary, physical activity, or medication behaviors were not significantly associated with Diabetes Numeracy Test (DNT) scores. DNT was modestly associated with HbA1c level. A 10-percentage point decrease of correct DNT responses predicted an increase of HbA1c of 0.09%
Dewalt et al.	2007	To examine the association between literacy and trust, self-efficacy, and participation in medical decision making in adults with diabetes	Cross-sectional survey and chart review was performed	Patients with type II diabetes from general internal medicine practice N=250	Questionnaire; HbA1c, hemoglobin A1c; Health literacy: Revised Rapid Estimate of Adult Literacy in Medicine REALM-R). Trust measured by the Wake Forest Physician Trust Scale (WFPTS). Self-efficacy measured using the Diabetes Management Self-efficacy Scale (DMSES).	Of the participants, 53 had low health literacy. No relationship was found between literacy and trust or self-efficacy. Patients with low literacy had less desire to participate in medical decision-making and less diabetes related knowledge. Health literacy was associated with diabetes outcomes.

					Decision making by Desire to participate in Medical Decision-Making Scale (DPMD) and the Facilitation of patient Involvement Scale (FPI)	
Guo et al.	2012	To characterize the impact of diabetes education on glycemic control, and to assess the attitude, knowledge and self-care behavior in patients with type 2 diabetes in China.	Cross-sectional Questionnaire-based survey	Patients with type II diabetes from 50 medical centers across China (n=6043)	Diabetes Attitude Scale-3 formulate (DAS-3) Summary of Diabetes Self-Care Activities (SDSCA)	The result showed that most patients (79.8%) considered themselves educated on diabetes. Compared with patients without diabetes education, their educated counterparts showed significant lower values of HbA1c, after controlling for age, gender, body mass index, and duration of diabetes ($P < 0.01$). The patients who received diabetes education also performed significantly higher scores on attitude, knowledge and self-care than their uneducated counterparts. Patients with lower income or education level tended to have higher glucose levels, and lower percentage of these patients received diabetic education.
Hartayu, Izham & Suryawati	2012	Aimed to improve type II diabetes knowledge, attitude, and practice on diabetes self-care by implementing the community based interactive approach	Pre and post quasi-experimental with the control group design	Participants with type 2 diabetes in the intervention group were community members of the Sanata Dharma University, Indonesia, and the control	- Pre and post-test about Knowledge, Attitude and Practice (KAP) questionnaires are used as study instruments. - Knowledge scores range from 0–18 and attitude scores range from 9–45. Each score is categorized as rational scales in good (> 14), fair	The results showed that diabetes education improves type II diabetes knowledge, attitude and practice towards diabetes.

		(CBIA).		group's members were part of the charity hospital DM-club and diabetic patients of the public hospital. N=87	(12–14) and poor (< 12) for knowledge levels, and good (> 35), fair (30–35) and poor (< 30) for attitude levels [14].	
He & Wharrad	2007	-To investigate the effects of current Diabetes self-management education in China on diabetes knowledge and glycemic control, • To examine the relationship between diabetes knowledge and glycemic control, and • To identify the characteristics of patients who have poor diabetes knowledge and the areas of diabetes information that are not well known by Chinese patients.	Non-experimental cross-sectional study	Chinese patients with type 2 diabetes N=100, n=40 inpatient and n=60 outpatient in Shanghai hospital China	Diabetes knowledge (DK): A Chinese version of the Diabetes Knowledge Scale was used to assess DK and collect demographic data and HbA1c levels Glycemic control was measured by HbA1c (glycosylated Hemoglobin level)	- There was no difference in overall diabetes knowledge in people with HbA1c <7%, indicating good control, and those with HbA1c ≥7%, suboptimal glycemic control was indicated. - Diabetes knowledge does not guarantee people will achieve good glycemic control. In addition, the results show that, although diabetes knowledge was higher than other studies, the HbA1c in a number of patients was higher than the optimal level. -The findings indicate that some specific areas of diabetes knowledge were significantly correlated with glycemic control, such as food substitution and diabetes complications. Some areas of diabetes knowledge should be further developed within the DSME programs,
Mancuso	2010	Examine the impact of HL on	Cross-sectional survey	Patients with DM1/2 in	Health Literacy: The Test of Functional Health Literacy in Adults	A significant positive correlation was found between HL and diabetes

		glycemic control.		two primary care clinics in the USA n = 102 Mean age: 52 Female: 61%	(TOFHLA) Mediating variable: - Knowledge of diabetes (DKT) SM: SDSCA Other: Glycemic control (HbA1C); patient trust (HCR Trust Scale); Depression (CES-D)	knowledge HL was not significantly correlated with SM or HbA1C. Duration diabetes: 5.8 years
Mbaezue et al.	2010	Examine the relationship between health literacy and self-monitoring of blood glucose.	Cross-sectional survey	Diabetic patients receiving care in a large urban public health care setting in Atlanta, USA n = 189 Mean age: 51 Female: 59% Duration diabetes: 8.5	Health Literacy: The Test of Functional Health Literacy in Adults (TOFHLA) Self-Management: Self-Monitoring of Blood Glucose (SMBG)	There was no difference in Self-monitoring of blood glucose (SMBG) among patients by HL level. However, those with adequate HL more often kept a record of their glucose levels than patients with inadequate HL. In multivariate logistic modeling, no significant association was found between HL and SBMG.
Osborn et al.	2010	To assess associations among health literacy, diabetes knowledge, self-care, and glycemic control in a low income, predominantly minority population with type 2 diabetes.	Survey Questionnaire	Patients with type II diabetes from primary care clinic (n=125) A low income, predominantly minority population. USA	Diabetes Knowledge Questionnaire (DKQ); HbA1c, hemoglobin A1c; Health Literacy: Revised Rapid Estimate of Adult Literacy in Medicine (REALM-R).	Examined the associations among health literacy, diabetes knowledge, medication adherence, and self-care, Health literacy was only significantly associated with diabetes knowledge. In the final adjusted model for independent factors associated with glycemic control, both diabetes knowledge and perceived health status were significantly associated with better glycemic control, whereas health literacy was not associated with glycemic control.
Ozcelik et al.	2010	To assess the relationship between	Face to face cross-sectional	Patients with type 2 diabetes n=164	- Diabetes knowledge: 28 questions were compiled from	A significant negative correlation was observed between KA scores and HbA1c and FBG levels.

		glycemic control and effective diabetes education using the knowledge and awareness (KA) questionnaire. Also, the effect of age, duration of diabetes, sex, body mass index (BMI), and education level on glycemic control was assessed.	Interview	Istanbul Turkey	the Michigan Diabetes Research and Training Center's Brief Diabetes Knowledge Test (DKT)	Sixty- three patients had received diabetes education. These patients had higher KA scores and lower HbA1c levels compared with the remaining group. There was a strong negative correlation between the KA score and HbA1c, and between the KA score and FBG
Powell et al.,	2007	Explore the relationship among HL, readiness to take health actions, and diabetes knowledge.	Cross-sectional study	Patients with DM2 receiving care at a general internal medicine clinic in the USA (n = 68) Median age: 55 Female: 80% Duration diabetes: 7	Health Literacy: Revised Rapid Estimate of Adult Literacy in Medicine (REALM-R). Mediating variable: - Diabetes knowledge (DKT) Health belief: Diabetes Health Beliefs Model (DHBM) Health Literacy: The Test of Functional Health Literacy in Adults (TOFHLA) - Diabetes self-efficacy Self-Management: Summary of Diabetes Self-Care Activities (SDSCA)	HL was associated with diabetes knowledge and HbA1C. Those with low HL had lower DKT scores (estimated coefficients 0.004) and higher HbA1C levels No significant association was found between DHBM scale score and HL levels.
Rogvi et al.	2012	To investigate the association between	Cross-sectional survey	Patients with diabetes from Steno Diabetes	Self-management behaviors: Diabetes Self-care Activities Scale (DSCA)	Good glycemic control was significantly associated with older age, higher education, higher patient activation,

		glycemic control and patient socio-demographics, activation level, diabetes-related distress, assessment of care, knowledge of target HbA1c, and self-management behaviors, and to determine to what extent these factors explain the variance in HbA1c in a large Danish population.		Centre, a specialist diabetes clinic in the Copenhagen area of Denmark N=1081	assessed self-management behaviors, such as diet, exercise, and taking medication. To measure patient activation, we used the short form of the Patient Activation Measure (PAM) which includes 13 items exploring knowledge, skills, confidence, and behaviors critical for coping with a chronic illness - To assess care, we used the Patient Assessment of Chronic Illness Care scale (PACICS).	lower diabetes-related emotional distress, better diet and exercise behaviors, lower body mass index, shorter duration of disease, and knowledge of HbA1c targets -Patient activation, emotional distress, knowledge, educational level, exercise, diet, BMI, age, and duration of diabetes were significantly associated with glycemic control and explained 14% of the variance in HbA1c levels in the total population.
Saleh et al.	2012	This study assessed the relationship between knowledge and practices among newly diagnosed type 2 DM patients.	Cross-sectional design	Newly diagnosed adults with type 2 diabetes N=508 Were selected from 19 health care center in Bangladesh	Diabetes knowledge: the Diabetes Knowledge Test (DKT) questionnaire, which was validated by the University of Michigan	Approximately 16%, 66%, and 18% of respondents had good, average, and poor (GAP) basic knowledge respectively and 10%, 78%, and 12% of respondents had GAP technical knowledge, about DM. -A significant relationship existed between basic knowledge and glucose monitoring. Technical knowledge and foot care were significantly related, though 81% with good technical knowledge and about 70% from the average and poor groups did not take care of their feet.
Samtia et al.	2013	To assess the impact of pharmacies-	Interventional study a 5-month	Patients with diabetes in selected	Patients were asked to test their HbA1c values at the start and at	- The baseline characteristics of both study groups were similar

		led multifactor intervention on health parameters, medication adherence, and disease-related knowledge among type 2 diabetes patients in southern Punjab, Pakistan	period	diabetes clinics in southern Punjab, Pakistan n=170 in a randomly selected control group and intervention group n=178	the end of the study. - Self-reporting approach was used to assess adherence to medications. Knowledge regarding disease, self-monitoring, and lifestyle modifications were assessed on yes/no basis at the start and end of the study.	- Significant reductions from baseline in BMI and waist circumference were seen in the intervention group - There was significant reduction in fasting blood glucose and HbA1c values in the intervention group - There was significant improvement in patients' disease knowledge and self-care activities in the intervention group - Improvement regarding knowledge of sensory changes, foot care, self-monitoring of blood sugar, role of exercise, and dietary restrictions. - The increase in non-smokers was significant in intervention group but was insignificant in the control group
Wallace et al.,	2009	Evaluate the impact of providing patients with a literacy-appropriate diabetes education guide accompanied by brief counseling designed for use in primary care on diabetes SM among patients with adequate and inadequate HL.	Intervention study	English and Spanish speaking DM2 patients in academic internal medicine practices in the USA (n = 250) Mean age: 56 Female: 64.8%	Health Literacy: The Test of Functional Health Literacy in Adults (TOFHLA) - Patient activation measure (PAM): a thirteen-items measure -The Diabetes Distress Scale (DDS) -Self-efficacy: using an eight-item measure - Diabetes knowledge: a nine-item instrument developed by the authors -Self-Management: Subjective scale for diabetes self-management activities a five-item scale asking	At baseline, patients with marginal or inadequate HL scored higher on mean diabetes self-management activities (manage medications, monitor blood glucose, maintain a diet, exercise, and conduct foot care) than patients with adequate HL. At baseline, patients with marginal or inadequate HL scored lower on mean self-efficacy than patients with adequate HL. At baseline, patients with marginal or inadequate HL scored lower on knowledge than patients with adequate HL.

					participants to rate their ability to manage their medications, blood glucose, maintain a diet, exercise, and conduct foot care	
Wang et al.	2013	To determine whether Asian Pacific Islanders with type 2 diabetes who have better knowledge and self-management would have better baseline hemoglobin A1c (HbA1c) and total cholesterol values	-A descriptive cross-sectional survey	Participants with type 2 diabetes from mixed Asian, including Hawaiian/Asians, Hawaiian/Caucasian, and Hawaiian/Pacific Islander from Faculty Practice Specialty Clinic in Manoa USA N=104	Self-care: Summary of Diabetes Self-Care Activities (SDSCA) survey used originates from a previous study and is a self-report tool that evaluates components involved in diabetes self-management care (Toobert, Hampson, & Glasgow, 2000) -The DKA survey used was a revised scale from the Diabetes Self-Management Record	-Significant relationships were found among (a) general diet on HbA1c ($p < .030$), (b) medications on HbA1c ($< .009$), and (c) diabetes knowledge on HbA1c ($p < .001$). - Self-management and diabetes knowledge appears to impact significantly the HbA1c value. -Findings indicate statistical significance of diabetes knowledge to the HbA1c value but no statistical significance in diabetes knowledge to the total cholesterol level.
Zuhaid et al.	2012	To evaluate the knowledge and perceptions of diabetes in a sample population of Peshawar Pakistan	Cross-sectional, descriptive study	Patients with diabetes N=305 Peshawar, Pakistan	A special questionnaire contained 25 questions besides demographic characteristics. Questionnaire was subdivided into five sections. The first two sections included questions on demographic characteristics and medical history. The third section was designed for diabetic participants and covered their diabetic history	Knowledge of diabetes was suboptimal. Knowledge regarding risk factors of diabetes is greater amongst females than males Excessive sugar intake, obesity, family history, lack of physical activities, and stress were acknowledged by 46.2%, 42.3%, 39.3%, 33.4%, and 31.8% of the subjects respectively. Presence of family history and level of education were recognized to be associated with more knowledge.

					and glycemic control status. In the fourth section questions were put to test knowledge regarding symptoms, risk factors, and complications of diabetes. The last section included questions regarding prevalence, prevention, and awareness.	There is a considerable lack of knowledge and perceptions about diabetes in the population of Peshawar.
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Appendix C

Literature Review of Self-efficacy

Author	Year	Purpose	Design	Sample	Measurement	Result
Cherrington	2010	Examining associations between depressive symptoms, self-efficacy, and glycemic control among men (n = 64) and women (n = 98) with type 2 diabetes to see if self-efficacy mediates the relationship between depression and glycemic control	A cross-sectional study	Patients with type 2 diabetes N=162 men (n = 64) and women (n = 98) with type 2 diabetes in USA	Perceived self-efficacy of diabetes self-management behaviors was assessed with the Perceived Diabetes Self-Management Scale (PDSMS) -Depression was assessed using the Center for Epidemiologic Studies Depression (CES-D) Scale,	-Increased depressive symptoms were associated with worse glycemic control among men but not among women -A significant association between depressive symptoms and glycemic control was found for men but not for women. -Men had higher income levels, higher levels of self-efficacy, and lower levels of depressive symptoms than women. -Path analysis suggested that, among men, self-efficacy mediates the relationship between depressive symptoms and glycemic control HbA1c. -The relationship between self-efficacy and glycemic control HbA1c approached significance for the females.
Dewalt et al.	2007	To examine the association between literacy and trust, self-efficacy, and	Cross-sectional survey and chart review was performed	Patients with type II diabetes from general internal medicine practice N=250	Questionnaire; HbA1c, hemoglobin A1c; Health literacy: Revised Rapid Estimate of Adult Literacy in Medicine REALM-R). Trust measured by	Of the participants, 53 had low health literacy. No relationship was found between literacy and trust or self-efficacy. Patients with low literacy had less desire to participate

		participation in medical decision making in adults with diabetes			the Wake Forest Physician Trust Scale (WFPTS). Self-efficacy measured using the Diabetes Management Self-efficacy Scale (DMSES). Decision making by Desire to participate in Medical Decision-Making Scale (DPMD) and the Facilitation of patient Involvement Scale (FPI)	in medical decision-making and less diabetes related knowledge. Health literacy was associated with diabetes outcomes.
Dutton and colleagues	2009	To examine whether self-efficacy mediated the relationship between participation in a 1-month, print based physical activity intervention and improvements in activity levels.	Randomized control trial (The intervention was individually-tailored based on theoretical constructs, including self-efficacy)	Patients with diabetes from a community diabetes center in Florida USA N=85	Physical activity was assessed with the 7-day physical activity recall (PAR; Blair et al. 1985) - Self-efficacy was assessed with a 5-item measure. These five items assessed one's confidence to exercise	- The tailored intervention was associated with significant improvements in physical activity - There was an indirect effect of treatment on physical activity through self-efficacy. - The treatment effect on physical activity was completely mediated by changes in self-efficacy
Kim & YU	2010	The purpose of this study was to examine the mediating effect of self-efficacy on the relationship between	Cross-sectional study	Community-dwelling Korean older adults from Community-based senior welfare centers in Korea N=103	The Korean Test of Functional Health Literacy in Adults (KTOFHLA; Kim & Lee, 2008) KTOFHLA, developed based on the Test of Functional Health Literacy in Adults (TOFHLA; Parker, 1995), General Self-Efficacy Scale (GSE)	The study found that low health literacy was associated with poorer physical and mental health status, and the effect of health literacy on physical and mental health status was mediated through self-efficacy.

		health literacy and health status in Korean older adults with chronic disease			Physical Component Summary (PCS-12) and Mental Component Summary (MCS-12) of the Medical Outcomes Study 12-item Short Form.	
King et al.	2010	To evaluate associations between psychosocial and social-environmental variables and diabetes self-management, and diabetes control.	A randomized trial to evaluate the effect of an interactive multimedia diabetes self-management program	Patients with type 2 diabetes From five Kaiser Permanente Colorado primary care clinics in the Denver metropolitan area N=463	Self-management behaviors: using self-report surveys. -Fat intake was measured by: the National Cancer Institute's Percent Energy from Fat (PFAT) screener - Eating behaviors: the Starting the Conversation scale -Physical activity: the Community Healthy Activities Model Program for Seniors (CHAMPS) questionnaire - Self-efficacy was assessed with Lorig's 8-item Diabetes Self-Efficacy Scale - The social and environmental context in which patient self-management was assessed at the health care and community resource levels. -Support from health providers by Patient Assessment of Chronic Illness Care (PACIC)	Self-efficacy was strongly related to healthy eating and calories expended in physical activity. Self-efficacy, problem solving, and social-environmental support were independently associated with diet and exercise, increasing the variance accounted for by 23 and 19%, respectively.
Osborn et al.	2010	To explore the role of diabetes self-efficacy in the predicted	Cross-sectional study	Adults with type I and type II DM in primary care and diabetes	Health literacy: Rapid Estimate of Adult Literacy in Medicine (REALM) Numeracy: with the math section	Path models estimated relations among health literacy, numeracy, and diabetes self-efficacy as predictors of A1C.

		pathway linking health literacy and numeracy to glycemic control.		clinics in USA n=383	of the Wide Range Achievement Test (Wilkinson, 1993), 3rd Edition (WRAT-3 R), Diabetes self-efficacy was assessed using the eight-item Perceived Diabetes Self-Management Scale (PDSMS) (Wallston et al., 2007).	Health literacy and numeracy were each associated with greater diabetes self-efficacy, and greater diabetes self-efficacy was associated with lower A1C levels. Greater diabetes self-efficacy was associated with lower A1C levels.
Rak et al.	2013	To examine the association of health literacy and self-efficacy with employment outcomes among individuals with diabetes. - Whether the relationship of health literacy and employment outcome is mediated by self-efficacy.	Cross-sectional design	Consisted of individuals with diabetes from diabetes education and support groups and the public vocational rehabilitation agency in a Midwestern state USA n=126	Test of Functional Health Literacy in Adults (TOFHLA) - Several survey items were used to assess employment outcome - For self-efficacy, the Perceived Diabetes Self-Management Scale (PDSMS; Wallston et al., 2007) - The World Health Organization Quality of Life–BREF (WHOQOL-BREF) was used to assess physical health and psychological well-being	Diabetes-management self-efficacy was not directly related to employment, but it was indirectly linked to it through physical health and lack of interference of diabetes with activities of daily living. - Statistically significant differences were noted at the univariate level between the two groups on diabetes management self-efficacy and self-assessed interference of diabetes with ADLs. - Individuals who worked had a higher level of diabetes management self-efficacy than individuals who did not work - This research suggests that strategies to improve self-efficacy may contribute to improved health and employment

						outcomes
Robertson	2013	To examine the role of baseline depression, anxiety, and stress symptoms on post-intervention diabetes self-efficacy and glycemic control (HbA1c)	Diabetes self-management intervention study	Patients with uncontrolled diabetes from Veterans Affairs medical centre USA	<p>-The Diabetes Specific Self-Efficacy Scale(DSAES) was used to assess participants' perceptions of diabetes-specific self-efficacy at baseline and post-intervention</p> <p>- The Depression, Anxiety and Stress Scale (DASS) was used to measure negative emotional symptoms associated with depression, anxiety, and stress</p>	<p>- The role of affective symptoms in predicting post-intervention diabetes self-efficacy and the moderating effect of affective symptoms on the relationship between change in diabetes self-efficacy and HbA1c within the context of a self-management intervention.</p> <p>- Anxiety and stress symptoms significantly and independently moderated the relationship between changes in diabetes self-efficacy and post-intervention HbA1c.</p> <p>-Greater changes in diabetes self-efficacy were associated with lower post-intervention HbA1c but only among those with higher baseline levels of affective symptoms.</p>
Shi, Ostwald and Wang	2010	To examine the effect of a hospital-based clinic intervention on glycemic control self-efficacy	A randomized controlled trial consisting of a two-group pretest-post-test.	One hundred and fifty-seven Chinese patients with type 2 DM were randomly divided into two groups: the experiment	<p>-Self-efficacy: Diabetes Management Self-Efficacy Scale (DMSES) The DMSES was developed by van der Bijl et al. (1999)</p> <p>-Self-care: Diabetes Self-Care Activities Measure (DSCAM)</p>	The findings revealed that the experimental group showed statistically significant improvement in glycemic control self-efficacy and glycemic control behavior immediately and four months after

		and glycemic control behavior of Chinese patients with type 2 diabetes mellitus (DM)		al group n=77 and the control group n=80 in China N=157		the intervention - Resulted in an improvement in glycemic control self-efficacy and glycemic control behaviors in Chinese participants with type 2 DM
Wangberg et al.	2008	To assess whether self-efficacy (SE) could function as a moderator of the effect of a tailored Internet-based intervention aimed at increasing self-reported diabetes self-care behaviors	Two-group Randomized controlled trial	Patients with diabetes Norwegians between 17 and 67 years of age, recruited through Internet advertising n=60	Baseline questionnaire - The Summary of Diabetes Self-Care Activities (SDSCA) measure was used for assessing diabetes self-care behaviors. The perceived competence scales (PCS) were used for assessing SE.	Improvements in self-care were observed for both groups, but the Highest Self-efficacy (HSE) group improved more. Self-care also increased for those areas that the intervention did not target. Furthermore, SE levels decreased from baseline to follow-up. Changes in diabetes self-care from pre- to post-intervention were observed. The HSE group improved slightly more than the Lowest Self-efficacy (LSE) group. This study suggests that SE can function as a moderator in a behavioral intervention for diabetes self-care, and hence that initial levels of SE provide relevant information for tailoring such interventions. - The findings support the hypothesis that SE is a moderator of the effect of

						educational interventions on diabetes self-care behaviors.
Weaver	2014	To examine how demographic factors, social conditions, and health perceptions shape Diabetes Self-Efficacy (DSE) in order to enhance diabetes self-management.	Interview/ Survey study	A survey of 97 type 2 diabetes patients in a primary health care clinic located east of Toronto (Canada)	Survey questionnaires	Gender, time since diagnosis, and education showed a significant association to DSE. Perceived health variables, self-reported A1C, and self-reported health showed the strongest relationship to DSE
Xu and Toobert	2008	To test a model describing the effects of individual and environmental factors on diabetes self-management (DSM) in a sample of patients with diabetes in Beijing, China	Cross-sectional research design	Convenience sample of 201 Chinese adults with type 2 diabetes during outpatient visits in China	<ul style="list-style-type: none"> - The Chinese version of DSM measure was adapted from the Summary of Diabetes Self-Care Activities (SDSCA) - Diabetes Knowledge (DKN) scales (Beeney, Dunn, & Welch, 2003) - The Personal Models of Diabetes Questionnaire (Hampson, Glasgow, & Toobert, 2003) and the Perceived Treatment Effectiveness Scale - Self-Efficacy Scale for patients with type 2 diabetes (SE-Type 2 scale) 	<p>Knowledge, social support, and provider-patient communication affected self-management indirectly via beliefs and self-efficacy</p> <ul style="list-style-type: none"> - Diabetes self-efficacy directly affected DSM. - Provider-patient communication indirectly affected DSM through self-efficacy, beliefs, and knowledge. - Duration of diabetes affected DSM directly and indirectly through self-efficacy.
Zulman et al.	2012	To examine the influence	Cross-sectional study	Using data from the Health and Retirement	Diabetes survey using a well-validated measure of the five domains	All diabetes psychosocial attributes were associated with self-

		of diabetes psychosocial attributes (self-efficacy, risk awareness, care understanding, prioritization of diabetes, and emotional distress) and self-management on glycemic control and diabetes status change.		Study, a nationally representative longitudinal study of U.S. adults >51 years N=1834	Medication adherence, diet, exercise, blood sugar monitoring, and checking feet for ulcers by using a 5-point scale that ranged from “So difficult: I could not do it at all,” to “Not difficult: I got it exactly right.” - Diabetes self-efficacy was measured based on participants’ reported confidence in their ability to perform six key diabetes care activities	management ratings, with self-efficacy having the strongest positive relationships. - Levels of diabetes self-efficacy were also high, with 1092 respondents (61%) indicating that they were confident in their ability to perform at least seven of eight diabetes tasks. - Lower self-management ratings was associated with worse glycemic control Higher levels of diabetes self-care understanding were associated with better glycemic control
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Appendix D

Literature Review of Social Support

Author	Year	Purpose	Design	Sample	Measurement	Result
Bond et al.	2010	To investigate the impact of a 6-month Web-based intervention on the psychosocial well-being of older adults with diabetes.	Randomized controlled trial	Adult patients older than 60 with diabetes from the University of Washington Diabetes Center USA N=62	- Depression: using the Center for Epidemiological Studies Depression Scale (CES-D) - The Problem Areas in Diabetes Scale (PAID) - Diabetes Social Support Scale	- The intervention group showed significant improvement when compared with the control group on measures of depression, quality of life, social support, and self-efficacy when controlling for all baseline outcome variables (age, gender, and number of years with diabetes).
Chesla et al.	2010	To examine the evidence that family interventions improve health in persons with chronic illness and their family members, across the life span	Meta-analysis of randomized controlled trials	Studies about whether and how family intervention improves health	Focused on reviews and meta-analyses on family psychosocial treatments of physical health conditions or chronic illnesses of a family member across the life span, although some meta-analyses included dementia-type illnesses	Reasonable evidence supports family approaches to type 1 diabetes treatment in children -there is fairly clear evidence that family care approaches were superior to usual medical treatment in relieving family member burden; regardless of treatment approach, target of the intervention or type of illness, burden was less in family-treated groups
Chew et al.	2011	To examine the prevalence of social support and its association with glycemic control in patients with type 2 diabetes mellitus (T2D) in an urban primary care center within an academic institution.	Cross-sectional survey	Type II diabetes patients in an university primary care clinic in Kuala Lumpur, Malaysia N=175	Social support was measured using The Social Support (SS) Survey–Medical Outcomes Study (SS), a self-administered questionnaire; Glycemic control was measured using the 3 most recent glycosylated hemoglobin (HbA1c) levels within the past 3 years.	A significant correlation was found between SS score and number of social supporters (n = 167). No significant correlation was found between the self-reported number of social supporters or the SS score and the mean HbA1c level. Conclusions: Social support was not associated with glycemic control in adult patients with T2D in this primary care setting.

Chlebowy et al.	2006	To examine the relationships of psychosocial variables (social support, self-efficacy, and outcome expectations) to diabetes self-care behaviors and glycemic control in Caucasian and African American adults with type 2 diabetes.	Survey study	Adult participants with type 2 diabetes registered for clinical outpatient visits at 1 of 3 clinical sites in the southeastern United States N=91	Social Support Questionnaire (SSQ), Self-efficacy Questionnaire (SEQ), Outcome Expectancy Questionnaire (OEQ), and The Diabetes Activities Questionnaire (TDAQ) at the time of the clinic visit. glycosylated hemoglobin analyses at the time of the clinic visit.	No significant associations were found between 1) Social support and self-care behaviors and (2) self-efficacy and self-care behaviors. Self-care behaviors were significantly, positively correlated with outcome expectancy scores for the total group and for African Americans. No significant relationships were found between (1) social support and glycemic control, (2) self-efficacy and glycemic control, and (3) outcome expectations and glycemic control. African Americans reported less social support satisfaction than Caucasians did.
Choi et al.	2009	To examine the influence of family support for diet on glucose outcomes in Korean immigrants with type 2 diabetes, taking into consideration patient gender.	Cross-sectional descriptive study	Korean immigrants with type 2 diabetes from West Coast Korea town, USA N=143	Diabetes Family Behavior Checklist-II [DFBC]	-A higher level of diet family support was significantly associated with lower A1C, indicating the beneficial effect of diet family support on glucose control. -Although the main effect of gender A1C was not significant, the effect of the product term of family support and gender was, indicating that the significant beneficial impact of family diet support on A1C depends on gender. -Family support, specific to diet, is significantly associated with glucose outcomes in Korean immigrants with type 2

						diabetes. That is, more perceived family support was associated with better glucose control.
Comellas et al.	2010	To develop, implement, and evaluate a peer-led diabetes self-management support program in English and Spanish for a diverse, urban, low-income population	Pilot study To evaluate peer-led diabetes self-management	-Adults with diabetes participated in the new peer-led 5-session program New York, USA N=17	-Summary of Diabetes Self-Care Activities (SDSCA) measure Self-report of physical activity -World Health Organization (WHO) 5-item Well-Being Scale Survey data were collected pre- and post-intervention on diabetes self-care activities, quality of well-being, and number of steps using a pedometer.	-Significant improvements were found in several physical and nutritional activities, with a modest improvement in well-being
Dale et al.	2008	-To assess the evidence for peer support telephone-delivered interventions involving verbal communication and aiming to improve health and health behaviors	Narrative systematic review	Seven studies that used randomized controlled trials which used peer support telephone calls	-Types of studies -Types of outcome measures -Electronic searches and randomised controlled trials of peer support interventions delivered by telephone call	The results showed that peer support telephone delivery intervention in these studies improved depressive symptoms in women, increased self-efficacy, and improved diet in patients with myocardial infarction, encouraged breast feeding, increased mammography usage in women over 40 and increase self-efficacy in people with type 2 diabetes
Fisher et al.	2012	To investigate the effect of ongoing peer support on diabetes self-management outcomes in international settings	Longitudinal International study	Patients with diabetes Cameroon (n=96), South Africa Uganda n=46 Thailand	-Implementation: peer progress documented the implementation - Assistance in daily management - Social and emotional support -Linking to	Study found improvements in symptom management, diet, blood pressure, BMI, and blood sugar level - Participants' average glycated hemoglobin (HbA1c) declined markedly, from 9.6

		(Cameroon, South Africa, Thailand, and Uganda)		n=53 N=195	clinical care	percent to 6.7 percent.
Fortmann et al.	2011	To investigate the value of a multiple-mediator model in explaining how support resources for disease management influence hemoglobin A1c (HbA1c) levels in a sample of 208 Latinos with Type 2 diabetes recruited from low-income serving community clinics in San Diego County	Randomized trial	Latino men and women with Type 2 diabetes and HbA1c greater than 8% from San Diego County USA N=208	-Support resources: Chronic Illness Resources Survey (CIRS) -Diabetes self-management: Summary of Diabetes Self-Care Activities scale (SDSCA)	-Participants who perceived greater support resources for disease-management reported better diabetes self-management -Findings showed that individuals reporting greater support resources for disease management also reported more adaptive self-management behaviors and less depressive symptomatology, which in turn were associated with lower HbA1c levels.
Frosch et al.	2011	To test if participants assigned to the experimental condition would report more engagement in self-care behaviors and would have lower HbA1c, lipid, and blood pressure levels after completing the intervention at 6 months.	Randomized controlled trial (an intervention that included a 24-minute video behavior support, a workbook and 5 sessions of telephone coaching by diabetes nurses or a 20-page handout developed	Patients with diabetes type 2 (African American and Latino) from Los Angeles, California USA N= 201	Knowledge was assessed with Diabetes Knowledge Test, developed by the University of Michigan Diabetes Research and Training Center - Self-care was assessed with the 25-item Summary of Diabetes Self-Care Activities measure (SDSCA)	There was a significant overall reduction in mean (SD) HbA1c value from baseline to 6 months, but differences between groups were non-significant. - Difference on other measures (lipid levels and blood pressure) and diabetes knowledge and self-care behavior were non-significant.

			by the National Diabetes Education Program)			
Gensichen and Korff	2009	-Assessed whether physicians' characteristic level of practical and communicative support (mean across patients) and each patients' deviation from their physician's mean level of support was associated with glycemic control outcomes	Prospective observational, survey study	Patients with diabetes in nine primary care clinics in Western Washington, USA N=3897	To assess patient perceptions of physician support for diabetes care: used a modified version of the Health Care Climate Questionnaire (HCCQ)	- Physicians' average level of practical support (based on patient ratings of their provider) was associated with significantly lower HbA1c at follow-up, controlling for baseline HbA1c (p = .0401) - The prospective analysis of predictors of HbA1c at follow-up found that being seen by a physician with a higher mean level of practical support was associated with more favorable glycemic control outcomes. - the physician's mean level of practical support was a significant predictor of follow-up HbA1c
Gleeson-Kreig et al.	2008	- To examine the relationship between social support and physical activity. - To describe sources of social-environmental support for physical activity perceived by people with type 2 diabetes	Cross-sectional study	Participants living in northern New York State With type 2 diabetes N= 58	-Physical activity: using a modification of the Habitual Physical Activity Index (HPAI) - Multidimensional support was measured using a modified version of the Chronic Illness Resources Survey (CIRS)	- Support from the media scored highest, followed by the health care team, personal support, workplace, family and friends, and lowest for the community. Physical activity was related to personal, media, and community support. - CIRS had a mean of 3.02 (SD = .68), indicating a moderate level of perceived supports - Total physical activity was only related to the community support subscale - it could also point to the positive benefits of the media in promoting healthy behaviors.

Heisler et al.	2010	To compare a reciprocal peer-support (RPS) program with nurse care management (NCM).	Randomized, controlled trial.	Men with HbA1c levels greater than 7.5% during the previous 6 months from U.S. Department of Veterans Affairs (VA) N=244	- Secondary self-report outcomes measured by survey at baseline and 6 months included validated measures of medication adherence, diabetes-related emotional distress, and diabetes-specific social support.	- Mean HbA1c decreased from 8.02% to 7.73% (change, \square 0.29%) in the RPS group and increased from 7.93% to 8.22% (change, 0.29%) in the NCM group. - Patients who were randomly assigned to receive RPS (Reciprocal Peer Support) achieved HbA1c levels that were 0.58% lower on average than those of patients who received NCM (Nurse Care Management).
Ingram et al.	2007	To describe the effect of a promotora-driven intervention to build social support as a means to affect self-management behaviors and clinical outcomes in a farm worker community on the US-Mexico border.	Survey study	Participants were from farm workers who have type 2 diabetes from a workers community on the US-Mexico border N=70	The Campesinos Diabetes Management Program (CDMP), created by Campesinos Sin Fronteras - CDMP employed a participatory model of evaluation, in which the 3 main project partners, CSF, SCHC, and the Mel and Enid Zuckerman College of Public Health participated in the development of evaluation methodology and instruments. Perceived social support was measured using a 5-point Likert-type scale measuring how comfortable participants felt talking with family and friends about their diabetes and	Glycosylated hemoglobin (HbA1c) levels decreased 1% among high-risk participants. Improved HbA1c level was associated with promotora advocacy and participation in promotora-led support groups. Participants reported increased support from family and friends and more comfort speaking about diabetes (la enfermedad) with family and friends.

					their emotions.	
Kanbara et al.	2008	To study whether social support promotes self-efficacy and reduces stress responses of patients with diabetes in Yogyakarta, Indonesia.	Survey/questionnaire study	Patient with diabetes from Dr. Sadjito Hospital in Yogyakarta, Indonesia voluntary (convenience sample) participants N=125	The original questionnaires were developed in Japan, and were translated to English and then to Indonesian, the questionnaires included the scales and subscales of social support, self-efficacy, psychological stress response, and demographic measures.	It was found that augmentation of emotional support to patients significantly increased their 'active coping for the disease' and 'controllability of health', and that 'helplessness' was reduced significantly. Behavioral support affected only 'controllability of health'. Self-efficacy reduced the stress response of the patients. It was also found that subjects who received support from their children scored significantly higher in perceived availability of social support than those without support from their children.
Kang et al.	2010	To compare family partnership intervention care (FPIC) with conventional care (CC) across a number of outcome measures in patients with poorly controlled type 2 diabetes.	Randomized controlled trial design	Patients with poorly controlled type 2 diabetes were randomly assigned to the FPIC group (n=28) and to the CC group (n=28) from the diabetes outpatient clinics of a community teaching hospital in Taipei, Taiwan	-Diabetes family behavior checklist (DFBC), knowledge and attitude toward diabetes questionnaire (KAQ), and diabetes self-care scale (DSC) were used for data collection	- Overall, the mean A1C value decreased in FPIC patients more than CC patients but the change was not significant - a higher proportion of patients (n = 8; 28.6%) in the FPIC group reached A1C values below 7% than patients in CC group
Khan et		- Investigated	- Patients	American	- Spousal support	- On a daily basis,

al.	2013	how spousal support and control independently and jointly influence patient physical activity and efficacy to engage in physical exercise on a daily basis.	and spouses completed diaries on 477 days (97.3%) and on 480 days (97.9%), respectively.	adults age 55 and older with type 2 diabetes n=70 n=53 wore an activity monitoring device (Kent State University) N=123	and control of patient exercise: On each evening, spouses indicated the extent to which they provided support targeting patient exercise that day in seven items - Moderate-to-vigorous physical exercise (MVE): Each evening, patients reported the number of minutes in which they engaged in light (e.g., grocery shopping, household chores), moderate (e.g., yard work, brisk walking), and vigorous (e.g., running, bicycling) levels of exercise that day. Measures of exercise were based on items of the Yale Physical Activity Survey, which assesses older adults' physical activity -Patient efficacy for tomorrow's physical exercise: Each evening, patients rated "What number between 0 and 10 best describes your confidence	spousal support was positively associated with physical activity, whereas spousal control was either unrelated or linked to less physical activity. An increase in spouses' support or control above their own respective means was not significantly associated with that day's efficacy to exercise tomorrow - Findings suggest that spousal exercise support on its own or in conjunction with spousal exercise control may facilitate daily diabetes management through physical activity
King et al.	2010	To evaluate associations between psychosocial and social-environmental variables and diabetes self-management,	Randomized control trial	Patients with type 2 diabetes From five Kaiser Permanente Colorado primary care	Self-management behaviors: using self-report surveys. -Fat intake was measured using the National Cancer Institute's Percent Energy	Self-efficacy was strongly related to healthy eating and calories expended in physical activity, as was behavior-specific support from family, friends, and community resources.

		and diabetes control.		clinics in the Denver metropolitan area N=463	from Fat (PFAT) screener. -Eating behaviors: the Starting the Conversation scale -Physical activity: the Community Healthy Activities Model Program for Seniors (CHAMPS) questionnaire - Self-efficacy was assessed with Lorig's 8-item Diabetes Self-Efficacy Scale - The social and environmental context in which patient self-management was assessed at the health care and community resource levels. -Support from health providers by Patient Assessment of Chronic Illness Care (PACIC)	Self-efficacy, problem solving, and social-environmental support were independently associated with diet and exercise, increasing the variance accounted for by 23 and 19%, respectively.
Mayberry et al.	2014	- To assess the relationships between supportive and obstructive family behaviors and patients' diabetes self-care activities and HbA1c and potential interaction effects and differences by demographic characteristic	Cross-sectional study	Adult patients with type 2 diabetes USA N=192	-To assess family supportive and non supportive Diabetes: Family Behavior Checklist-II (DFBC-II) -To assess patient adherence to different self-care behaviors: the Summary of Diabetes Self-Care Activities (SDSCA)	- Participants reported similar rates of supportive and obstructive behaviors that were positively correlated - Supportive family behaviors were associated with adherence to different self-care behaviors - Whereas obstructive family behaviors were associated with less adherence to self-care behaviors and worse HbA1c - Involving family members in patients' diabetes management

		s.				may impede patients' self-care and compromise their glycemic control unless family members are taught to avoid obstructive behaviors.
McEwen et al.	2010	To pilot test the efficacy of a culturally tailored diabetes self-management social support intervention for Mexican American adults with Type 2 diabetes (T2DM) living in the U.S.- Mexico border region and to test the feasibility of recruiting and training promoters to encourage patients to participate in intervention delivery	Randomized control trial a single-group pretest and posttest design	Mexican American US-Mexican border Patients with type II diabetes N= 21	-Using self-report questionnaires, -Behavioral outcomes were: (1) Summary of Diabetes Self-Care Activities (SDSCA), (2) International Physical Activity Questionnaire (IPAQ) - Glycosolated hemoglobin (HbA1c) and anthropometric measures	- An increase in participants' diabetes self-management activities and diabetes knowledge and a decrease in diabetes-related distress and sedentary behaviors - No significant changes in physiologic outcomes. - This intervention positively affected diabetes self-management behaviors.
Nicklett et al.	2010	Hypothesized that (a) support for regimen adherence is negatively associated with self-reported health declines among older diabetic adults and that (b) regimen adherence is negatively associated with health declines	Cross-sectional study	Individuals with type 2 diabetes mellitus, USA N= 1,788	-Data from the Health and Retirement Study (HRS) Waves 6 and 7 (2002 and 2004) as well as the 2003 diabetes supplement. HRS is a national population-based study that has tracked individuals and households for a 12-year period -Patient-provider interaction to optimize adherence and successful treatment	-Diabetic support is not significantly associated with health decline, but it is strongly associated with adherence to health-promoting activities consisting of a diabetic regimen. A relationship was found between illness support and component regimen adherence, controlling for all other factors included in Model 3. Each being highly significant

		among older diabetic adults.			-Participants indicated (through a 5-point Likert scale) the extent to which they can rely on family or friends to provide help and support for each regimen component (illness-related support)	
Oftedal et al.	2011	- To examine perceptions of social support and associations of social support with diet and exercise management, and to investigate the degree to which these relationships are mediated by ability expectations in people with type 2 diabetes	Cross-sectional design	- A sample comprised of 425 adults aged 30–70 years with type 2 diabetes completed the questionnaire University of Stavanger, Norway N=425	-Diet and exercise management: Diabetes Self-Care Activities (SDSCA) -Ability expectations to perform necessary diet and exercise: Diabetes Management Self-efficacy Scale	- The majority of the participants reported constructive support from healthcare practitioners, whereas relatively few felt they had support from family and friends. Only modest associations were found between social support and self-management - Greater constructive support from healthcare provider as compared to family and friends - Associations of variables assessing social support with diet management were strongest among those who had the disease <6 years. -Associations between support variables and exercise management were significant, and constructive support from family and friends showed significant bivariate correlations with exercise management in both subsamples. -Both subsamples' exercise ability expectations mediated approximately 60% of the variance accounted for by support

						variables in exercise management.
Okura et al.	2009	To examine whether cognitive impairment in adults with diabetes mellitus is associated with worse glycemic control and to assess whether levels of social support for diabetes mellitus care modifies this relationship	Cross-sectional analysis.	Adults aged 50 and older with diabetes mellitus in the United States N= 1,097	-Cognitive function, measured with the 35-point: Health and Retirement Study (HRS) cognitive scale (HRS-cog) -Mail Survey on Diabetes from Michigan Diabetes Research and Training Center - Social support for diabetes mellitus care; Self-reported knowledge of diabetes mellitus; treatments for diabetes mellitus components of the Total Illness Burden Index related to diabetes mellitus; and functional limitations.	-The result showed high proportion of individuals receiving a higher level of social support (family and friend) in the lowest cognitive quartile and an association between higher level of social support and better glycemic control. - Cognitive impairment was associated with worse glycemic control in those with diabetes mellitus. - Although cognitive impairment was associated with worse glycemic control, higher levels of social support for diabetes mellitus care ameliorated this negative relationship.
Osborn et al.	2010	Examine the relationship between HL, determinants of SM and glycemic control.	Cross-sectional study	Patients with type II diabetes at a university hospital N=130 Mean age: 62.7 Female: 72.5% from Charleston, SC USA	HL: REALM-R Mediating variables: -Diabetes knowledge (DKQ) - Diabetes fatalism - Social support (MOS Social Support Survey) Self-Management(SM): SDSCA Other: Glycemic control (HbA1C)	HL did not have a direct effect on diabetes knowledge, fatalism, SM, or glycemic control. More knowledge, less fatalism, and more social support were independent, direct predictors of self-management and through self-management related to glycemic control. HL had a direct effect on social support and through social support an indirect effect on SM and an indirect effect on

						glycemic control.
Pereira et al.	2008	To determine the impact of family factors on diabetes, particularly the influence of family support and family environment on adherence to treatment, quality of life, and metabolic control in Portuguese adolescents with type 1 diabetes.	Cross-sectional design	Portuguese diabetic patients from a major hospital in Oporto, Portugal N=157	<ul style="list-style-type: none"> - Self-Report Questionnaire on Adherence. - Diabetes Family Behavior Scale - Family Environment Scale - Diabetes Quality of Life 	<p>This study's results confirmed that adherence was predicted by family support for females and lower-class patients while metabolic control was predicted by family conflict for upper-class patients</p> <ul style="list-style-type: none"> - Adherence to glycemic control (93.7%) is quite high - Family social support moderated the relationship between adherence and metabolic control ($p = .027$). While the correlation between adherence and metabolic control is positive, regardless of the level of family social support, when family social support was very high, the correlation between adherence and metabolic control was stronger than when family social support was low. - Adolescents in upper and middle class families showed better adherence when compared with adolescents from lower social class families ($p < .05$). Adolescents in upper class families showed better metabolic control when compared with adolescents from lower social class ($p < .01$). Adolescents in upper and middle class families showed higher quality of life than adolescents from lower

						social class ($p < .001$).
Rees et al.	2010	To evaluate how social support and race/ethnicity were associated with diabetes self-care behaviors and clinical outcomes.	The cross-sectional 2005-2006 National Health and Nutrition Examination Survey (NHANES)	Patients with diabetes (white, black and Latino) from 2005-2006 National survey n= 450	National Health and Nutrition Examination Survey (NHANES) Ascertainment of depressive symptoms was based on the 9-item scale of the Patient Health Questionnaire (PHQ-9) ²⁷ where the score	There were no differences in social support by race/ethnicity. The authors observed several significant race/ethnicity by social support interactions in adjusted models, controlling for age, gender, education, self-reported health, depression, functional disability, insurance status, and insulin use. Among blacks, social support was associated with controlling weight, , exercising, controlling fat/calories, and lower diastolic blood pressure. Among whites, social support was associated with lower LDL. No significant effects were noted for Latinos.
Rosland et al.	2008	To test whether Family and Friend (FF) support differentially affects specific Self-Management Behaviors (SMBs) and compare the influence of support from health professionals and psychological factors on specific SMBs to that of FF support.	Cross-sectional survey of people with diabetes recruited for a self-management intervention	African-American and Latino adults with type 2 diabetes, living in inner-city of Detroit N=164	-Social support from family and friends (FF support) -Diabetes SMBs: the Survey of Diabetes Self-Care Activities (SDSCA) -Diabetes care self-efficacy: the Perceived Competence for Diabetes Scale (PCDS) and the Patient Health Questionnaire (PHQ-9) -Health Status: the Behavioral Risk Factor Surveillance Survey (BRFSS)	The adjusted odds ratio (AOR) of completing testing as recommended was associated with an increase in FF support for glucose monitoring. FF support was not associated with four other SMBs (taking medicines, following a meal plan, physical activity, checking feet). Support from non-physician health professionals was associated with checking feet and meal plan adherence. Diabetes self-efficacy was associated with testing sugar, meal plan adherence, and checking feet. Additional analyses suggested that self-

						efficacy was mediating the effect of FF support on diet and checking feet, but not the FF support effect on glucose monitoring.
Seidel & Franks	2012	-Examined expectations regarding spouse involvement in the health of a partner with type 2 diabetes from the perspectives of the patient and spouse.	Survey questionnaire study	Spouse of partner with type 2 diabetes Ohio, USA (N = 139 couples)	Data were collected as part of a larger study investigating couples' management of diabetes.	- Among male patients, when both partners shared an expectation for spouse involvement greater diet-related spouse control was associated with better diet adherence of patients. -Findings suggest that shared expectations for spouse involvement can facilitate spouses' attempts to improve patients' dietary adherence, especially among male patients and their wives.
Smith & Paul	2011	To test the effectiveness of peer support for patients with type 2 diabetes.	Cluster randomised controlled	395 patients (192 in intervention group, 203 in control group) and 29 peer supporters with type 2 diabetes from Republic of Ireland	-HbA1c ; cholesterol concentration; systolic blood pressure; and wellbeing score.	There was no difference between intervention and control patients at baseline -At two year follow-up, there were no significant differences in HbA1c -While there was a trend towards improvements in clinical outcomes, the results do not support the widespread adoption of peer support.
Strom & Egede	2012	The purpose of this systematic review is to examine the impact of social support on outcomes in adults with type 2 diabetes.	Systematic review	Thirty-seven articles met the inclusion criteria set for this review and analysis observational studies n=21, interventional	Search Medline/ PubMed for articles on social support for patient with type II diabetes	More studies suggested that higher levels of social support were associated with improved diabetes-related clinical outcomes (HbA1c, BP, lipids) -Diet and exercise support/ behavioral-targeted support mechanisms improved clinical outcomes in diabetes

				on studies: n= 16 N=37		management - in this review of social support and clinical outcomes, there was strong evidence that higher levels of social support were associated with better clinical outcomes and behavior adaptations. - all articles in this review did not find a positive association between the two variables. Data from the opposing studies indicate that study limitations may have minimized the effects seen
Tang et al.	2008	The purpose of this study was to examine social support and its relationship to diabetes-specific quality of life and self-care behaviors in African Americans with type 2 diabetes.	Cross-sectional survey	African Americans with type 2 diabetes from metro Detroit area USA N=89	-Diabetes-specific quality of life: The Diabetes Distress Scale (DDS) -Self-care behavior: the Summary of Diabetes Self-Care Activities Measure Revised (SDSCA). -Positive and negative support behavior: the Diabetes Family Behavior Checklist-II (DFBC-II) -Amount of social support received was measured by 1 item: "How much support do you get dealing with your diabetes?" -Satisfaction with social support was measured by 1 item: "How satisfied are you with the support you get for	Satisfaction with support was a predictor for improved diabetes-specific quality of life and blood glucose monitoring. Positive support behavior was a predictor for following a healthy eating plan, spacing out carbohydrates evenly throughout the day, and performing physical activity at least 30 minutes per day. Negative support behavior was a predictor for not taking medication as recommended.

					dealing with your diabetes?" -Primary source of social support was measured by 1 item: "Please list the person who helps you the most in dealing with your diabetes."	
Trief et al.	2011	To assess the feasibility and potential efficacy of a couples-focused diabetes intervention in which a collaborative problem-solving approach to diabetes self-care was promoted	Pilot study	Patients with type 2 diabetes USA female n =28 male n=16 N=44 Participants were randomly assigned to a couples intervention ("Couples"), individual intervention ("Individual") or Enhanced Usual Care (EUC) that consisted of two diabetes education sessions plus meal plan review.	Self-care behaviors: Summary of Diabetes Self-Care Adherence scale (SDSCA)(Toober t, Hampson, & Glasgow, 2000).	Mean change in A1c: the Individual group showed the greatest declines. in HbA1c - Glycemic control improved in all three groups, especially the Individual group. - Mean change in total cholesterol: Both intervention groups declined, the Individual group showed the greatest declines, EUC increased. - Mean change in LDL cholesterol: Both intervention groups declined, the Individual group showed the greatest declines, EUC increased. - Mean change in waist circumference: The Couples group showed the greatest decline, Individual and EUC increased.
Vaccaro et al.	2014	To investigate how ethnicity, perceived family/friend social support	Cross-sectional study	174 Cuban-, 121 Haitian- and 110 African-American	-Michigan Diabetes Research and Training Center (MDRTC) Diabetes Care Profile	-Higher family social support (FSS) scores were associated with higher diabetes self-management (DSM) scores even with ethnicity and gender in

		(FSS), and health behaviors are associated with diabetes self-management (DSM) in minorities		s with type 2 diabetes from South Florida, USA N=405	questionnaire -Family Social Support scale questionnaire -DSM was a shortened version of the subscales available from the Diabetes Care Profile from MDRTC	the mode Family social support was not directly associated with diabetes control (HbA1c).
Van Dam et al.	2005	Testing effects of social support interventions on health outcomes in primary and outpatient care for type 2 diabetes. Six controlled trials were reviewed.	A systematic review of controlled intervention studies of social support in diabetes	Six controlled trials were reviewed.	The six reviewed studies were all RCTs, applying and studying a variety of social support interventions	<ul style="list-style-type: none"> - Most of the six reviewed studies carry evidence in support of the idea that social support is influential on self-care and outcomes of diabetes care. - Promising new forms of social support: group consultations (better HbA1c and lifestyle), Internet or telephone-based peer support (improved perceived support, increased physical activity, respectively), and social support groups (improved knowledge and psychosocial functioning). - No improved diabetes control by classic forms of support, e.g. from spouse (but weight loss in women) and family and friends (no differences)
Wolever et al.	2010	To evaluate the effectiveness of integrative health (IH) coaching on psychosocial factors, behavior change, and glycemic control in patients with type II	Randomized control trial	Patients with type 2 diabetes were randomized to either 6 months of Integrating Health (IH) coaching or usual care	-The following validated surveys were used as pre-study and post-study assessments and have demonstrated adequate psychometric properties: - Adherence Start with Knowledge (ASK-20), Morisky	Perceived barriers to medication adherence decreased, while patient activation, perceived social support, and benefit finding all increased in the IH coaching group compared with those in the control group - Improvements in the coaching group alone were also observed for self-reported

		diabetes.		(control group) USA N=56	Adherence Scale, Patient Activation Measure (PAM-13), Appraisal of Diabetes Scale, Interpersonal Support Evaluation List (ISEL-12), Perceived Stress Scale (PSS-4), and Short-Form Health Survey (SF-12).	adherence, exercise frequency, stress, and perceived health status. -Coaching participants with elevated baseline A1C ($\geq 7\%$) significantly reduced their A1C.
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Appendix E

Literature Review of Self-management

Author	Year	Purpose	Design	Sample	Measurement	Result
Ahola and Groop	2013	The aim of this review is to discuss some of the barriers to optimal diabetes self-management.	Review articles	-----	-----	<ul style="list-style-type: none"> - This observation, together with patients' and practitioners' reports, suggests that active self-management is suboptimal. Various reasons, both individual and environment related, contribute to the suboptimal concordance with treatment regimen. - Self-management is associated with various individual and environment-related factors that either promote or impede good self-management.
Al-Khawaldeh and Al-Hassan	2012	- To evaluate the relationships between diabetes management self-efficacy and diabetes self-management behaviors, and glycemic control.	Cross-sectional design	Patients with type II diabetes from an outpatient clinic in a National Diabetes Center in Amman, Jordan N=223	<ul style="list-style-type: none"> -Diabetes management self-efficacy: The Diabetes Management Self-Efficacy Scale (DMSES) - Self-care: The revised Summary of Diabetes Self-Care Activities Scale (SDSCA) 	<ul style="list-style-type: none"> - Diet self-efficacy and diet self-management behaviors predicted better glycemic control, whereas insulin use was a statistically significant predictor for poor glycemic control - Subjects with higher self-efficacy reported better self-management behaviors in diet, exercise, blood sugar testing, and taking medication. - Subjects with greater diet self-efficacy and greater diet self-management behavior had lower HbA1c levels, whereas being on insulin was

						associated with higher HbA1c levels.
Bains et al.	2011	-To assess associations among health literacy, diabetes knowledge, self-care, and glycemic control in a low income, predominantly minority population with type 2 diabetes.	Intervention study	Adults with type II diabetes from a low income population Internal Medicine Clinic, Charleston, SC USA N=125	- Self-care behavior: Summary of Diabetes Self-Care Activities (SDSCA) - Health Literacy: Revised Rapid Estimate of Adult Literacy in Medicine (REALM-R) -Diabetes knowledge: Diabetes Knowledge Questionnaire (DKQ) -Medication adherence: The Morisky adherence score	- Health literacy was significantly related to diabetes knowledge, but, was not significantly related to medication adherence or diabetes self-care (general diet, exercise, blood sugar testing, and foot care). - Increased diabetes knowledge was associated with significantly lower HbA1c levels - Both diabetes knowledge and perceived health status were significantly associated with glycemic control, whereas health literacy was not associated with glycemic control
Bastiaens et al.	2009	To develop and implement a group self-management education program for people with type II diabetes at the community level in primary care. This pilot-study intended to evaluate the feasibility, acceptability, and long-term effects (12–18	Pilot-study	Patients with type II diabetes from primary care in Belgium N=44	For evaluation of the effectiveness of the program, patients completed measures on dietary habits (adapted food frequency questionnaire), physical activity (IPAQ), and emotional distress (PAID) prior to and at 12 and 18 months post-attendance. The Problem Area in Diabetes Scale (PAID) -PAID and IPAQ are	BMI decreased with 0.45 kg/m ² at 12-month and with 0.53 kg/m ² at 18-month follow-up. HbA1c declined from 7.4% (±1.3) to 6.8% The PAID-score diminished from 28 (±20) to 18 (±13) at 12 months post-intervention. These changes were only partly sustained at the 18-month follow-up. Actual behavior changed modestly. - We found no

		months) of this program on emotional distress, HbA1c, BMI, and actual behavior.			international questionnaires validated in Dutch.	statistically significant sustainability of the effect for HbA1c and PAID-score after 12 months
Castro & O'Toole	2009	To evaluate the effectiveness of the Full Circle Diabetes program on diabetes self-management for urban American Indians	Cross-sectional study	American Indians with type II diabetes from Minneapolis American Indian Center (MAIC) Native American Community Clinic (NACC) USA N=249	- Knowledge of resources: Lifestyle survey - Change in knowledge of resources: The McNemar Test (2-sided): Wilder Research provided Minneapolis American Indian Center (MAIC) and Native American Community Clinic (NACC) with semiannual evaluation reports.	- Program participation of any kind resulted in a significant improvement in knowledge of resources for managing diabetes - 98% of respondents reported that as a result of attending Living in Balance classes, they had made changes in one or more of the following behaviors: exercising, coping with diabetes stress, communicating with their health care provider, and improving their eating plan.
Clark et al.	2008	-Aims to further clarify this literature by considering published evidence for the effectiveness of self-management education, including community-based peer support groups and ongoing home telephone support.	A review of studies related to diabetes self-management	Studies done on diabetes self-management N= 11	Self-management patient education programs	- Evidence supports the effectiveness of self-management education in individuals with diabetes, particularly in the short-term. -Telephone care can be a vital link between patients and their health care providers for ongoing self-management support, especially when patients experience difficulty accessing face-to-face services.

Davies et al.	2008	To evaluate the effectiveness of a structured Group education program on biomedical, psychosocial, and lifestyle measures in people with newly diagnosed type 2 diabetes.	Multi central cluster randomized controlled trial	Patients with type II diabetes from 13 primary care centers in the United Kingdom N=824	Self-care: Summary of diabetes Self-care activities questionnaire, Physical activities: International physical activity questionnaire (IPAQ) -Quality of life: World Health Organization's Quality of Life Instrument (WHOQOL)	HbA1c levels decreased at 12 months by 1.48% in intervention group and decreased in control group by 1.21% -The difference was not significant -Greater weight loss in intervention group at 12 months -Intervention group showed significantly greater changes in illness belief scores; directions of changes were positive indicating greater understanding of diabetes and they had lower depression scores
Fortmann et al.	2011	To investigate the value of a multiple-mediator model in explaining how support resources for disease management influence hemoglobin A1c (HbA1c) levels in a sample of 208 Latinos with Type 2 diabetes recruited from low-income serving community clinics in San Diego County	Randomized trial	Latino men and women with Type 2 diabetes and HbA1c greater than 8% from San Diego County USA N=208	-Support resources: Chronic Illness Resources Survey (CIRS) -Diabetes self-management: Summary of Diabetes Self-Care Activities scale (SDSCA)	- Better diabetes self-management and less depression were both associated with tighter glycemic control - Results of simple mediation models indicating diabetes self- management (a) and depression (b) as partial mediators of the relationship between support resources for disease management and HbA1c. -We identified an inverse association between diabetes self- management and HbA1c levels in the present study, highlighting the importance of implementing effective diabetes

						self- management programs.
Gao et al.	2013	- To examine a conceptual model that hypothesizes how self-efficacy, social support, and patient-provider communication influence glycemic control through self-care behaviors in Chinese adults with type 2 diabetes	Cross-sectional study	Chinese adults with type 2 diabetes in a primary health care center in Shanghai, China N=222	-Self-care behavior: Summary of Diabetes Self-Care Activities (SDSCA) -Self-efficacy: Diabetes Management Self-Efficacy Scale (C-DMSES) -Social support and Patient Provider Communication (PPC): the Chinese versions of the questionnaires	- Diabetes self-care had a direct effect on glycemic control ($\beta = -0.21$, $p = .007$). No direct effect was observed for self-efficacy, social support, or PPC on glycemic control - Although Self-efficacy, social support, and PPC had no direct effect on HbA1c, all of them had an indirect effect on HbA1c through self-care (SDSCA). - There were significant positive direct paths from self-efficacy, social support, and PPC to diabetes self-care
Johnson et al.	2014	The purpose of this study is to examine differences in diabetes self-care activities (blood glucose monitoring, exercise, healthy eating, foot checks, and nonsmoking) by race/ethnicity and insulin use.	- Behavioral Risk Factor Surveillance System survey study	Adults with type II diabetes in USA N=2011	- Diabetes self-care activities: the Summary of Diabetes Self-care Activities (SDSCA) -Diabetes care from some of survey questions	- Overall, 20% of adults had high levels of diabetes self-care (as indicated by engaging in 4 or 5 self-care activities), while 64% had moderate (indicated by participating in 2 or 3 self-care activities) and 16% had low self-care - Overall, there were statistically significant differences in the prevalence of each self-care activity by race/ethnicity among non-insulin users
Jordan et al.	2010	To examine the diabetes self-care behaviors (regarding diet, exercise,	Cross-sectional descriptive study	Filipino American Patients with type II diabetes from Southern	Diabetes Self Care: Summary of Diabetes Self Care Activities– Revised and Expanded	- Younger FAs were less likely to perform optimum type 2 DM self-care behaviors pertaining to diet,

		medication use, and blood glucose self-measurements) of Filipino American (FA) adults with type 2 DM		California USA N=192	(SDSCA-R&E)	medication taking, and blood glucose testing compared to their older counterparts. - Only those participants who had lived in the US longer followed healthier eating plans. - FA males with type 2 DM and those participants with more education were more likely to engage in physical activity than FA females and those with less education
Kennedy et al.	2013	To determine the effectiveness of an intervention to enhance self-management support for patients with chronic conditions in UK primary care.	Two arm, practice level cluster randomized controlled trial to test whether the adoption of a whole systems model of self management support compared with routine primary care leads to improved health outcomes and cost.	5599 patients with a diagnosis of diabetes (n=2546), chronic obstructive pulmonary disease (n=1634), and irritable bowel syndrome (n=1419) from 43 practices (19 intervention and 22 control practices). From primary care trusts in the north west of England	-Postal questionnaire at baseline and at six and 12 months -Self efficacy (confidence to undertake the management of chronic disease), and generic health related quality of life (EQ-5D) and self-report questionnaire	We randomized 44 practices and recruited 5599 patients, representing 43% of the eligible population on the practice lists. 4533 patients (81.0%) completed the six month follow-up and 4076 (72.8%) the 12 month follow-up. No statistically significant differences were found between patients attending trained practices and those attending control practices on any of the primary or secondary outcomes. All effect size estimates were well below the pre-specified threshold of clinically important difference.
Khunti & Gary	2012	To measure whether the benefits of a	A multicenter cluster	Patients with diabetes type II in 13	- A postal questionnaire included	- Across all biomedical outcomes,

		single education and self management structured program for people with newly diagnosed type 2 diabetes mellitus are sustained at three years	randomized controlled trial	primary care sites across England and Scotland N=731	lifestyle questions on smoking status and physical activity, as well as quality of life and health related quality of life - An illness perceptions questionnaire to assess people's perception that they understood their diabetes (coherence), perception of the duration of their illness (timeline), and perception of their ability to affect the course of their diabetes (personal control).	improvements were seen in both groups, with no significant differences between groups at three years. The primary outcome, HbA1c level, did not differ significantly between the groups. - Participants may need further education and ongoing support to successfully manage their condition and to achieve improvements to clinical outcomes and self-management behaviors long term.
Nouwen & Balan	2011	-To analyze the longitudinal relationships between HbA1c and dietary self-care on the one hand and motivational factors (autonomy support, autonomous and controlled motivation, dietary self-efficacy, positive and negative outcome expectancies, self-evaluation) on the other	Longitudinal study	Patients with type II diabetes in two predominantly rural counties in the West-Midlands of England N=237	-Dietary Self-care and self-efficacy: Summary of Diabetes Self-Care Activities questionnaire (SDSCA) -Outcome expectation for dietary self-care: The positive outcome expectancy scale included 11 items and the negative outcome expectancy scale three items -Diabetes Knowledge Scale (DKS, Dunn & Bryson 1984) -Autonomy	Dietary self-care was longitudinally associated with self-efficacy, self-evaluation (the strongest predictor), autonomy support, and autonomous motivation, but not with controlled motivation or outcome expectancies -Negative outcome expectancies regarding diet were longitudinally associated with HbA1c, and changes in negative outcome expectancies predicted changes in HbA1c. However, there

					<p>support: The Modified Health Care Climate Questionnaire (HCCQ, Williams, Grow, Freedman, Ryan, Deci,</p> <p>- Autonomous motivation: The Treatment Self-Regulation Questionnaire (TSRQ, Ryan & Connell, 1989)</p>	<p>were indications that dietary self-care predicted changes in HbA1c</p> <p>All the motivational variables were significantly related to dietary self-care, except the negative outcome expectation</p> <p>-The results indicate that autonomy support, self-efficacy and, in particular, self-evaluation are key targets for interventions to improve dietary self-care.</p>
Nyunt et al.	2010	To estimate the prevalence of glycemic control and its associated factors among type-2 diabetes patients attending two private clinics in Yangon, Myanmar	Cross-sectional study	<p>Patients with diabetes in two private clinics in Yangon, Myanmar Thailand</p> <p>N=266</p>	<p>-Self-care behaviors: Summary of Diabetes Self-Care Activities (SDSCA) (Toobert et al., 2000)</p> <p>-Self-efficacy: Diabetes Mellitus Self-efficacy Scale (DMSES)</p>	<p>- About 62.0% of the patients had a high self-efficacy level, and 30.8% had good self-care behavior</p> <p>-Analysis found 7 variables (age, taking one OHA, an ulcerated foot, high self-efficacy levels, overall self-care behavior, self-care for diet and for physical exercise) were significantly associated with glycemic</p>
Packer et al.	2012	To investigate the impact of generic and diabetes-specific self-management programs offered in a real world context. 1. Does participation in a generic or disease-	Quasi-experimental design study	<p>Patients with chronic conditions such as diabetes from Curtin, Australia</p> <p>Diabetes n=222 and chronic condition n=236</p> <p>N=458</p>	<p>-Living Life with a Chronic Condition: Renamed in Western Australia, the Chronic Disease Self-Management Program (CDSMP)</p> <p>-Self-management knowledge and skills: The</p>	<p>- Participants (N = 458) in the two programs differed on almost all baseline measures. Both demonstrated statistically significant improvements in Self-management Knowledge and Skills, as well as reductions in depression. In addition to younger</p>

		<p>specific self-management program, offered in a real-world rather than research context result in:</p> <ul style="list-style-type: none"> - Improvements in self-management knowledge; skill; quality of life; self-efficacy, decreased levels of depression; social isolation; loneliness - Improved management of behavioral risk factors (exercise, alcohol intake, smoking), at post-intervention and/or follow-up? <p>2. Which baseline clinical and demographic characteristics predict improvement in quality of life; depression; self-efficacy?</p> <p>(3) Changes in which characteristics predict positive changes in quality of life;</p>			<p>Health Education Impact Questionnaire Version 2 (HeiQ)</p> <ul style="list-style-type: none"> - Health Related Quality of Life (HRQOL): The Assessment of Quality of Life (AQoL-8) - Depression. The depression module from the Patient Health Questionnaire (PHQ-9) - Social isolation. A three-item self report measure derived from the Revised UCLA Loneliness Scale (R-UCLA) - Loneliness. A single question with four possible responses: always feel lonely, often feel lonely, sometimes feel lonely, never feel lonely - Self-efficacy. The six item Stanford Self-efficacy measure - Health behaviors. Data on typical days per week doing exercise 	<p>age, low HRQOL, high self-efficacy, and Positive and Active Engagement in Life were the clinical factors most likely to lead to improvements in HRQOL and self-efficacy. Changes in different characteristics predicted different outcomes.</p> <p>Both groups performed very well, with statistically significant improvements in their self-management knowledge and skills, as indicated by the improved heiQ scores on five of six domains measured (four at post-test and follow-up and one at follow-up). Participants in the Chronic Condition program showed additional improvements on the domain of Constructive Attitudes and Approaches. Both groups had relatively low levels of depression at baseline, and both demonstrated statistically significant reductions at follow-up. This agrees with other studies showing that self-management approaches can be effective for</p>
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		depression; self-efficacy				individuals with mild depression Participants in the Chronic Condition program showed improvements in self-efficacy, which is consistent with other studies reporting on CDSMP programs internationally
Pun & Coates	2009	To systematically review the literature about barriers to diabetes self-care from both patients' and healthcare providers' perspectives. Background. Diabetes mellitus is a global health concern due to rapidly increasing	Systematic literature review	A total of 16 original research papers using various methods including survey, descriptive correlational, sequential explanatory mixed-method and qualitative exploratory design were reviewed	1. Original research articles published in peer-reviewed journals. 2. With a stated aim to investigate barriers to diabetes self-care management, or to explore the reasons for diabetes non-adherence, or to identify various factors affecting diabetes self-care behaviors from either patient, healthcare provider or both perspectives. 3. These articles had to be published in English. Review articles, commentaries, un-published papers and research articles not addressing any one of the above aims.	-Understanding barriers to diabetes self-care is the first step in facilitating providers to identify their role in enabling patients to overcome these barriers -Barriers perceived by patients included psychosocial, physical, and environmental factors affecting their change of behavior. Social support and knowledge were found to have significant influence on the prediction of self-care behaviors. From the healthcare provider's perspective, perceived barriers were related to the delivery of care, the provision and the quality of diabetes care provided for their patients
Schillinger et al.	2009	To examine the effect of two SMS strategies Automated	-3 arm Practical clinical trials from the	Patients with poorly controlled diabetes spoken	The researchers developed a questionnaire in English/Spanish and Cantonese	The study found that providing tailored Self-management Support (SMS)

		Telephone Self-management Support (ATSM) and Group Medical Visit (GMV) across outcomes corresponding to the chronic care model	Improving Diabetes Efforts Across Language and Literacy (IDEAL) project conducted in a safety net health system	English, Spanish or Cantonese/ Chinese outpatients of the San Francisco USA N=339	to assess self-management behaviors -Patient assessment chronic illness care (PACIC) - Diabetes quality improvement program - Interpersonal processes of care for Diverse Population (IPC) -Test of functional health literacy	using patient-generated behavioral action plans resulted in improvements in patient's experiences with chronic illness care, self-efficacy, and self-management behaviors. Patient-centered SMS improves certain aspect of diabetes care and positively influences self-management behaviors. - Glycemic control improved across all three arms, but there were no statistically differences in HbA1c changes between automated telephone self-management support (ATSM) and monthly group medical visit (GMV) arms relative to the usual care arm.
Sonsona et al.	2014	To investigate the diabetes self-management behaviors of the Filipino American population and the factors influencing their diabetes self-management behaviors	Cross-sectional study	Filipino Americans with Type 2 diabetes in USA N=113	-Diabetes Knowledge Test -Self-Efficacy for Diabetes Test, -Daily Spiritual Experience Scale, -Diabetes Social Support Questionnaire-Family Version, Summary of Diabetes Self-Care Activities	- The findings indicate that Filipino Americans (FilAms) with T2DM engage well in diabetes self-management behaviors and are expected to have significantly higher diabetes self-management behavior than the general population - The use of a holistic approach by health professionals would improve diabetes self-

						management practices of the Filipino American population with Type 2 diabetes
Tang & Funnell	2010	To examine the impact of a 6-month, empowerment-based diabetes self-management support (DSMS) intervention on clinical outcomes, self-care behaviors, and quality of life (QOL) compared to a 6-month control period. -To compare the intervention condition with a control condition	Control-intervention cohort study	African-American adults with type 2 diabetes in Detroit USA N=77	-Self-care behavior was assessed using items from the Summary of Diabetes Self-Care Activities (SDSCA) -Diabetes-specific quality of life was measured by the Diabetes Distress Scale (DDS),	-Compared to the control period, participation in the Lifelong Management (LM) intervention led to a significant improvement in glycemic control, BMI, and diet -Findings suggest that an empowerment-based, DSMS intervention is promising for improving and/or maintaining diabetes-related health, particularly A1C.
Tang et al.	2008	The purpose of this study was to examine social support and its relationship to diabetes-specific quality of life and self-care behaviors (healthy eating, physical activity, self-monitoring of blood glucose, foot care, medication and/or insulin use)	Cross-sectional survey	African Americans with type 2 diabetes from metro Detroit USA N=89	The Diabetes-specific quality of life: The Diabetes Distress Scale (DDS) -Self-care behavior: the Summary of Diabetes Self-Care Activities Measure Revised (SDSCA). -Positive and negative support behavior: the Diabetes Family Behavior Checklist-II (DFBC-II) -Amount of social support received: by 1	Satisfaction with support was a predictor for improved diabetes-specific quality of life and blood glucose monitoring. Positive support behavior was a predictor for following a healthy eating plan, spacing out carbohydrates evenly throughout the day, and performing physical activity for at least 30 minutes per day. Negative support behavior was a predictor for not taking medication as recommended.

		in African Americans with type 2 diabetes.			item question. -Satisfaction with social support: by 1 item question. Primary source of social support: by 1 item question.	
Walker and Stevens	2010	To increase knowledge about diabetes and improve adherence with recommended standards for exercise, diet, medications, and glycemic control of diabetes among African American adults age 40 and older diagnosed with type 2 diabetes mellitus.	Quasi-experimental intervention study	Patients with type II diabetes from Capital Beltway, USA Intervention group n= 145, Control group n= 50 N=195	- Diabetes Knowledge: Diabetes Knowledge Questionnaire (DKQ), Diabetes Self-Efficacy Outcomes Expectancies Questionnaire, Problem Areas in Diabetes Survey Exercise Benefits/Barriers Scale	- Results indicated significantly increased knowledge among intervention group participants between the pre- and post-test and the pre-test and follow-up. Findings for HbA1c values, body mass index, and weight were not significant but there was improvement - HbA1c values improved at follow-up for the intervention group -Exercise slightly improved in the intervention group from baseline to follow-up
Wang et al.	2013	To determine whether Asian Pacific Islanders with type 2 diabetes who have better knowledge and self-management would have better baseline hemoglobin A1c (HbA1c) and total cholesterol values	-A descriptive cross-sectional survey	Participants with type 2 diabetes from mixed Asian, mixed Hawaiian including Hawaiian/Caucasian, and Hawaiian/Pacific Islander from Faculty Practice Specialty Clinic In Manoa USA Pacific	The Survey of Diabetes Self-Care Activities (SDSCA): is a self-report tool that evaluates components involved in diabetes self-management care (Toobert, Hampson, & Glasgow, 2000) -The Diabetes Knowledge Assessment (DKA) survey, was revised scale from the Diabetes Self-	-Significant relationships were found among (a) general diet on HbA1c, (b) medications on HbA1c, and (c) diabetes knowledge on HbA1c. - Self-management and diabetes knowledge appear to impact significantly the HbA1c value. -Findings indicate statistical significance of diabetes knowledge to the HbA1c value but no statistical

				Islanders N=104	Management Record	significance in diabetes knowledge to the total cholesterol level.
Wattanaku I et al.	2011	To examine factors Influencing Diabetes and Self-Management Behaviors among Patients with T2DM in Rural Thailand, and to explore the relationships among self-management behaviors and Buddhist values, social support, self-efficacy, general diabetes knowledge, and risk perception for developing complications in Thai patients with T2DM.	Cross-sectional study	Thai adults with type 2 diabetes From an outpatient diabetes clinic in a community hospital of Chachoengsao province, Thailand N=197	-Diabetes knowledge questionnaires -Self-efficacy for diabetes scale Social support: chronic illness resources survey -Buddhist values questionnaire	Self-management behaviors were positively related to Buddhist values, social support, diabetes self-efficacy, and general diabetes knowledge, but were negatively related to risk perception. Diabetes self-efficacy and risk perception were the best predictors of compliance in self-management behavior
Wilkinson & Whitehead	2014	To identify issues that influences the ability to self-care for adults living with diabetes types 1 or 2.	Systematic review of qualitative research	Studies that investigated issues identified by individuals living with diabetes type 1 or 2 that influenced ability to self-care were analyzed N=37	- An electronic search of Health Sciences databases for primary published qualitative studies	- Thirty-seven qualitative studies were reviewed which look for barriers to self-care. The main issues impacting on an individual's ability to self-care were 'communication', 'education', 'personal factors', 'provider issues' and 'support' - People living with diabetes face many issue in their day-to-day management of the disease, compounded by

						vulnerability to wider situational, cultural, and social issues.
Zulman et al.	2012	To examine the influence of diabetes psychosocial attributes (self-efficacy, risk awareness, care understanding, prioritization of diabetes, and emotional distress) and self-management on glycemic control and diabetes status change.	Cross-sectional study	Using data from the Health and Retirement Study, a nationally representative longitudinal study of U.S. adults >51 years N=1834	Diabetes survey using a well-validated measure of the five domains (medication adherence, diet, exercise, blood sugar monitoring, and checking feet for ulcers) by using a 5-point Likert scale - Diabetes self-efficacy: based on participants' reported confidence in their ability to perform six key diabetes care activities	All diabetes psychosocial attributes were associated with self-management ratings, with self-efficacy having the strongest positive relationships - Levels of diabetes self-efficacy were also high, with 1092 respondents (61%) indicating that they were confident in their ability to perform at least seven of eight diabetes tasks. - Lower self-management ratings was associated with worse glycemic control Higher levels of diabetes self-care understanding were associated with better glycemic control

References

- Al-Adsani, A. M. S., Moussa, M. A. A., Al-Jasem, L. I., Abdella, N. A., & Al-Hamad, N. M. (2009). The level and determinants of diabetes knowledge in Kuwaiti adults with type 2 diabetes. *Diabetes & Metabolism, 35*(2), 121-128.
- Ahola, A. J., & Groop, P. H. (2013). Barriers to self- management of diabetes. *Diabetic Medicine, 30*(4), 413-420.
- 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-Maskari, F., El-Sadig, M., Al-Kaabi, J. M., Afandi, B., Nagelkerke, N., & Yeatts, K. B. (2013). Knowledge, attitude and practices of diabetic patients in the United Arab Emirates. *PloS one, 8*(1), e52857.
- Al-Qazaz, H. K., Sulaiman, S. A., Hassali, M. A., Shafie, A. A., Sundram, S., Al-Nuri, R., & Saleem, F. (2011). Diabetes knowledge, medication adherence and glycemic control among patients with type 2 diabetes. *International Journal of Clinical Pharmacy, 33*(6), 1028-1035.
- Al-Sarihin, K. K., Bani-Khaled, M. H., Haddad, F. H., & Althwabia, I. (2012). Diabetes knowledge among patients with diabetes mellitus at King Hussein Hospital. *Journal of Royal Medical Services, 19* (1), 72-77.
- Al Shafae, M. A., Al-Shukaili, S., Rizvi, S. G., Al Farsi, Y., Khan, M. A., Ganguly, S. S., & Al Adawi, S. (2008). Knowledge and perceptions of diabetes in a semi-urban Omani population. *BMC Public Health, 8*(1), 249.

- American Diabetes Association (2011). Executive summary: standards of medical care in diabetes—2011. *Diabetes Care*, *34*, S4.
- Bains, S. S., & Egede, L. E. (2011). Associations between health literacy, diabetes knowledge, self-care behaviors, and glycemic control in a low income population with type 2 diabetes. *Diabetes Technology & Therapeutics*, *13*(3), 335-341.
- Bandura, A., & Walters, R. H. (1963). *Social Learning and Personality Development*. New York, NY: Holt, Rinehart and Winston.
- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioural change. *Psychology Review*, *84*(12), 191-215.
- Bandura, A. (1986). *Social Foundation of Thought and Action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice-Hall.
- Bandura, A. (Ed.). (1995). *Self-efficacy in Changing Societies*. New York, NY: Cambridge University Press.
- Bastiaens, H., Sunaert, P., Wens, J., Sabbe, B., Jenkins, L., Nobels, F., . . . & Van Royen, P. (2009). Supporting diabetes self-management in primary care: Pilot-study of a group-based programme focusing on diet and exercise. *Primary Care Diabetes*, *3*(2), 103-109.
- Bennett, J. A. (2000). Mediator and moderator variables in nursing research: Conceptual and statistical differences. *Research in Nursing & Health*, *23*(5), 415-420.
- Berikai, P., Meyer, P. M., Kazlauskaitė, R., Savoy, B., Kozik, K., & Fogelfeld, L. (2007). Gain in patients' knowledge of diabetes management targets is associated with better glycemic control. *Diabetes Care*, *30*(6), 1587-1589.

- Bond, G. E., Burr, R. L., Wolf, F. M., & Feldt, K. (2010). The effects of a web-based intervention on psychosocial well-being among adults aged 60 and older with diabetes a randomized trial. *The Diabetes Educator*, *36*(3), 446-456.
- Caro- Bautista, J., Martín- Santos, F. J., & Morales- Asencio, J. M. (2014). Systematic review of the psychometric properties and theoretical grounding of instruments evaluating self- care in people with type 2 Diabetes Mellitus. *Journal of Advanced Nursing*, *70*(6), 1209-1227.
- Carper, B. A. (1978) Fundamental patterns of knowing in nursing. *Advances in Nursing Science, Care*, *24*(1), 50-59.
- Carpinto-Moyet, L. J. (2009). *Nursing Diagnosis: Application to clinical practice* (13th ed.). Philadelphia, PA: Lippincott Williams & Wilkins.
- Casagrande, S. S., Burrows, N. R., Geiss, L. S., Bainbridge, K. E., Fradkin, J. E., & Cowie, C. C. (2012). Diabetes knowledge and its relationship with achieving treatment recommendations in a national sample of people with type 2 diabetes. *Diabetes Care*, *35*(7), DC_111943.
- Castro, S., O'Toole, M., Brownson, C., Plessel, K., & Schauben, L. (2009). Peer Reviewed: A Diabetes self-management program designed for urban American Indians. *Preventing Chronic Disease*, *6*(4).
- Cavanaugh, K., Huizinga, M. M., Wallston, K. A., Gebretsadik, T., Shintani, A., Davis, D., . . . & Rothman, R. L. (2008). Association of numeracy and diabetes control. *Annals of Internal Medicine*, *148*(10), 737-746.
- Cherrington, A., Wallston, K. A., & Rothman, R. L. (2010). Exploring the relationship between diabetes self-efficacy, depressive symptoms, and glycemic control

- among men and women with type 2 diabetes. *Journal of Behavioral Medicine*, 33(1), 81-89.
- Chesla, C. A. (2010). Do family interventions improve health? *Journal of Family Nursing*, 16(4), 355-377.
- Chew, B. H., Khoo, E. M., & Chia, Y. C. (2011). Social support and glycemic control in adult patients with type 2 diabetes mellitus. *Asia-Pacific Journal of Public Health*, 1010539511431300.
- Chinn, P. L., & Kramer, M. K. (1999). *Theory and Nursing: Integrated knowledge development*. Year Book, St Louis, MO: Mosby.
- Chlebowy, D. O., & Garvin, B. J. (2006). Social support, self-efficacy, and outcome expectations impact on self-care behaviors and glycemic control in Caucasian and African American adults with type 2 diabetes. *The Diabetes Educator*, 32(5), 777-786.
- Choi, S. E. (2009). Diet-specific family support and glucose control among Korean immigrants with type 2 diabetes. *The Diabetes Educator*, 35(6), 978-985.
- Clark, M. (2008). Diabetes self-management education: a review of published studies. *Primary Care Diabetes*, 2(3), 113-120.
- Cohen, J. (1992). A power primer. *Psychological Bulletin*, 112(1), 155.
- Cohen, J. W. (1988). *Statistical power analysis for the behavioral sciences*. Hillsdale, NJ: Lawrence Erlbaum Association.
- Cohen, J. (1992). Statistical power analysis. *Current Directions in Psychological Science*, 98-101.

- Comellas, M., Walker, E. A., Movsas, S., Merkin, S., Zonszein, J., & Strelnick, H. (2010). Training community health promoters to implement diabetes self-management support programs for urban minority adults. *The Diabetes Educator*, 36(1), 141-151.
- Corty, E. W. (2007). *Using and Interpreting Statistics: Practical Text for the Health, Behavioural, and Social Sciences*. St. Louis, Missouri: Mosby Elsevier.
- Dale, J., Caramlau, I. O., Lindenmeyer, A., & Williams, S. M. (2008). Peer support telephone calls for improving health. *The Cochrane Database of Systematic Reviews*, 4. Art. No.: CD006903. DOI: 10.1002/14651858.CD006903.pub2
- Davies, M. J., Heller, S., Skinner, T. C., Campbell, M. J., Carey, M. E., Craddock, S., . . . & Khunti, K. (2008). Effectiveness of the diabetes education and self-management for ongoing and newly diagnosed (DESMOND) programme for people with newly diagnosed type 2 diabetes: cluster randomised controlled trial. *BMJ: British Medical Journal*, 336 (7642), 491-495.
- Dean, H. (1995). Science and practice. In A. Omery, C. E. Kasper, & G. Gayke (Eds.), *Search of nursing science*. (pp. 275-90) Thousand Oaks (US): SAGE.
- DeWalt, D. A., Boone, R. S., & Pignone, M. P. (2007). Literacy and its relationship with self-efficacy, trust, and participation in medical decision-making. *American Journal of Health Behavior*, 31(Supplement 1), S27-S35.
- Donaldson, S. K., & Crowley, D. M. (1978). The discipline of nursing. *Nursing outlook*, 26(2), 113-120.

- Donaldson, S. K. (1995). Introduction: nursing science for nursing practice In: A. Omery, C. E. Kasper, & G. Gayke. *Search of nursing science*. (pp. 3-12). Thousand Oaks (US): SAGE.
- Dsouza, P. (2017). Population of Qatar by Nationality. Retrieved from <http://priyadsouza.com/population-of-qatar-by-nationality-in-2017/>
- Dutton, G. R., Tan, F., Provost, B. C., Sorenson, J. L., Allen, B., & Smith, D. (2009). Relationship between self-efficacy and physical activity among patients with type 2 diabetes. *Journal of Behavioral Medicine*, 32(3), 270-277.
- Faul, F., Erdfelder, E., Buchner, A., & Lang, A. G. (2009). Statistical power analyses using G* Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods*, 41(4), 1149-1160.
- Fawcett, J. (1978). The relationship between theory and research: A double helix. *Advances in Nursing Science*, 1 (1), 49-62.
- Field, A. (2009). *Discovering Statistics Using SPSS* (3rd ed.). London Eciy: Sage.
- Fisher, E. B., Boothroyd, R. I., Coufal, M. M., Baumann, L. C., Mbanya, J. C., Rotheram-Borus, M. J., & Tanasugarn, C. (2012). Peer support for self-management of diabetes improved outcomes in international settings. *Health Affairs*, 31(1), 130-139.
- Fitzgerald, J. T., Funnel, M. M., Hess, G. E., Barr, P. A., Anderson, R. M., Hiss, R. G., Davis, W. K. (1998). The reliability and validity of brief diabetes knowledge testing. *Diabetes Care*, 21(5), 706-710.

- Fortmann, A. L., Gallo, L. C., & Philis-Tsimikas, A. (2011). Glycemic control among Latinos with type 2 diabetes: the role of social-environmental support resources. *Health Psychology, 30*(3), 251.
- Frosch, D. L., Uy, V., Ochoa, S., & Mangione, C. M. (2011). Evaluation of a behavior support intervention for patients with poorly controlled diabetes. *Archives of Internal Medicine, 171*(22).
- Funnell, M. M., Brown, T. L., Childs, B. P., Haas, L. B., Hosey, G. M., Jensen, B., . . . & Weiss, M. A. (2011). National standards for diabetes self-management education. *Diabetes Care, 34*(Supplement 1), S89-S96.
- Gao, J., Wang, J., Zheng, P., Haardörfer, R., Kegler, M. C., Zhu, Y., & Fu, H. (2013). Effects of self-care, self-efficacy, and social support on glycemic control in adults with type 2 diabetes. *BMC Family Practice, 14*(1), 66.
- Gately, C., Rogers, A., & Sanders, C. (2007). Re-thinking the relationship between long-term condition self-management education and the utilisation of health services. *Social Science & Medicine, 65*(5), 934-945.
- Gensichen, J., Von Korff, M., Rutter, C. M., Seelig, M. D., Ludman, E. J., Lin, E. H., . . . & Katon, W. J. (2009). Physician support for diabetes patients and clinical outcomes. *BMC Public Health, 9*(1), 367.
- Gleeson-Kreig, J. (2008). Social support and physical activity in type 2 diabetes a social-ecologic approach. *The Diabetes Educator, 34*(6), 1037-1044.
- Guo, X. H., Yuan, L., Lou, Q. Q., Shen, L., Sun, Z. L., Zhao, F., . . . & Yang, H. Y. (2012). A nationwide survey of diabetes education, self-management and

- glycemic control in patients with type 2 diabetes in China. *Chinese Medical Journal*, 125 (23), 4175-80.
- Hartayu, T. S., Mohamed, I. M., & Suryawati, S. (2012). Improving of type 2 diabetic patients' knowledge, attitude and practice towards diabetes self-care by implementing community-based interactive approach-diabetes mellitus strategy. *BMC Research Notes*, 5(1), 315.
- He, X., & Wharrad, H. J. (2007). Diabetes knowledge and glycemic control among Chinese people with type 2 diabetes. *International Nursing Review*, 54(3), 280-287.
- Heale, R., & Griffin, M. T. Q. (2009). Self-efficacy with application to adolescent smoking cessation: A concept analysis. *Journal of Advanced Nursing*, 65(4), 912-918. doi: 10.1111/j. 1365-2648.2008.04953
- Heisler, M., Vijan, S., Makki, F., & Piette, J. D. (2010). Diabetes control with reciprocal peer support versus nurse care management: A randomized trial. *Annals of Internal Medicine*, 153(8), 507-515.
- Higgins, P. A., & Straub, A. J. (2006). Understanding the error of our ways: mapping the concepts of validity and reliability. *Nursing Outlook*, 54(1), 23-29.
- Hinshaw, A. S. (1989). Nursing science: The challenge to develop knowledge. *Nursing Science Quarterly*, 2(4), 162-171.
- Hully, S. B., Cummings, S. R., Browner, W. S., Grady, D. G., & Newman, T. B. (2007). *Designing Clinical Research*. Philadelphia, PA: Lippincott Williams & Wilkins.

- Hunt, C. W., Grant, J. S., Palmer, J. J., & Steadman, L. (2014). Facilitators of diabetes self-management among rural individuals. *Home Healthcare Nurse, 32*(3), 154-166.
- International Diabetes Federation (2011). Retrieved from <http://www.idf.org/diabetesatlas/5e/the-global-burden>
- International Diabetes Federation. (2011). *IDF Diabetes Atlas*. International Diabetes Federation, Executive Office. Retrieved from http://www.idf.org/sites/default/files/21991_diabAtlas_5thEd.pdf
- Ingram, M., Torres, E., Redondo, F., Bradford, G., Wang, C., & O'Toole, M. L. (2007). The impact of promotoras on social support and glycemic control among members of a farmworker community on the US-Mexico border. *The Diabetes Educator, 33*(Supplement 6), 172S-178S.
- Johnson, P. J., Ghildayal, N., Rockwood, T., & Everson-Rose, S. A. (2014). Differences in diabetes self-care activities by race/ethnicity and insulin use. *The Diabetes Educator, 40*(6), 767-777.
- Jordan, D. N., & Jordan, J. L. (2010). Self-care behaviors of Filipino-American adults with type 2 diabetes mellitus. *Journal of Diabetes and its Complications, 24*(4), 250-258.
- Kanbara, S., Taniguchi, H., Sakaue, M., Wang, D. H., Takaki, J., Yajima, Y., & Ogino, K. (2008). Social support, self-efficacy and psychological stress responses among outpatients with diabetes in Yogyakarta, Indonesia. *Diabetes Research and Clinical Practice, 80*(1), 56-62.

- Kang, C. M., Chang, S. C., Chen, P. L., Liu, P. F., Liu, W. C., Chang, C. C., & Chang, W. Y. (2010). Comparison of family partnership intervention care vs. conventional care in adult patients with poorly controlled type 2 diabetes in a community hospital: A randomized controlled trial. *International Journal of Nursing Studies*, 47(11), 1363-1373.
- Karademas, E. C. (2006). Self-efficacy, social support and well-being: The mediating role of optimism. *Personality and Individual Differences*, 40(6), 1281-1290.
- Karter, A. J., Subramanian, U., Saha, C., Crosson, J. C., Parker, M. M., Swain, B. E., . . . & Marrero, D. G. (2010). Barriers to insulin initiation the translating research into action for diabetes insulin starts project. *Diabetes Care*, 33(4), 733-735.
- Kennedy, A., Bower, P., Reeves, D., Blakeman, T., Bowen, R., Chew-Graham, C., . . . & Rogers, A. (2013). Implementation of self-management support for long-term conditions in routine primary care settings: Cluster randomised controlled trial. *BMJ: British Medical Journal*, 346.
- Khan, C. M., Stephens, M. A. P., Franks, M. M., Rook, K. S., & Salem, J. K. (2013). Influences of spousal support and control on diabetes management through physical activity. *Health Psychology*, 32(7), 739.
- Khunti, K., Gray, L. J., Skinner, T., Carey, M. E., Realf, K., Dallosso, H., . . . & Davies, M. J. (2012). Effectiveness of a diabetes education and self-management programme (DESMOND) for people with newly diagnosed type 2 diabetes mellitus: Three-year follow-up of a cluster randomised controlled trial in primary care. *BMJ: British Medical Journal*, 344, e2333.

- Kim, C., McEwen, L. N., Kieffer, E. C., Herman, W. H., & Piette, J. D. (2008). Self-efficacy, social support, and associations with physical activity and body mass index among women with histories of gestational diabetes mellitus. *The Diabetes Educator, 34*(4), 719-728.
- King, D. K., Glasgow, R. E., Toobert, D. J., Strycker, L. A., Estabrooks, P. A., Osuna, D., & Faber, A. J. (2010). Self-efficacy, problem solving, and social-environmental support are associated with diabetes self-management behaviors. *Diabetes Care, 33*(4), 751-753.
- Kim, S. H., & Yu, X. (2010). The mediating effect of self-efficacy on the relationship between health literacy and health status in Korean older adults: A short report. *Aging & Mental Health, 14*(7), 870-873.
- Koopman, R. M. A. (2005). Changes in age at diagnosis of type 2 diabetes mellitus in the United States. *Annual of Family Medicine, 3*(1), 60-63.
- Lee, J. Y., Divaris, K., Baker, A. D., Rozier, R. G., & Vann Jr, W. F. (2012). The relationship of oral health literacy and self-efficacy with oral health status and dental neglect. *American Journal of Public Health, 102*(5), 923-929.
- Lenz, E. R., & Shortridge-Baggett, L. M. (2002). *Self-efficacy in nursing*. New York, NY: Springer.
- Lin, N. (1986). Conceptualizing social support. In N. Lin, A. Dean, & W. M. Ensel (Eds.), *Social Support, Life Events, and Depression*. (pp. 17-30), Orlando, FL: Academic.
- Liu, T. (2012). A concept analysis of self-efficacy among Chinese elderly with diabetes mellitus. *Nursing Forum, 47* (4), 226-234.

- LoBindo-Wood, G., & Haber, J. (2006). *Nursing Research: Methods and Critical Appraisal for Evidence-based Practice*. St. Louis, Missouri: Mosby Inc.
- Lorig, K., & Holman, H. (2003). Self-management education: history, definition, outcomes, and mechanisms. *Ann Behav Med*, 26, 1–7.
- Mancuso, J. M. (2010). Impact of health literacy and patient trust on glycemic control in an urban USA population. *Nursing & Health Sciences*, 12(1), 94-104.
- Mayberry, L. S., & Osborn, C. Y. (2014). Family involvement is helpful and harmful to patients' self-care and glycemic control. *Patient Education and Counseling*, 97(3), 418-425.
- Mbaezue, N., Mayberry, R., Gazmararian, J., Quarshie, A., Ivonye, C., & Heisler, M. (2010). The impact of health literacy on self-monitoring of blood glucose in patients with diabetes receiving care in an inner-city hospital. *Journal of the National Medical Association*, 102(1), 5.
- McCullagh M. (2004) Health promotion. In S. J. Peterson & T. S. Bredow (Eds.), *Middle Range Theories: Application to Nursing Research* (2nd ed., pp. 117-146). Philadelphia, PA: Lippincott Williams & Wilkins.
- McEwen, M. M., Pasvogel, A., Gallegos, G., & Barrera, L. (2010). Type 2 diabetes self- management social support intervention at the US- Mexico border. *Public Health Nursing*, 27(4), 310-319.
- McQuiston, C. M., & Campbell, J. C. (1997). Theoretical substruction: A guide for theory testing research. *Nursing Science Quarterly*, 10 (3), 117-123.
- Medical Outcomes Study: Social Support Instrument. Retrieved from http://www.rand.org/health/surveys_tools/mos/mos_socialsupport_survey.html

Meleis, A. I. (1987). Theoretical nursing: today's challenges, tomorrow's bridges.

Nursing papers. Perspectives en Nursing, 19(1), 45.

Merriam-Webster Online Dictionary. (2013). *Efficacy.* Retrieved from

<http://www.merriam-webster.com/dictionary/efficacy>.

Michigan Diabetes Research and Training Centre (1990). Diabetes knowledge test.

Retrieved April 24, 2015, from

<http://www.med.umich.edu/mdrtc/profs/survey.html>.

Mohebi, S., Azadbakht, L., Feizi, A., Sharifirad, G., & Kargar, M. (2013). Review the

key role of self-efficacy in diabetes care. *Journal of Education and Health*

Promotion, 2.

Nam, S., Chesla, C., Stotts, N. A., Kroon, L., & Janson, S. L. (2011). Barrier to diabetes

management: Patient and provider factors. *Diabetes Research and Clinical*

Practice, 93 (2011), 1-9.

NDFS. (2011). National Diabetes Fact Sheet: *National estimates and general information*

on diabetes and prediabetes in the United States. Atlanta, GA: U.S. Department of

Health and Human Services, Centre for Disease Control and Prevention

National Diabetes Fact Sheet: Retrieved November from

http://www.cdc.gov/diabetes/pubs/pdf/ndfs_2011.pdf

National Health Strategy: executive summary Updated 2013 retrieved from

<http://www.nhsq.info/app/media/325>

- Nicklett, E. J., & Liang, J. (2010). Diabetes-related support, regimen adherence, and health decline among older adults. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, *65*(3), 390-399.
- Nouwen, A., Ford, T., Balan, A. T., 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.
- Nyunt, S. W., Howteerakul, N., Suwannapong, N., & Rajatanun, T. (2010). Self-efficacy, self-care behaviors and glycemic control among type-2 diabetes patients attending two private clinics in Yangon, Myanmar. *Southeast Asian J Trop Public Health*, *41*, 943-951.
- Ofstedal, B., Bru, E., & Karlsen, B. (2011). Social support as a motivator of self- management among adults with type 2 diabetes. *Journal of Nursing and Healthcare of Chronic Illness*, *3*(1), 12-22.
- Okura, T., Heisler, M., & Langa, K. M. (2009). Association between cognitive function and social support with glycemic control in adults with diabetes mellitus. *Journal of the American Geriatrics Society*, *57*(10), 1816-1824.
- Omery, A., Kasper, C. E., & Page, G. (Eds.). (1995). *In Search of Nursing Science*. California: Sage Publications.
- Orem, D.E. (1995). *Nursing Concept of Practice*. (5th ed.). St Louis, MO: Mosby.
- Osborn, C. Y., Cavanaugh, K., Wallston, K. A., & Rothman, R. L. (2010). Self-efficacy links health literacy and numeracy to glycemic control. *Journal of Health Communication*, *15*(S2), 146-158.

Osborn, C. Y., Bains, S. S., & Egede, L. E. (2010). Health literacy, diabetes self-care, and glycemic control in adults with type 2 diabetes. *Diabetes Technology & Therapeutics*, *12*(11), 913-919.

Oxford online Dictionary. (2013). *Efficacy*. Retrieved from <http://oxforddictionaries.com/>

Ozcelik, F., Yiginer, O., Arslan, E., Serdar, M. A., Uz, O., Kardesoglu, E., & Kurt, I. (2010). Association between glycemic control and the level of knowledge and disease awareness in type 2 diabetic patients. *Polskie Archiwum Medical Wewnetranej*, *120* (10), 399-406.

Packer, T. L., Boldy, D., Ghahari, S., Melling, L., Parsons, R., & Osborne, R. H. (2012). Self-management programs conducted within a practice setting: Who participates, who benefits and what can be learned?. *Patient Education and Counseling*, *87*(1), 93-100.

Pereira, M. G., Berg-Cross, L., Almeida, P., & Machado, J. C. (2008). Impact of family environment and support on adherence, metabolic control, and quality of life in adolescents with diabetes. *International Journal of Behavioral Medicine*, *15*(3), 187-193.

Peyrot, M., Bushnell, D. M., Best, J. H., Martin, M. L., Cameron, A., & Patrick, D. L. (2012). Development and validation of the self-management profile for type 2 diabetes (SMP-T2D). *Health and Quality of Life Outcomes*, *10*(1), 1-11.

- Powell, C. K., Hill, E. G., & Clancy, D. E. (2007). The relationship between health literacy and diabetes knowledge and readiness to take health actions. *The Diabetes Educator*, 33(1), 144-151.
- Pun, S. P., Coates, V., & Benzie, I. F. (2009). Barriers to the self-care of type 2 diabetes from both patients' and providers' perspectives: literature review. *Journal of Nursing and Healthcare of Chronic Illness*, 1(1), 4-19.
- Quran Multilingual. (1 November 2017), Retrieved from <http://www.quranwow.com/#/ch/1/t1/ar-allah/t2/en-italia/a1/alafasy-64/a2/italia-64/v/1>
- Rak, E. C. (2013). Employment outcomes in persons with diabetes: The role of health literacy and diabetes management self-efficacy. *Rehabilitation Counseling Bulletin*, 0034355213500816.
- Rees, C. A., Karter, A. J., & Young, B. A. (2010). Race/ethnicity, social support, and associations with diabetes self-care and clinical outcomes in NHANES. *The Diabetes Educator*, 36(3), 435-445.
- Resnick, B. (2004). Self-efficacy. In S. J. Peterson & T. S. Bredow (Eds.), *Middle Range Theories: Application to Nursing Research* (2nd ed., pp. 117-146). Philadelphia, PA: Lippincott Williams & Wilkins.
- Richard, A. A., & Shea, K. (2011). Delineation of self-care and associated concepts. *Journal of Nursing Scholarship*, 43(3), 255-264.
- Robb, M. (2012). Self-efficacy with application to nursing education: A concept analysis. *Nursing Forum*, 47 (3), 166-172.

- Rogvi, S., Tapager, I., Almdal, T. P., Schiotz, M. L., & Willaing, I. (2012). Patient factors and glycaemic control-associations and explanatory power. *Diabetic Medicine*, *29*(10), e382-e389.
- Robertson, S. M., Amspoker, A. B., Cully, J. A., Ross, E. L., & Naik, A. D. (2013). Affective symptoms and change in diabetes self- efficacy and glycaemic control. *Diabetic Medicine*, *30*(5), e189-e196.
- Rosland, A. M., Kieffer, E., Israel, B., Cofield, M., Palmisano, G., Sinco, B., . . . & Heisler, M. (2008). When is social support important? The association of family support and professional support with specific diabetes self-management behaviors. *Journal of General Internal Medicine*, *23*(12), 1992-1999.
- Saleh, F., Mumu, S. J., Ara, F., Begum, H. A., & Ali, L. (2012). Knowledge and self-care practices regarding diabetes among newly diagnosed type 2 diabetics in Bangladesh: A cross-sectional study. *BMC Public Health*, *12*(1), 1112.
- Salonen, A. H., Kaunonen, M., Astedt-Kurki, P., Javenpaa, A. L., Isoaho, H., & Tarkka, M. T. (2009). Parenting self-efficacy after childbirth. *Journal of Advanced Nursing*, *65* (11), 2324-2336.
- Samtia, A. M., Rasool, M. F., Ranjha, N. M., Usman, F., & Javed, I. (2013). A multifactorial intervention to enhance adherence to medications and disease-related knowledge in type 2 diabetic patients in Southern Punjab, Pakistan. *Tropical Journal of Pharmaceutical Research*, *12*(5), 851-856.
- Sarkar, U., Fisher, L., & Schillinger, D. (2006). Is self-efficacy associated with diabetes self-management across race/ethnicity and health literacy? *Diabetes Care*, *29*(4), 823-829.

- Sausa, V. (2003). Testing a conceptual framework for diabetes self-care management (Doctoral dissertation, Case Western Reserve University, 2003). *Dissertation Abstract International*, 64, 3193.
- Sausa, V. & Zauszniewski, J. A. (2005). Toward the theory of diabetes self-care management. *The Journal of Theory Construction & Testing*, 9(2), 61-67.
- Schillinger, D., Handley, M., Wang, F., & Hammer, H. (2009). Effects of self-management support on structure, process, and outcomes among vulnerable patients with diabetes a three-arm practical clinical trial. *Diabetes Care*, 32(4), 559-566.
- Seidel, A. J., Franks, M. M., Stephens, M. A. P., & Rook, K. S. (2012). Spouse control and type 2 diabetes management: Moderating effects of dyadic expectations for spouse involvement. *Family Relations*, 61(4), 698-709.
- Shaw, J. E., Sicree, R. A., & Zimmet, P. Z. (2010). Global estimates of the prevalence of diabetes for 2010 and 2030. *Diabetes Research and Clinical Practice*, 87(1), 4-14.
- Sherbourne, C. D. & Stewart, A. L. (1991). The MOS social support survey. *Social Science and Medicine*, 12(6), 705-714.
- Shi, Q., Ostwald, S. K., & Wang, S. (2010). Improving glycaemic control self-efficacy and glycaemic control behavior in Chinese patients with type 2 diabetes mellitus: randomised controlled trial. *Journal of Clinical Nursing*, 19(3-4), 398-404.
- Shumaker, S. A. & Brownell, A. (1984). Toward theory of social support: closing conceptual gaps. *Journal of Social Issues*, 40(4), 11-36.

- Slackman, M. (2010, April 27). Wealth and tradition pull Qatar toward unhealthy choices. *The New York Times*, p. A4.
- Smith, S. M., Paul, G., Kelly, A., Whitford, D. L., O'Shea, E., & O'Dowd, T. (2011). Peer support for patients with type 2 diabetes: cluster randomised controlled trial. *BMJ: British Medical Journal*, 342.
- Snoj, J. (2013). Population of Qatar by nationality Retrieved from <http://www.bqdoqa.com/2013/12/population-qatar>
- Sonsona, J. B. (2014). *Factors Influencing Diabetes Self-Management of Filipino Americans with Type 2 Diabetes Mellitus: A Holistic Approach* (Doctoral dissertation, Walden University).
- Stanford Patient Education Research Center. (1996). Diabetes Self-efficacy Scale. Retrieved from <http://patienteducation.stanford.edu/research/sediabetes.pdf>
- Strom, J. L., & Egede, L. E. (2012). The impact of social support on outcomes in adult patients with type 2 diabetes: A systematic review. *Current Diabetes Reports*, 12(6), 769-781.
- Swerissen, H., Belfrage, J., Weeks, A., Jordan, L., Walker, C., Furler, J., . . . & Peterson, C. (2006). A randomised control trial of a self-management program for people with a chronic illness from Vietnamese, Chinese, Italian and Greek backgrounds. *Patient Education and Counseling*, 64(1), 360-368.
- Tabachnik, B. G., & Fidell, L. S. (2007). *Multivariate Statistics* (5th ed.). New York, NY: Pearson Education Inc.

- Tang, T. S., Brown, M. B., Funnell, M. M., & Anderson, R. M. (2008). Social support, quality of life, and self-care behaviors among African Americans with type 2 diabetes. *The Diabetes Educator, 34*(2), 266-276.
- Tang, T. S., Funnell, M. M., Brown, M. B., & Kurlander, J. E. (2010). Self-management support in “real-world” settings: An empowerment-based intervention. *Patient Education and Counseling, 79*(2), 178-184.
- Thijampa, S., Mawn, B. (2017). The moderating effect of social cognitive factors on self-management activities and HbA1c in Thai adults with type-2 diabetes. *International Journal of Nursing Sciences, 4*(1), 34-37.
- Trief, P., Sandberg, J. G., Ploutz-Snyder, R., Brittain, R., Cibula, D., Scales, K., & Weinstock, R. S. (2011). Promoting couples collaboration in type 2 diabetes: The diabetes support project pilot data. *Families, Systems, & Health, 29*(3), 253.
- Vaccaro, J. A., Exebio, J. C., Zarini, G. G., & Huffman, F. G. (2014). The role of family/friend social support in diabetes self-management for minorities with type 2 diabetes. *Journal of Nutrition and Health, 2*(1), 1-9.
- Van Dam, H. A., van der Horst, F. G., Knoops, L., Ryckman, R. M., Crebolder, H. F., & van den Borne, B. H. (2005). Social support in diabetes: a systematic review of controlled intervention studies. *Patient Education and Counseling, 59*(1), 1-12.
- Van der Bijl, J., Van-Poelgeest-Eeltink A. & Shortridge-Baggett, L. (1999). The psychometric properties of diabetes management self-efficacy scale for patients with type 2 diabetes mellitus. *Journal of Advance Nursing, 30*(2), 352-359.
- Walker, L. O., & Avant, K. C. (2011). *Strategies for Theory Construction in Nursing* (5th ed.). Upper Saddle River, NH: Pearson Prentice Hall.

- Walker, E. A., Stevens, K. A., & Persaud, S. (2010). Promoting diabetes self-management among African Americans: An educational intervention. *Journal of Health Care for the Poor and Underserved, 21*(3), 169-186.
- Wallace, A. S., Seligman, H. K., Davis, T. C., Schillinger, D., Arnold, C. L., Bryant-Shilliday, B., . . . & DeWalt, D. A. (2009). Literacy-appropriate educational materials and brief counseling improve diabetes self-management. *Patient Education and Counseling, 75*(3), 328-333.
- Wang, W. L., Lee, H. L., & Fetzer, S. J. (2006). Challenges and strategies of instrument translation. *Western Journal of Nursing Research, 28*(3), 310-321.
- Wang, C., Inouye, J., Davis, J., & Wang, C. Y. (2013). Diabetes knowledge and self-management effects on physiological outcomes in type 2 diabetes. *Nursing Forum, 48*(4), 240-247.
- Wangberg, S. C. (2008). An internet-based diabetes self-care intervention tailored to self-efficacy. *Health Education Research, 23*(1), 170-179.
- Wattanakul, B. (2012). *Factors Influencing Diabetes Self-Management Behaviors among Patients with T2DM in Rural Thailand* (Doctoral dissertation, University of Illinois at Chicago).
- Weaver, R. R., Lemonde, M., & Goodman, W. M. (2014). What shapes diabetes self-efficacy. *Demographics, Social Relations and Health Perceptions. J Diabetes Metab, 5*(370), 2.
- Whiting, D. R., Guariguata, L., Weil, C., & Shaw, J. (2011). IDF diabetes atlas: global estimates of the prevalence of diabetes for 2011 and 2030. *Diabetes Research and Clinical Practice, 94*(3), 311-321.

- Wilkinson, A., Whitehead, L., & Ritchie, L. (2014). Factors influencing the ability to self-manage diabetes for adults living with type 1 or 2 diabetes. *International Journal of Nursing Studies*, *51*(1), 111-122
- Wolever, R. Q., Dreusicke, M., Fikkan, J., Hawkins, T. V., Yeung, S., Wakefield, J., . . . & Skinner, E. (2010). Integrative health coaching for patients with type 2 diabetes a randomized clinical trial. *The Diabetes Educator*, *36*(4), 629-639.
- World Health Organization, Eastern Mediterranean Region: Retrieved from <http://www.emro.who.int/>
- Xu, Y., Toobert, D., Savage, C., Pan, W., & Whitmer, K. (2008). Factors influencing diabetes self- management in Chinese people with type 2 diabetes. *Research in Nursing & Health*, *31*(6), 613-625.
- Zhang, P., Zhang, X., Brown, J., Vistisen, D., Sicree, R., Shaw, J., & Nichols, G. (2010). Global healthcare expenditure on diabetes for 2010 and 2030. *Diabetes Research and Clinical Practice*, *87*(3), 293-301.
- Zuhaid, M., Zahir, K. K., & Diju, I. U. (2012). Knowledge and perceptions of diabetes in urban and semi urban population of Peshawar, Pakistan. *J Ayub Med. Coll. Abbottabad*, *24*(1), 105-8.
- Zulkosky, K. (2009). Self-efficacy: A concept analysis. *Nursing Forum*, *44*(2), 93-102.
- Zulman, D. M., Rosland, A. M., Choi, H., Langa, K. M., & Heisler, M. (2012). The influence of diabetes psychosocial attributes and self-management practices on change in diabetes status. *Patient Education and Counseling*, *87*(1), 74-80.