Thesis Title

Self-care behaviours and related psychosocial factors in men and women with Type 2 Diabetes Mellitus in Jordan: a cross sectional study

By:

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"Your PhD is not your thesis. The thesis is one output from the PhD process. You are the main output!"

- Nathan Ryder

Dedication

This thesis is dedicated to:

My daughters Massa and Misk who were born during this journey and who were the motivation for me to finish the work I have undertaken and set a positive example for them.

Type 2 diabetic patients who have to live with and struggle with this disease each and every day. This research is for all diabetes sufferers, with particular mentions to those I know and those who contributed to this study.

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Abstract

Background: Effective management of Type 2 Diabetes Mellitus (T2DM) depends on a number of specific elements of self-care. Theoretical and empirical evidence identify the important role of psychosocial factors in predicting self-care behaviours. Understanding of gender differences in these relationships is needed to guide appropriate management. However, evidence is limited, particularly in Middle Eastern populations.

Aim: To examine the relationship between self-efficacy, social support, diabetes distress factors and self-care behaviours in men and women Jordanian Type 2 Diabetes Mellitus patients.

Methods: 239 Type 2 Diabetes Mellitus patients from two family medicine clinics in Amman, Jordan were recruited. The study participants completed a self-reported questionnaire with measures of diabetes related self-efficacy, diabetes distress, diabetes social support and diabetes self-care. Statistical analyses used correlational and multiple regression methods.

Results: Women were found to have significantly reported higher diabetes distress than men (p< 0.0001) and reported significant less support received by family and friends (p=0.006). Regarding self-care behaviours, men did more exercise than women, (p=0.032). Women had better foot care than men (p<0.0001).

Self-efficacy was a strong predictor for self-care behaviours for both men and women. The modelled psychosocial variables explained more of the variance for men than for women for all the examined self-care behaviours.

Models showed that gender was not a moderator of the relationship between psychosocial and self-care behaviours.

Conclusion: There are significant gender differences in psychosocial and self-care behaviours among Type 2 Diabetes Mellitus Jordanian patients. Self-efficacy was the best predictor of self-care behaviour for both men and women. Clinicians need to be aware of the significant gender differences in both psychosocial factors and self-care behaviours. Interventions to improve self-care for both men and women should involve strengthening psychosocial factors, particularly self-efficacy.

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Abbreviations

- **ADA** : American Diabetes Association

- **BCF**: Basic Conditioning Factors

- **BMI** : Body Mass Index

- **CDC**: Centres for Disease Control and Prevention

- **CFA:** Confirmatory Factor Analysis

- **CVD**: CardioVascular Disease

- **DCP**: Diabetes Care Profile

- **DOS**: Department of Statistics (Jordan)

- **EFA:** Exploratory Factor Analysis

- **EM:** Expectation maximization

- **FPG**: Fasting Plasma Glucose

- **HADS**: Hospital Anxiety and Depression scale

- **HbA1c**: Haemoglobin A1c

- **IDF**: International Diabetes Federation

- **IFG**: Impaired Fasting Glucose

- **IGT**: Impaired Glucose Test

- **MENA**: Middle East and North Africa

- **MoH**: Ministry of Health (Jordan)

- **NCDEG**: National Centre for Diabetes, Endocrine and Genetics (Jordan)

- **NICE**: The National Institute for Health and Care Excellence

- **OGTT**: Oral Glucose Tolerance Test

- **PAID**: Problems Area In Diabetes

- **PRISMA:** Preferred Reporting Items for Systematic Reviews and Meta-Analyses

- **RMS**: Royal Medical Services (Jordan)

- **SDSCA**: Summary of Diabetes Self-Care Activities

- **SEM**: Structural Equation Modelling

- **T1DM**: Type 1 Diabetes Mellitus

- **T2DM**: Type 2 Diabetes Mellitus

- **UK**: United Kingdom

- **UNRWA**: United Nations Relief and Works Agency for Palestine refugees

- **USA**: United States of America

- **WHO**: World Health Organisation

Chapter 1 Introduction to the study

1.1 Introduction

This chapter provides a brief overview to the subject of the study under research (section 1.2). Following this, the choice of the study's topic and how it developed is presented (section 1.3). Section 1.4 presents the aim of study and the specific questions that the study proposes to answer. Finally, an outline of the content of the following chapters is presented (section 1.5).

1.2 Overview of the research problem

Type 2 Diabetes Mellitus (T2DM) is a major public health concern worldwide. The prevalence of T2DM diagnoses is increasing globally (Internationa Diabetes Federation, 2015). Diabetes has devastating complications and implications for patients' health (Herman and Zimmet, 2012), hence, the importance of proper management. The first line of T2DM management is the adoption of healthy lifestyle and the practice of certain self-care behaviours by the patient (ADA, 2016). However, it is reported that many patients find self-care challenging, especially as it requires adherence to a daily routine of self-care activities over long periods of their lives (Shrivastava, Shrivastava and Ramasamy, 2013). Thus, self-care can be complex and various factors may influence it. A growing body of evidence has documented psychosocial factors as related to and affecting patients' self-care practicing levels (Wilson *et al.*, 1986; Lerman *et al.*, 2004; Cosansu and Erdogan, 2014; Walker *et al.*, 2015). Evidence based recommendations for the assessment and screening of these factors upon diagnosis of T2DM have been established in the

clinical practice as a part of the patients' diabetes management plan (ADA, 2016; National Institute for Health and Care Excellence, 2016). Identifying and assessing these factors can enhance self-care practices of the patient, which in turn is generally reported to result in improvement of disease control and better quality of life (Peyrot and Rubin, 2007; Shrivastava, Shrivastava and Ramasamy, 2013). In addition, understanding psychosocial factors related to self-care behaviours will assist health care practitioners to be better focused when planning or providing health care to these patients which will save more time and reduce costs.

Individualised management approach for chronic diseases is currently encouraged to a greater degree than ever before (Lund *et al.*, 2015; W Powell *et al.*, 2015). Patient's own circumstances, preferences and characteristics are taken into consideration to guide healthcare providers when forming the patient's health care plan (ADA, 2016). Gender is an important characteristic that is found to play an important role in shaping the experience and in influencing the health outcomes of patients with chronic diseases (Vlassoff, 2007). Differences in self-care behaviours and psychosocial variables have been found between men and women with diabetes (Misra and Lager, 2009). An understanding of how gender is associated with psychosocial and self-care variables can aid in identifying how these factors can be modified to improve the management strategies of T2DM patients.

In Jordan, T2DM is highly prevalent (Ajlouni *et al.*, 2008; Al-Nsour *et al.*, 2012). However, there is very little research on self-care among patients with diabetes or its relationship to the psychosocial characteristics of patients. This study has addressed this important gap; moreover, it is the first study that has examined the gender differences in these variables in Jordan. This should lead to a better insight on the

needs of Jordanian patients with T2DM in order to ensure that patients are offered appropriate support.

A concise explanation of the particular viewpoint of this study is shown in Figure 1-1 which illustrates the scope of this study, and how it specifically focuses on the self-care of men and women with T2DM. Particularly, this thesis is focused on exploring the relationship between the patients' psychosocial factors and self-care behaviours and comparing these in T2DM men and women living in Jordan.
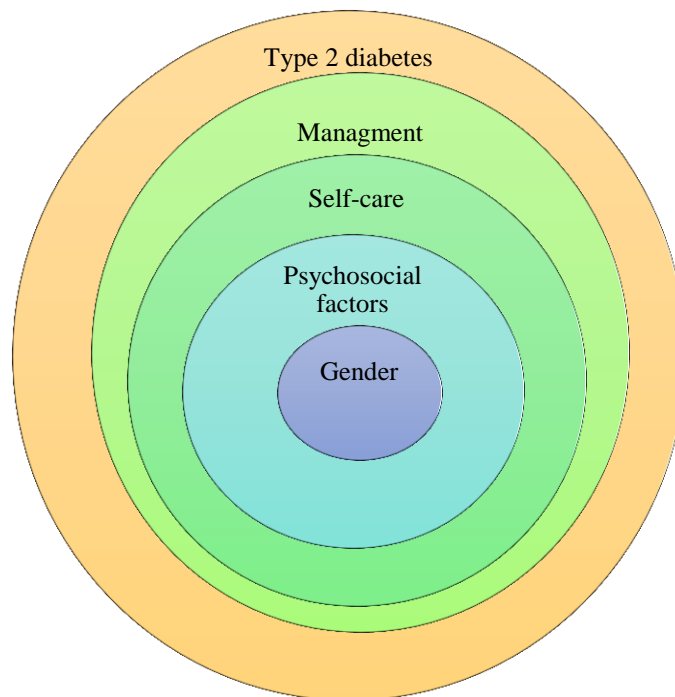
Figure 1-1 illustration of the scope of this thesis and where it fits within the larger problem of type 2 diabetes

1.3 The study's topic choice and development

My interest in this topic was partly influenced by my background in the medical field and partly by the need to understand how men and women who are suffering from T2DM are living with this disease in Jordan, which is a specific area I identified as

requiring study during my research process. After my graduation from the medical school in 2010, I started the post-graduation training which included a training course at a comprehensive primary health centre in Amman / Jordan. During that period, patients with chronic diseases including diabetes were a prominent group visiting the primary care clinics and diabetes was one of the most challenging illnesses to manage. GPs were directed to advise and encourage self-care behaviours and refer patients to dietician advice. I noticed that diabetes had affected the wellbeing of these patients; many of whom showed low motivation to self-care advice and many expressed that diabetes contributed strongly to their emotional burden. I could see that not much was done to understand the unique psychological and social situation of these patients or how these factors could have affected their self-care levels. I was interested in understanding their experience due to my own personal exposure to sufferers of the disease within my social circle. When I started my research career, it was an opportunity to translate this interest into research which was reflected in my choice of this topic.

I first came across the topics of gender in relation to health and gender specific analyses during doing my Masters in public health in one of my taught courses and it remained an area of interest for me throughout the Masters course. Prior to applying for my PhD I decided I wanted to do my research combining the topic of differences between men and women in self-management of diabetes. From background analysis it was identified that there was a gap in terms of the availability of similar research in the Middle East in general and Jordan in particular. Thus, my interest in achieving this research aim was motivated by the wish to explore T2DM self-care and related psychosocial factors, as this is likely to influence the effectiveness of

health management strategies designed for T2DM patients in general and in Jordan in particular.

1.4 The aim, research questions and objectives of the study

The aim of the study is to examine the relationship between self-efficacy, social support, diabetes distress factors, and self-care behaviours in men and women with T2DM in Jordan.

The following research questions were formulated in view of this aim:

1) Do men and women with T2DM living in Jordan differ in their psychosocial variables and self-care activities?

2) What is the relationship between psychosocial variables and the level of self-care among T2DM patients in Jordan?

3) Can gender affect the relationship between psychosocial variables and self-care?

The objectives outlined below highlight the process by which the aims of the study were achieved

1- Investigate whether men and women with T2DM who visit the outpatient clinics have different psychosocial (including: self-efficacy, social support and diabetes distress) and self-care (including: exercise, diet, blood sugar monitoring, foot care, and adherence to medication) characteristics.

2- Examine the relationship between self-care behaviours and: self-efficacy, diabetes related distress and social support variables in the men and women sample.

3- Examine whether the relationships between self-care behaviours and: self-efficacy, diabetes related distress and social support variables are moderated by gender.

1.5 Outline of thesis

This thesis is organised into seven chapters. The current chapter provides an overview of the study and its main aims.

Chapter two provides a background about T2DM and the approach of management of this condition. Then it describes the main features of the health system in Jordan, some background information on T2DM epidemiology and how diabetes is managed in Jordan. Finally, it provides a general background into the differences between men and women with diabetes.

Chapter three presents evidence derived from the literature using a systematic synthesis approach. The aims of the review were to identify the presence of differences in self-care and psychosocial factors between men and women with T2DM and to identify gaps that can be addressed in this current study. The review also sought to provide the basis for the formulation of theoretical hypotheses in addition to guiding the methods of this study which are presented in the subsequent chapters.

Chapter four is a review of the theoretical literature relevant to self-care, psychosocial factors including self-efficacy, diabetes distress and social support. The chapter provides a conceptual framework of the terms of interest in this study as well as a discussion of the relevant theories concerning each in literature (sections 4.2.1,

4.2.2, 4.3.1, 4.4.1, and 4.5.1). A discussion of how each of self-efficacy, diabetes distress and social support is related to self-care behaviours of T2DM is provided within sections of these concepts (4.3.2, 4.4.2, and 4.5.2). In addition, the chapter presents a literature review of the work on the concepts of gender, gender and health, and gender related differences (section 4.6.1, 4.6.2, and 4.6.3). The chapter concludes with a summary (section 4.7) and an illustration of the theoretical model used for this research (section 4.8).

The fifth chapter describes the study methods; it explains the process of the data collection in pilot and main data collection phases, in addition to the methods of data analysis.

The sixth chapter contains the results obtained by this study; it is composed of descriptive and analytic sections where the main research questions are addressed.

 Finally, **Chapter seven** comprises a discussion of the study's main findings, strengths and limitations of the current research and the implications for practice. The chapter finishes with conclusion, summarising the overall significance of this study.

2. Chapter 2: Background

2.1 Introduction

This chapter aims to set a general foundation for the current study prior to going into greater depth in the following chapters of literature review and theoretical framework (Chapters 3 and 4). It provides contextual information that is prerequisite to the understanding of the research of interest. Accordingly, section 2.2 provides a brief clinical and epidemiological summary of T2DM (2.2.1-2.2.7). Following this, a separate section (2.3) is dedicated to discuss the management of T2DM; specifically, how T2DM management is approached according to the current recommendations, it focuses on discussing the importance of self-care aspect in the management of T2DM and how it can improve the health outcomes of T2DM patients. Section 2.4 describes the health system and epidemiology in Jordan, then summarises diabetes related research in Jordan, highlighting the gaps in the literature and the contributions that this study will make to the health care field there. Section 2.5 provides a brief exploration into the influence of gender on different aspects of T2DM. The chapter is concluded with section 2.6 explaining the relevance of psychosocial factors to self-management of diabetes and the argument for the need to further explore the theoretical and the empirical evidence for gender influences on self-care and psychosocial variables.

2.2 Introduction to Diabetes Mellitus

2.2.1   Definitions

Diabetes Mellitus is a chronic metabolic condition resulting from insufficient production of insulin by the pancreas or the inability of the body to use the insulin it produces effectively (i.e. insulin resistance) (ADA, 2010; CDC, 2011; WHO, 2013b). Insulin is a hormone that regulates blood sugar levels. Hyperglycaemia or raised blood sugar is a common effect of uncontrolled diabetes that over time leads to serious damage to many of the body's systems; especially the nerves and blood vessels (Stratton, Adler and Neil, 2000).

Diabetes has many types or variants, the most common are:

-    Type 2 diabetes (the principal focus of this study):

Type 2 diabetes mellitus (T2DM) was formerly called Non–Insulin-Dependent Diabetes Mellitus (NIDDM) or adult-onset diabetes. It results from the body's ineffective use of insulin and is the most common type among adults (CDC, 2011). Unlike patients with T1DM, patients with T2DM are not absolutely dependant on insulin. This distinction was the basis for the older terminology for types 1 and 2 (Insulin Dependent and Non-Insulin Dependent Diabetes Mellitus) respectively (CDC, 2011).

Other types include:

- Type 1 diabetes:

Type 1 diabetes (T1DM) previously known as insulin-dependent or childhood-onset diabetes is characterized by a lack of insulin production. Although disease onset can occur at any age, T1DM usually starts at younger ages than other types of diabetes (WHO, 2013b). In adults, T1DM accounts for approximately 5% of all diagnosed cases of diabetes globally (CDC, 2011).

- Gestational diabetes:

Gestational diabetes is a form of glucose intolerance with onset or first recognition during pregnancy (Alberti and Zimmet, 1998). It is considered as a risk factor for developing T2DM in mothers later in life (Kim, Newton and Knopp, 2002; Bellamy *et al.*, 2009).

- Variant causes:

These could result from specific genetic conditions (such as maturity-onset diabetes of youth), surgery, medications, infections, pancreatic disease, and other illnesses. Such types of diabetes account for 1-5% of all diagnosed cases (Alberti and Zimmet, 1998; CDC, 2011).

- Impaired glucose tolerance (IGT) and impaired fasting glycaemia (IFG):

Impaired glucose tolerance (IGT) and impaired fasting glycaemia (IFG) are intermediate conditions in the transition between "normality" and diabetes, people

with IGT or IFG are at high risk of progressing to T2DM, although this is not inevitable (WHO, 2013b).

2.2.2 Prevalence of T2DM

T2DM is one of the most common chronic illnesses. The prevalence of diabetes worldwide is estimated to be 8.8% (Internationa Diabetes Federation, 2015). T2DM accounts for more than 90% of all diagnosed cases of diabetes (WHO, 2013b). The number of patients with diabetes is predicted to increase by two thirds of the current estimation by 2030 (Guariguata *et al.*, 2013). The rising prevalence of T2DM is associated with rapid cultural and social changes, ageing populations, increasing urbanization, dietary changes, reduced physical activity and other unhealthy lifestyle and behavioural patterns (WHO, 2011a).

2.2.3 Regional trends

T2DM prevalence varies in different regions of the world, however, 80% of people with T2DM live in low- and middle-income countries (Mathers and Loncar, 2006; IDF, 2014). The disease prevalence estimations in 2015 for the 20-79 years age group showed the highest prevalence in the North America and Caribbean region at 11.5%, followed closely by the Middle East and North African regions at 10.7%, the prevalence in Africa was the lowest at 3.2% (Internationa Diabetes Federation, 2015) .

2.2.4 Burden of T2DM

Diabetes and its complications exert heavy economic consequences on individuals, families, health systems and countries. The burden of diabetes is particularly evident in the developing regions of the world. It is in these regions that healthcare resources are already scarce and where the greatest increase in the numbers of diabetics is projected to occur (Whiting *et al.*, 2011). In 2015, more than 5 million people worldwide died due to complications of the disease (Internationa Diabetes Federation, 2015). The global annual costs in healthcare expenditures in 2014 of diabetes were estimated to be at least USD 612 billion dollars; this equates to 12% of total healthcare expenditure in adults (20-79 years) (da Rocha Fernandes *et al.*, 2016), however, the majority of this expenditure is spent in the relatively wealthy countries and much less in low and middle income countries where the majority of patients are (van Dieren *et al.*, 2010; Internationa Diabetes Federation, 2015).

2.2.5 Risk factors for T2DM

Many risk factors contribute to developing T2DM; these include characteristics of the individuals, their behaviours, and the surrounding environment. Risk factors can be broadly categorized as modifiable or non-modifiable that may interact with each other and influence disease risk (Bower, 2010).

Non-modifiable factors include age, sex, genetic predisposition, and family history. These factors are considered unchangeable and thus comprise the underlying risk for a particular individual. The incidence of T2DM increases with age, however, the

number of younger people diagnosed with the disease is increasing (Rosenbloom and Joe, 1999). This is linked to increased obesity among this age group (Rosenbloom and Joe, 1999). T2DM has multiple hereditary factors; genetic characteristics may predispose individuals towards developing T2DM (Barnett *et al.*, 1981). Approximately two thirds of patients with T2DM report a family history of diabetes (Singh *et al.*, 2010).

On the other hand, modifiable factors include an individual's weight, smoking status, dietary habits, and physical activity levels (Bower, 2010). Dietary habits and physical activity are the two factors most often discussed with regards to modifiable diabetes risk factors (Collins *et al.*, 2011). Each is an independent risk factor, although they may also act together through a common pathway of increasing adiposity/obesity (Collins et al. 2011).

In summary, aetiology of T2DM is multifactorial and epidemiological data shows that both genetic and non-genetic factors may play a role.

2.2.6   Clinical presentation and diagnosis

The course of T2DM is usually insidious, and develops slowly with no symptoms or signs in the early stages (ADA, 2010). Symptoms of hyperglycaemia include polydipsia (thirst), polyuria (urine frequency) and fatigue (WHO, 2013a). By the time these appear and diagnosis is confirmed, the majority of patients are likely to have already developed vascular complications (Alberti and Zimmet, 1998), hence the importance of early diagnosis.

The WHO has established diagnostic criteria for diabetes as: fasting plasma glucose $\geq$ 7 mmol/l (126mg/dl), or 2-hours plasma glucose $\geq$11.1mmol/l (200mg/dl) after a 75g oral glucose tolerance test (OGTT) (WHO, 2010). The HbA1c test reflects average plasma glucose over the previous 8–12 weeks (WHO, 2011b). Unlike the oral glucose tolerance test, an HbA1c test can be performed at any time of the day and does not require any special preparation, such as fasting. The WHO and the ADA have recommended a level of 48 mmol/mol (6.5%) for HbA1c as the cut-off point for diagnosing T2DM (ADA, 2010; WHO, 2010; NHS, 2011). A report in the UK recommends using HbA1c values between 42 and 47 mmol/mol (6.0–6.4%) to indicate that a person is at high risk of T2DM (John, 2012).

2.2.7   Complications and outcomes

T2DM is associated with an array of complications, mainly due to the involvement of small and large blood vessels (microvascular and macrovascular complications) and nerves (neuropathic complications). These are the major contributors to morbidity, reduced quality of life and mortality in T2DM patients (Fowler, 2008).

- **Macrovascular:**

Macrovascular complications include angina, myocardial infarction, stroke, peripheral artery disease, and congestive heart failure and are all common among patients with T2DM (Fowler, 2008). Having T2DM triples the risk of stroke among patients as compared to the general population (van Dieren *et al.*, 2010).

- **Microvascular:**

Microvascular complications of T2DM are primarily nephropathy, retinopathy, neuropathy, and small vessel complications (Fowler, 2008). T2DM is a leading cause of blindness, renal failure, and lower limb amputations (Mayfield *et al.*, 1996; Fowler, 2008; van Dieren *et al.*, 2010). Diabetic retinopathy is the most common microvascular complication of diabetes; it usually precedes the diagnosis of T2DM by years (Fong, 2003). Nerve damage can cause erectile dysfunction, and in many cases serious consequences such as lower limb amputations (NICE, 2008).

Development of T2DM related macro or microvascular complications can be predicted by the magnitude and duration of hyperglycaemia (Fowler 2008).

2.3 Management of T2DM

The ultimate goal of T2DM management is to improve the health of patients through the control of glucose levels and the prevention of complications. The basis of T2DM management is the ongoing self-care and the adoption of healthy lifestyle habits (ADA, 2016).

Additionally, depending on the progress of diabetes, pharmacological treatment is offered to diabetic patients to lower blood glucose. The WHO's list of essential medicines for diabetes include Metformin and Gliclazide which are orally administered (World Health Organisation 2015). When oral medications are not sufficiently effective, insulin can be combined with oral therapy (National Institute for Health and Care Excellence, 2016). T2DM pharmacological treatment can extend to include blood pressure control agents, cholesterol lowering agents, and in some circumstances,

antiplatelet therapy (National Institute for Health and Care Excellence, 2016). Patients should also receive recommended preventive care services which include screening for complications and comorbidities such as eye, foot, and renal complications (National Institute for Health and Care Excellence, 2016).

Components of self-care for T2DM include diet, exercise, foot care, and glucose monitoring, the recommendations for each domain are summarised below.

Diet: Patients with T2DM are recommended to reduce the intake of sugar, fat, salt and alcohol. The ADA recommends that distribution of calories among carbohydrates, fats, and proteins for people with diabetes should be individualised according to total calorie and metabolic goals for each patient (ADA, 2016). In general, emphasis on foods higher in fibre content such as whole grains, vegetables, and fruits are advised. Evidence is still not conclusive about the optimal intake level of fat or protein, however, trans fats should be avoided and the protein intake should be individualised depending on the kidney status of the patient (ADA, 2016).

Exercise: Physical activity is another important component of self-care. The exercise health goal is to achieve at least 150 minutes per week of moderate-intensity physical activity (50–70% of maximum heart rate) spread over at least three days per week with no more than two consecutive days without exercise (ADA, 2016). Adults over the age of 65 years or those with disabilities are advised to follow similar exercise guidelines if possible, otherwise, are advised to be as physically active as they are able to be (ADA, 2016). Dietary and exercise self-care aim to reduce the cardiovascular complications risk and to contribute to maintaining healthy weight (Inzucchi *et al.*, 2015).

Foot care aims to decrease diabetic foot complications that usually occur due to neuropathy and microvascular consequences of T2DM. Daily foot care of skin and toenails is recommended. Patients are encouraged to inspect for any abnormalities such as blisters, redness, cuts, nail problems or swelling. They are also advised to wash feet daily and to make sure to dry them properly. Additionally, the selection of appropriate footwear is also recommended (ADA, 2016).

Patient **self-monitoring of blood glucose** helps to evaluate the patient's response to therapy. The results of glucose monitoring can be a useful tool to guide the planning of better diet and physical activity self-care which in turn can improve glycaemic control, and assist with adjusting medications. Patients with T2DM who are orally treated or are on less intensive insulin therapy are advised to do self-monitoring of blood glucose, however, there is no conclusive recommendations for the frequency or the timing of monitoring among these patients as the evidence is still insufficient (Clar *et al.*, 2010) (ADA, 2016).

From the above discussion of self-care components, we can see that self-care is demanding; patients are required to integrate self-care activities into their daily routine over long periods of their lives (Shrivastava, Shrivastava and Ramasamy, 2013; Young-Hyman *et al.*, 2016). The patient primarily manages their conditions. The role of health care professionals should be focused on supporting the patient in this role (Bodenheimer *et al.*, 2002).

Evidence based guidelines for T2DM management emphasise on the uptake of a comprehensive "patient-centered" approach to achieve optimal healthcare outcomes

and patient's wellbeing (ADA, 2016; National Institute for Health and Care Excellence, 2016). In this approach, a comprehensive assessment of the newly diagnosed patient is required. This approach requires that in addition to the medical history, physical examination and laboratory tests, the components of the patient's assessment are broadened to include an evaluation of the behavioural, lifestyle, and psychosocial factors and needs (ADA, 2016). The ADA recommends routinely screening for psychosocial issues, specifically; expectations for medical management and outcomes, social resources, depression, diabetes-related distress, and anxiety (ADA, 2016). This comprehensive approach has two major advantages; it allows a time saving for the healthcare provider in planning and managing the patient's condition whilst simultaneously identifying the modifiable factors for each patient which can be improved (Inzucchi *et al.*, 2015).

2.4 Setting profile

2.4.1 Introduction

The previous sections (2.2-2.3) have provided information about T2DM and its management in general. This section presents an overview of T2DM in Jordan which is the place this study was conducted in.

2.4.2 Jordan

Jordan is a small upper-middle income country (World Bank, 2014) (Figure 2-1). It has a total territorial area of 89,300 square kilometers of land. Jordan is a constitutional monarchy. Administratively, Jordan is divided into 12 governorates (DOS, 2010a). The

total population is 9.5 million people (48.5% women, 51.5% men) (Department Of Statistics-Jordan, 2015), of whom, 6,6 million are Jordanians and constitute 70% of the total population. The remaining 30% are non-Jordanians; half of these are Syrian (1.3 million). More than a third of the Jordanian population reside in the capital (Amman) (Department Of Statistics-Jordan, 2015). The average annual population growth rate is 2.2%. The population of Jordan are mostly Arabs; with some Circassians, Chechens and Armenians. With regards to health indicators, life expectancy is 73 years on average (71.6 for men and 74.4 for women) (DOS, 2012). Whilst infectious disease prevalence has reduced, there is an increasing prevalence of non-communicable diseases. Causes related to cardiovascular diseases are the leading causes of death in Jordan, followed by neoplasms and external causes (Ajlouni, 2011).

Figure 2-1 Jordan Map (Maps.com, 2011)

2.4.3 Health system in Jordan

Jordan's health system is based on a combination of services provided by the following sectors:

- ❖ The Public Sector which includes:

    - ▪ Ministry of Health (MoH),

    - ▪ Royal Medical Services (RMS) and

    - ▪ Public University Hospitals.

- ❖ The Private Sector.

- ❖ The International and Charitable Sector (e.g. The United Nations Relief and Work Agency, UNRWA).

Each of the health care sectors has its own financing and delivery system (MoH, 2014). In the public sector, MoH accounts for 37% of all hospital beds in the country; the military's Royal Medical Services provide 24% of all beds; and the Universities Hospitals account for 3% of total beds in the country. The private sector provides 36% of all hospital beds (Ajlouni, 2011). The UNRWA operates 21 primary care centers and 30 special care clinics for Jordan's Palestinian refugees since the 1950s (Bocco, 2010). 82% of the population in Jordan are covered by formal health insurance (Paul and Leader, 2011). MoH is the largest health insurer, followed by private firms and UNRWA. The university hospitals insure about 2.3% of the population. Of those with insurance, around 11% have multiple insurances. Access at

military hospitals is open to the general public, and is not restricted to military personnel (Paul and Leader, 2011).

2.4.4 Overview of T2DM in Jordan

2.4.4.1 Prevalence

The Middle East and North Africa (MENA) region has a higher prevalence of diabetes than the global average (Boutayeb, 2012; Handlos *et al.*, 2013; Internationa Diabetes Federation, 2015). For 21 MENA countries for which data is available (including Jordan), nearly 37 million people are living with diabetes, and another 18 million are estimated to be undiagnosed cases (Internationa Diabetes Federation, 2015). Estimations of the prevalence of T2DM in Jordan were reported variably over the past decade to range from 11-17% (Ajlouni *et al.*, 2008) (Internationa Diabetes Federation, 2015). An increase in the prevalence of T2DM by 31.5% was reported between 1998 and 2008 (Ajlouni et al. 1998; Ajlouni et al. 2008).

2.4.4.2 Burden of T2DM in Jordan:

T2DM is one of the leading causes of morbidity and mortality in Jordan (Zindah *et al.*, 2008). T2DM is identified as a major risk factor for cardiovascular disease (Unwin *et al.*, 2009; van Dieren *et al.*, 2010). Cardiovascular diseases are the leading cause of death in Jordan (Brown *et al.*, 2009; Ajlouni, 2011). More than 3000 deaths among adults in Jordan in 2014 were diabetes related, half of them were under the age of 60 (Internationa Diabetes Federation, 2015). In addition, T2DM is a leading cause for haemodialysis in Jordan (Abdullah *et al.*, 2007). There has been limited research on the

burden of diabetes in Arab regions including Jordan (Boutayeb, 2012), however, data shows that a high number of people (190,000) with T2DM in Jordan are undiagnosed (Internationa Diabetes Federation, 2015). T2DM is usually accompanied by other chronic diseases, mainly hypertension (Kaplan, 2002); similarly, in Jordan, the prevalence of hypertension among T2DM patients is very high (72%) (Mubarak *et al.*, 2008), which can lead to an increased burden from T2DM on patients and the health care system.

T2DM associated complications are important contributors to the burden of disease in Jordan. A study at the National Centre for Diabetes, Endocrinology, and Genetics (NCDEG) in Amman revealed that 45% of patients with diabetes had retinopathy, 33% had nephropathy, and 5% had amputations (Jbour, Jarrah and Radaideh, 2003). Sexual dysfunction complications are also prevalent among both men and women in Jordan (Khatib, Jarrah and Shegem, 2006; Abu Ali *et al.*, 2008).

2.4.4.3 Health services for diabetes patients in Jordan

Health sectors previously mentioned (section 2.4.3) provide primary, secondary and tertiary healthcare services to patients with diabetes (MoH, 2014). In addition, a National Centre for Diabetes, Endocrinology and Genetics (NCDEG) was established in 1996. The center is an independent institution; however, it is considered a part of the academic system of Jordan University Hospital in Amman. NCDEG attracts patients from all over the country who are either physician-referred or self-referred (Jbour, Jarrah and Radaideh, 2003; Mubarak *et al.*, 2008; Adham *et al.*, 2010).

2.4.4.4 Self-care behaviours of T2DM patients in Jordan:

Self-care is mandatory in the management of T2DM, as discussed previously (section 2.3). Obesity, poor diet, and physical inactivity are common in Jordan (Zindah *et al.*, 2008; Al-Nsour *et al.*, 2012; Al-Odat, Ahmad and Haddad, 2012). High percentages of Jordanians are reported to have poor glycaemic control (Adham *et al.*, 2010; Khattab *et al.*, 2010). A study of 650 diabetic patients (90% of which were T2DM) reported low levels of adherence to the diet plan and the 30 minutes of exercise per day recommended by health professionals (Al-Amer *et al.*, 2011). A national household survey by the Centres for Disease Control and Prevention in Jordan showed that two-thirds of patients with diabetes in Jordan reported that they never had their feet checked for sores or irritations, and nearly half had not had an eye examination in the past 12 months (CDC, 2006; Zindah *et al.*, 2008). Similar findings showed that patients in Jordan did not practice preventative foot care behaviours due to personal beliefs about healthcare; participants believed that the presence of diabetes does not necessitate the need for regular foot examination when there are no active ulcers on their feet (Abu-Qamar and Wilson, 2011). Similar patterns of poor self-care were reported in T2DM patients in Saudi and United Arab Emirates (Al-Kaabi *et al.*, 2009; Sabbah and AlShehri, 2014).

A study of 737 Jordanian patients with T2DM assessed the stage of readiness for the uptake of diabetes related self-care behaviours. It was found that a significant number of the patients who participated in the study had low readiness to practice the recommended levels of exercise, consuming 5 servings or more of fruit and vegetables,

and self-monitoring of blood glucose (Bawadi *et al.*, 2012). This indicates that self-care rates are still low among Jordanian diabetics. Lack of adequate education about diabetes is possibly one of the causes for this, with evidence suggesting that low numbers of T2DM patients in Jordan had ever attended a diabetes education program (Al-Khawaldeh, Al-Hassan and Froelicher, 2012).

Use of herbal medicines in the management of diabetes is common among patients in Jordan; one in every five diabetic patients in one study (95.2% were T2DM patients) reported consuming plants and sincerely believing that they may cure diabetes (Wazaify *et al.*, 2011). In another study, two thirds confirmed their intention to re-use these herbs and were satisfied with the results (Otoom and Al-Safi, 2006). The easy accessibility and lower cost of using medicinal herbs in Jordan may explain their popularity (Wazaify *et al.*, 2011).

In summary, this section highlights important gaps in the literature specifically in self-care behaviours of Jordanians with T2DM and in regard to the influence of gender on self-care.

2.5   Gender and T2DM

2.5.1   Introduction

In this section a brief background that is focused on the influence of gender in relation to diabetes including the differences in clinical and epidemiological factors between men and women.

There is a growing recognition that differences between men and women extend beyond biological or physiological factors, particularly with regard to their effect on the health outcomes of chronic diseases (Pollard and Hyatt, 1999). Socially constructed gender roles are believed to influence women's and men's health behaviours and this could explain some subsequent health outcomes (Vlassoff, 2007). For T2DM, existing studies reveal several differences between men and women with diabetes, in regards to clinical, psychosocial and behavioural aspects as will be discussed in the following subsections (2.5.2-2.5.6).

2.5.2   Prevalence of T2DM

In general, T2DM is reported to be slightly more common in men than women. For example, in 2015, it was estimated that there were 215.2 million men with T2DM compared to 199.5 million cases in women aged between 20 and 79 (Internationa Diabetes Federation, 2015).

2.5.3   Risk factors for T2DM

Risk factors for T2DM discussed in section 2.2.5 are similarly present for women and men. These include age, family history, and genetics (Meisinger and Thorand, 2002). High weight is the strongest risk factor for developing T2DM in both sexes (Arnetz, Ekberg and Alvarsson, 2014). However, the BMI at which insulin resistance starts to develop is higher in women than in men; this is because lipids accumulate as subcutaneous adipose tissue in women which does less harm than accumulation of visceral adipose tissue in men. Additionally, risk factors such as regular smoking, alcohol intake and/or high cholesterol levels are more commonly associated with T2DM

among men, while having a high waist-hip ratio, high blood pressure, high level of uric acid, and/or physical inactivity are more common predictors of the disease in women (Grant *et al.*, 2009; Arnetz, Ekberg and Alvarsson, 2014).

2.5.4 Clinical presentation and diagnosis of T2DM

Women are more likely to experience symptoms of hyperglycaemia than men. In studies in USA and UK, women report a higher incidence of polyphagia, polydipsia, fatigue, skin manifestations (Lipodystrophy) and cataracts compared to men (Kumar, 1996; Bulpitt *et al.*, 1998; Summerson *et al.*, 1999).

Acknowledging differences in clinical presentation has implications for clinical practice. For example, the key diagnostic indicator for T2DM is Fasting Plasma Glucose (FPG); in women, relying solely on FPG may lead to "under-diagnosis" of T2DM because women are found to have isolated postprandial (after food) hyperglycaemia more often than fasting hyperglycaemia compared to men (Meigs, 2002; Cavalot *et al.*, 2006). Thus, a 2-hour postprandial blood test is currently recommended in women with significant risk factors for T2DM before the diagnosis is ruled out (Legato *et al.*, 2006).

2.5.5 Complications and prognosis

Cardiovascular complications are the most common complication of T2DM (Fowler, 2008). Although women in most developed and developing countries have lower cardiovascular mortality rates than men (Ulrich *et al.*, 1999; Shara, 2010), studies show that the relative risk of cardiovascular disease (CVD) is higher among women with T2DM than amongst men with T2DM (Legato *et al.*, 2006; Rivellese, Riccardi and Vaccaro, 2010). Studies suggest that women have increased sympathetic nervous system

(SNS) activity that implicates the pathogenesis of insulin resistance and greatly increases their cardiovascular risk whereas men have the opposite relationship between insulin resistance and heart activity which could explain the greater risk of CVD in women (Flanagan *et al.*, 2007). It is also suggested that in patients with diabetes, the oestrogen-related protective mechanisms are nullified and thus women with diabetes are less protected from cardiovascular disease than those without diabetes (Juutilainen *et al.*, 2004).

2.5.6   Psychosocial factors

Living with T2DM can be challenging psychologically as patients have to include diabetes in their daily lives and the anticipation of possible complications may exacerbate this (Polonsky, 2002). Depression is one of the main co-morbid manifestations related to T2DM (Anderson and Funnell, 2008). T2DM patients are reported to be at increased risk of anxiety and depression; however, women are more likely to exhibit symptoms of anxiety or depression than men (Svenningsson *et al.*, 2012). A systematic literature review showed that the prevalence of depression is higher in women with T2DM (23.8%) compared with men with T2DM (12.8%). The number of T2DM patients in the included studies was 17,200. T2DM studies included were mostly conducted in the USA, followed by Europe and one study from Iraq (Ali *et al.*, 2006).

Social networks are an important factor that may influence the psychosocial wellbeing of T2DM patients; the sources and frequency of social support for T2DM patients might differ according to gender. Common sources of support include family, friends and

spouses/partners (Hjelm and Berterö, 2009). Men are more likely to receive social support from their spouses than women, while women are considered providers for support by their family and spouse (Song *et al.*, 2012). It is highlighted in literature that women may place family needs first, even where these responsibilities have a significant impact on these women's own health (Hannan, 2009; da Silva, Hegadoren and Lasiuk, 2012). This might indicate the importance of gender related social expectations, especially the tendency to see women as care givers.

2.6 Chapter summary

This chapter has provided background information on diabetes, the setting of the study and the differences between men and women in various aspects of diabetes. In summary, T2DM is a highly prevalent chronic disease worldwide that is affecting the lives of millions of patients and that needs ongoing health care by the patient and the provision of health care services to them. It has also highlighted that although practicing self-care is the first line of T2DM management, self-care for T2DM generally, and particularly in Arab countries including Jordan, is sub-optimal. As diabetes is such a psychologically and socially demanding disease, in order to plan and support better management of T2DM there is a need to better understand the psychosocial factors that influence effective self-care. Consequently, psychosocial variables and self-care practices are of a particular interest in this study.

This chapter also demonstrated that although it seems that there are gender differences in the course of the disease and the health outcomes of T2DM between men and

women, diabetes management guidelines largely do not distinguish between management for men and women. Health interventions including education and support services are rarely designed specifically to address gender differences. If the findings of this study provide evidence that there are important differences in self-care of diabetes patients and psychosocial factors of men and women, it would suggest that gender differences should be accounted for in the design of future self-care guidelines. After considering the psychosocial factors identified in the next chapter this study aims to determine whether a patient's gender influences the effect these psychosocial factors have on effective self-care.

Studies of gender based differences among T2DM patients in Jordan are scarce. In particular, no studies that examined gender differences in psychosocial or self-care practices were found. Therefore, the evidence for gender differences among T2DM patients internationally was explored. Accordingly, in the next chapter a systematic literature review was conducted in order to understand the relationship between key psychosocial factors and diabetes self-care in men and women.

3. Chapter 3: A systematic literature review of the evidence for differences in self-care and psychosocial factors between men and women with diabetes

3.1 Introduction

The background literature presented in Chapter 2 suggested that men and women differ in various aspects related to T2DM. In order to identify evidence as to whether differences in psychosocial and self-care behaviours exist among men and women T2DM population, I conducted a review during the first year (2013) of the PhD. A second aim of conducting the review was to identify the relevant concepts commonly discussed in the literature on this topic. The review used a systematic approach and synthesised the evidence from quantitative, qualitative, and mixed methods literature published between 1992 and 2013.

A systematic review approach was chosen to ensure that the existing evidence on the research topic of interest could be identified and synthesised using a structured, comprehensive and unbiased method. This review followed the general methodology and outline of systematic reviews provided in published guidelines by Cochrane organisation (julian PT. Higgins and Green, 2011).

This chapter is composed of eleven sections. The specific questions this review sought to answer are presented in section 3.2. The methodology this review had undertaken is illustrated in sections 3.3-3.5. Results of the search for studies and the synthesis of the findings are summarised in section 3.6 and section 3.7. The limitations of the included studies are considered in section 3.8. Discussions of the key findings of this literature

review are summarised in section 3.9 and the limitations of this literature review are presented in section 3.10. Finally, conclusions derived from the preceding discussion of the review findings are presented in section 3.11.

3.2 Questions in this review

This chapter contributes to the research aims by generating findings from literature between 1992 and 2013 for the following questions;

3.2.1   Primary questions:

- Are there differences in self-care and psychosocial factors between men and women with T2DM?

- What is the relationship between key psychosocial factors and diabetes self-care in men and women?

3.2.2   Secondary questions:

 - What are the common psychosocial and self-care variables studied in the literature?

- What are the common health-related outcomes measured in the literature related to gender differences among T2DM patients?

3.3 Selection of the included studies

A comprehensive search was conducted to identify relevant studies; an initial scoping exercise was followed by a series of complementary search methods, including databases searches, and citation searches.

The references retrieved from the literature searches were carefully examined to identify all references meeting the inclusion criteria for the review. The scoping search yielded a high number of studies which were difficult to manage within time constraints; thus, a further step was taken to narrow down the review scope, and studies were selected based on three main criteria. Firstly, studies needed to be of relevance to the main aims of the review, secondly, studies needed to address gender differences in which men and women had to be compared on the basis of one or more of the variables relevant to this review, thirdly, the studies have to include measurement of variables relevant to this review; these being either psychosocial factors (e.g. self-efficacy, depressive symptoms, diabetes-specific social support) and/or self-care practices (e.g. diet, exercise, foot care, blood sugar testing and adherence to medication).

No specification of country or setting were applied; this was to include a variety of settings in order to formulate a more comprehensive overview of gender differences in an array of settings and countries.

Study populations had to be adults who are diagnosed with T2DM of any disease duration. Study types eligible for inclusion could be either quantitative, qualitative or mixed studies as this allowed the gathering of more information and facilitated better insight into the review questions.

3.4 Search resources and methods

The following electronic databases were searched:

- Web of Knowledge (WoK)

- Medline

- PsycINFO

- Scopus

- Google Scholar

Other sources were:

- Reference list of included studies.

- "Similar articles" option that were present in Medline and PsycINFO databases.

- "Cited by" feature by Google scholar.

The search was conducted between September-November 2013. English language studies were included. All references retrieved from the searches were entered into Mendeley desktop reference manager Version 1.10.1. Hits were combined, and then carefully examined to remove entries containing duplicate references. After that, search results were screened by title and abstract for relevant studies by the reviewer. Detailed search strategies for each database are reported in Appendix 1.

3.5 Data extraction and synthesis

Data from each included study was extracted using a template developed specifically for this review which contained the following: the study ID, journal of publication, country/setting of the study, aim of the study, study design, information about population, measured outcomes and tools used as well as the main findings (Appendix 2). In order to facilitate a comparative description of the study characteristics and findings afterwards, the studies were then grouped according to quantitative or qualitative design in tables. (Appendix 3).

Data of different types were synthesised separately according to methodology as presented in the results Section 3.6. The quantitative and qualitative components of the mixed methods studies were incorporated in the quantitative study and qualitative study analysis below.

3.6 Results

3.6.1 Search results

The search yielded 667 studies in total. Studies were screened by title as first step, then abstract. 66 studies were eligible for full text screening. 25 studies were included in this literature analysis. See Figure 3-1 for illustration of this process.

PRISMA Diagram of included studies

Databases search			
Psychinfo	Medline	WoK	Scopus
n = 140	n = 180	n = 194	n = 112

Other sources (Reference lists and similar studies) n = 41

Included after title screening

Psychinfo	Medline	Wok	Scopus	Others
n = 47	n = 59	n = 50	n = 37	n = 41

Included for abstract screening

Psychinfo	Medline	Wok	Scopus	Others
n = 12	n = 27	n = 21	n = 16	n = 10

n = 86 → Duplicates removed n = 20

Screened for full text

n = 66 → Excluded by full text screening n = 41

Included for discussion in the literature review

n= 25

Identification — Searching — Eligibility — Included

Figure 3-1 PRISMA diagram showing the selection process of the included studies

3.6.2 General description of the excluded studies

A total of 642 studies were excluded from the review based on the sequential sifting process and inclusion criteria set out previously. Exclusion reasons varied, for example: having irrelevant aims (Brody *et al.*, 2008; Bond *et al.*, 2010; Zulman *et al.*, 2012) or reporting adjusted data to gender among other demographic characteristics of participants, rather than setting it as an essential comparative variable. With these studies there was a risk of increased likelihood to report gender differences only when deemed significant (Camacho, Anderson and Bell, 2002; Lerman *et al.*, 2004; Moody-Ayers *et al.*, 2005; Whittemore, D'Eramo Melkus and Grey, 2005; Tang *et al.*, 2008; Fortmann, Gallo and Philis-Tsimikas, 2011; Schiøtz *et al.*, 2012; Gao *et al.*, 2013). Other studies included participants who are not diagnosed with T2DM but at risk of developing T2DM (Meisinger and Thorand, 2002; Agardh *et al.*, 2004). Studies including patients with T1DM only or both T2DM and T1DM patients with no clear differentiation of results or where data was reported as one merged group (Hanson, Henggeler and Burghen, 1987; Stenström and Wikby, 1995; Tseng *et al.*, 2006; Undén *et al.*, 2008) were excluded. Studies were also excluded for not including an outcome measure of interest; examples are (Chou *et al.*, 2007) which measured differences in management and care provided to participants, and (Daniulaityte, 2004; Flanagan *et al.*, 2007; Dasgupta, Khan and Ross, 2010) which measured economic and education differences among both genders.

3.6.3   General description of the included studies

The studies included varied in type, methods and measured outcomes as discussed in this section, tables in Appendix 3 summarise the characteristics of each of the included studies, grouped by methodology. Included studies were published between 1992 and 2013 and comprised 19 quantitative studies, three qualitative studies, and three mixed methods studies.

The aims of the included studies are first summarised in groups according to the methods of the study.

3.6.3.1 Aims of the included quantitative studies

(Brown et al. 2000) study described gender based differences in social support for diet control in T2DM of a Mexican American population in USA. Similarly, (Chiu and Wray, 2011) study investigated differences between men and women in T2DM specific social support, self-efficacy, perceived self-control and coping with diabetes as psychosocial variables in addition to exercise, diet, adherence to medication and blood sugar monitoring variables of self-care. Social support was also examined by (Connell, Fisher and Houston, 1992) , (Kacerovsky-Bielesz *et al.*, 2009), (Gucciardi, Wang and DeMelo, 2008) and (Ponzo, Gucciardi and Weiland, 2006) and its correlation to self-care behaviours in both men and women. Self-efficacy, commonly defined in the included studies as the patients' confidence in being able to self-control diabetes, was examined in five studies (Khunti *et al.*, 2008), (McCollum *et al.*, 2005), (Misra and Lager, 2009), (Nau, Aikens and Pacholski, 2007) and (Shrestha, Kosalram and Gopichandran, 2013).

Coping was examined in five studies, (Sriram, Sridhar and Madhu, 2001; Gåfvels and Wändell, 2006; Degazon and Parker, 2007; Kacerovsky-Bielesz *et al.*, 2009; Chiu and Wray, 2011). These five studies aimed to determine whether men and women adopted different coping strategies.

Seven studies examined differences in depressive symptoms between men and women with T2DM. (Khunti *et al.*, 2008), (Chiu and Wray, 2011), (Gucciardi, Wang and DeMelo, 2008), (McCollum *et al.*, 2005), (Nau, Aikens and Pacholski, 2007), (Ponzo et al. 2006) and (Raum *et al.*, 2012). Findings of these studies are presented in section 3.7.

One study focused mainly on investigating whether men and women show differing responses to physician recommendations on T2DM self-care, with regard to their actual behaviours following the recommendations. The study specifically explored gender differences in physical exercise and weight management (Gavin, Fox and Grandy, 2011). (Bell *et al.*, 2007) focused on comparing men's and women's ownership of T2DM self-care equipment as one aspect of self-care practices. Lastly, two studies (Taru and Tsutou, 2008; Yu *et al.*, 2013) assessed differences in dieting activities among T2DM men and women and the effect of these activities on the metabolic control of patients.

3.6.3.2 Aims of the included qualitative studies

Among the three included qualitative studies, one aimed primarily at exploring typical methods used to cope with T2DM and related stresses (Iwasaki et al. 2005) . (Mathew *et al.*, 2012) and (Wenzel *et al.*, 2005) aimed to better understand the

differences in barriers and challenges among men and women living with T2DM and compared their experiences with the disease.

3.6.3.3 Aims of the included mixed methods studies

(Ponzo et al. 2006) used both an interviewer assessed questionnaire and focus groups to explore the relationship between gender and ethno-cultural factors, such as family support specific to health-related eating behaviours, as well as gender differences in T2DM related depressive symptoms, and illness perceptions and their effect on T2DM self-care. Similarly, (Hjelm and Berterö, 2009) studied social support and its impact on women's and men's capacity to manage their T2DM. Finally, (DeCoster and Cummings, 2004) used in-depth interview to explore whether gender influences coping style, and then analyzed the relationship between coping and self-assessed diabetic control quantitatively, using a single item scale (asked participants to rate their success at controlling diabetes on a scale of 1-10).

3.7 Findings from the included studies

3.7.1 Psychosocial variables in T2DM men and women

The review identified different types of psychosocial variables for which gender differences were explored, these include social support, depression and coping with diabetes, and self-efficacy variables. These are presented below.

- **Social support in men and women with T2DM**

One study (Brown *et al.*, 2000) found that T2DM men reported greater support provided by their wives and family in helping them follow their diet plan

recommendations than women who reported less support by their husbands and family. A possible explanation for this is that the social gender roles regarding food preparation meant that women were more likely to be responsible for making food for their families (Schafer and Schafer, 1989). When cooking, a wife may be expected to adjust her diet to suit a husband with diabetes, whereas a wife with diabetes is more likely to be asked to cook her food separately (Day, 1995). That might explain women's feeling of being less supported by their spouse or families.

Similarly, in (Chiu and Wray, 2011) and (Nielsen, 2006) included studies, women received less family support regarding following diet plans, as well as with addition to other aspects of self-care, including taking medication, foot care, physical activities, testing sugar, seeing the doctor, weight control, and feelings about their diabetes. This may reflect the influence of women's generally socially perceived role as family care-giver on their health.

(Gucciardi, Wang and DeMelo, 2008) study found that women reported higher levels of social support from their professional health care providers than men did and lower family support than men reported. Women may tend to compensate for the lack of family support by looking to other sources, such as their care providers (Gucciardi, Wang and DeMelo, 2008). This is in line with (Kacerovsky-Bielesz *et al.*, 2009) study which reported women with T2DM to express high trust in their doctor's support but lower level of satisfaction with social support from partners. Last, (Misra and Lager, 2009) study concluded that women of different ethnicities received higher social support; however sources of support were not reported in this study.

Among qualitative studies, (Hjelm and Berterö, 2009) study interviewed 40 Swedish T2DM participants and reported that women have described support experienced while being diagnosed with T2DM as limited or non-existent irrespective of the duration of their diabetes. Some men stated they had been given informative support and material support in the form of medication from health care professionals, when diagnosed with diabetes. However, several men described having just been given a diagnosis and then medical treatment: The most important persons identified as giving support were people in the study participants' closest social network, such as wife/husband or children. The focus on desired support with regard to diabetes differed. Women mainly desired support from the family, although some talked about a combination of family and health professionals. Men desired professional and medical support in terms of adequate treatment and regular visits to physicians, while women discussed the need for information (Hjelm & Berterö 2009).

- **Depression and coping with stresses in men and women with T2DM**

With regards to depressive symptoms, all included studies which assessed depressive symptoms among T2DM patients have shown higher levels of reported depressive symptoms among women than among men. (Khunti *et al.*, 2008) study found that women report more depressive symptoms than men, this is associated with the belief of not being able to affect the course of their diabetes reported by these women more often than men. The study used Hospital Anxiety And Depression Scale (HADS) questionnaire to measure the score for depression in T2DM men and women, and measured the association of these scores to the health beliefs of patients (Khunti *et al.*, 2008). Similarly, (Ponzo et al. 2006) study findings showed that women report

more symptoms of depression and this is related to poorer glycaemic control outcomes than men. The study examined depression using a score based questionnaire measuring the frequency of experiencing symptoms of depression during the past week and the relationship of depression to the level of glycaemic control of men and women (Ponzo et al. 2006).

Furthermore, (Raum *et al.*, 2012) study measured depression as reporting a 'history of physician diagnosed depression' and found that diagnosis of depression was more common among T2DM women than men.

Women in (Gucciardi, Wang and DeMelo, 2008) study were reported to have more depressive symptoms than men. (Gucciardi, Wang and DeMelo, 2008) study measured depression using the Beck-depression inventory II which focuses on symptoms of depression experienced during the past two weeks.

In (McCollum *et al.*, 2005) study, the presence of depression was assessed by the presence of prescription for anti-depressant medication. The study found women had more depression; this was associated with poorer diet and physical activity outcomes.

Lastly, (Nau, Aikens and Pacholski, 2007) examined depression in men and women with T2DM and its association to the adherence to oral T2DM medications using a self-reported questionnaire. Women had a higher score of depression than men; however, depressed women had relatively higher levels of adherence to medication than men with depression. It is noted that most if not all of the included studies which examined depression among T2DM men and women primarily depended on

the clinical diagnosis of depression or on the physical symptoms of depression reported by the patients. As this may require a more in-depth critical response, a discussion on this issue is presented in next chapter (section 4.4.1).

(Chiu and Wray, 2011) study investigated coping (e.g. coping with complications, feeling overwhelmed by the diabetes regimen) and found that women scored less well on that scale. (Degazon and Parker, 2007) study examined coping in more detail, the study measured three different types of coping (confrontive, emotive and palliative coping) (Appendix 4) and compared them in 212 men and women in an urban community in Northeast, USA. The study showed that women used more palliative coping strategies which included prayer, hoping things will get better, and going to sleep; however, no gender differences were observed for the use of either confrontational or emotive coping strategies. It was found that women felt less able to cope than men did, despite reporting making greater efforts. On the other hand, (Gåfvels and Wändell, 2006) study described coping strategies as "positive" and "negative" (Appendix 4). The setting was a Swedish primary healthcare centre. Findings showed that women tended to use more negative coping strategies (e.g. isolation, resignation and protest) than men did. (Kacerovsky-Bielesz *et al.*, 2009) study reported women were using religious strategies to cope more often than men.

The qualitative evidence from the included studies showed differences in coping between men and women with diabetes as well. (Iwasaki, Bartlett and O'Neil, 2005) study explored the ways in which T2DM participants coped with stress; their cross-thematic analysis indicated that women considered parenting, motherhood and household work major sources of stress, unlike men who did not. In addition, women

with T2DM emphasized the importance of the social support provided by their friends and significant others facing similar life circumstances, and who were therefore felt to understand their feelings better, while men focused more on having the proper support systems to make self-care easier for them. Finally, (DeCoster and Cummings, 2004) study found that men reported, overall, fewer methods, less emotion-focused, yet more problem-focused methods than women. Moreover, 'preoccupy mind' (enjoy self to forget about T2DM) and seek 'diabetes education' were the most frequent methods reported by men, whereas women more frequently reported prayer and faith in God as coping strategies.

-   **Self-efficacy in men and women with T2DM**

The included studies also examined self-efficacy. (Chiu and Wray, 2011) study concluded that being a woman is associated with lower diabetes specific self-efficacy. Similarly, in Nepal, (Shrestha, Kosalram and Gopichandran, 2013) reported that only 35% of women in the study had self-efficacy (defined in the study as the individual's belief in his or her capacity to perform self-management behaviours) compared to 65% of men. (Gucciardi et al. 2008) study assessed self-efficacy in using diabetes self-management education and in discussing self-management issues with health care providers and found no gender differences.

3.7.2 Self-care behaviours in T2DM men and women

12 out of 19 of the included quantitative studies examined one or more measures of self-care activities. (Chiu and Wray, 2011) study examined differences in exercise, diet, medication adherence and blood sugar monitoring and found that women did less exercise (measured as participation in a specific physical activity during the past

two weeks including walking for exercise, performing outdoor household chores, and doing vigorous exercise (e.g., running or jogging, biking, tennis, aerobic dance, or hiking) but were more adherent to dieting plans and sugar monitoring, while the medication adherence scale showed no difference.

(Gavin, Fox and Grandy, 2011) study included a total of 1369 T2DM patients of Caucasian, African American and Hispanic ethnicities. The study measured physical activity as the type and length of physical activity over the previous 7 days and categorised into low or inactive, moderate activity of at least 20-30 minutes per day and high activity (vigorous). The findings showed that women performed less physical activity despite receiving more professional recommendations for regular exercise than men.

Similarly, in England and Scotland, (Khunti *et al.*, 2008) used the International Physical Activity Questionnaire in their study and found that men did vigorous (>5 times a week) and moderate (>3 times a week) more than women did. Women were also less likely to engage in physical activity than men in (Raum et al. 2012) and (Yu et al. 2013) studies.

Regarding dietary self-care, (Gavin, Fox and Grandy, 2011) study reported women's higher tendency to follow diet advice and found more efforts to lose weight in the past year than men, regardless of ethnicity. Similarly, (Yu *et al.*, 2013) study found women had better diets (more fruit and vegetables and less fat), more foot care, and better glycaemic control compared to men.

(Gucciardi et al. 2008) study found no significant differences between men and women in exercise or diet during the past 7 days, but women had done more foot care and more sugar testing than men in the same time period.

In (Connell, Fisher and Houston, 1992) study, participants showed no difference in blood sugar testing frequency, but education and younger age were correlated with better sugar monitoring in men, while receiving social support was correlated with better sugar monitoring in women.

Medication adherence was also a commonly measured outcome in the included studies. (Nau, Aikens and Pacholski, 2007) did not find a direct relationship between gender and self-reported adherence; however, their results identified an interaction between gender and depression. Men with depression had worse adherence, whereas women were relatively adherent regardless of depressive symptoms. On the other hand, (Raum *et al.*, 2012) found that men were slightly less adherent to medication than women and this related to poorer glucose control among men. (Taru and Tsutou, 2008) identified gender differences where women with T2DM had better dietary self-management and men better physical activity behaviours related to glucose control (HbA1c) and indicators of obesity (waist circumference, BMI).

In contrast to previous studies, (Shrestha et al. 2013) reported higher scores for self-care of diet and foot care among men who followed the monthly eating plan better than women.

3.8 Limitations of the included studies

Differing kinds and measures of psychosocial and self-care were analysed by the included studies with varying tools, making it difficult to compare findings, and risky to derive conclusions. However, an effort to summarise similar information was made, measures and tools were compared where appropriate and usage of similar tools to collect data was highlighted in this review in the results section, in order to aid in formulating valid comparison.

Furthermore, the cross-sectional nature of most of the included studies (17 out of 25) raises concerns for this review: these studies represent a certain point of time and may fail to provide definite information about cause-and-effect relationships. These do not address the possibility of various changes over time. Despite such cautions, cross-sectional methods remain the predominate mode of analysis in empirical strategy research and it is a useful method for identifying associations, which is relevant to the main question in this review (Bowen and Wiersema, 1999; Carlson and Morrison, 2009).

An additional concern is the use of the same measurements for men and women when assessing variables that influence health, as it is reported that this may produce incorrect appraisals (Popay, Bartley and Owen, 1993; Green and Pope, 1999). This observation had influenced the implementation of certain analytical methods (measurement invariance) to overcome this problem. This is discussed in more detail in section 5.9.4 in the methods chapter.

Nearly all included studies have discussed self-reporting of most of the analysed data as a potential source of recall and desirable answers biases among populations of studies. Unequal samples of men and women were also noted in the majority of included studies. Differences between men and women respondents in the demographic variables within the studies (including education, income, and age) are present, which might have influenced the results. In qualitative studies the inadequate or low sample size was commonly reported as a limitation.

3.9 Discussion of the key findings in this review

This review shows that differences in psychosocial, self-care practices and health outcomes according to gender has been a relatively common research topic over the period examined in this literature review (20 years). Despite the great heterogeneity among included studies, several conclusions regarding the importance of gender for understanding psychosocial and self-care behaviours among T2DM patients can be derived from the studies reviewed in this section.

Firstly, gender is noted to play a role in the determinants of psychosocial and self-care factors and consequently health outcomes; the implication of this is that it can be assumed that models for health behaviours and outcomes apply differently for men and women. This suggests that gender-specific analysis is important to understanding the experience of T2DM and how to intervene to improve health outcomes of patients. Nevertheless, it is clear that these differences may vary according to the measures selected and according to the characteristics of the population studied.

Secondly, the review found that the most common psychosocial variables studied among the reviewed studies were social support, depressive symptoms, self-efficacy and coping with diabetes. The majority of the included studies showed that social support and self-efficacy are lower in women, with the exception of one study which reported better social support received by women (Misra and Lager, 2009). Gender roles of women could be an important contributor to these findings as explained by studies in various societies or among different ethnicities, where men receive better general and specific social support; for example, dietary support was more likely to be received by men because women were mostly responsible for meals preparation (Shrestha, Kosalram and Gopichandran, 2013). Coping has been shown to be related to social support (Thoits, 1995), which may explain the similar less favourable findings of coping with T2DM among women across the included studies..

Studies measuring depression as an outcome consistently showed that it is more common in women than men. Studies mostly used self-reported questionnaires assessing symptoms of depression. One study depended mainly on reporting a diagnosis of depression by patients' physician (Raum *et al.*, 2012). One study considered reporting the presence anti-depressant medication as their measure for the presence of depression (McCollum *et al.*, 2005). The implications of using different methods for assessment of depression is discussed from a theoretical perspective in the next chapter (section 4.4).

Thirdly, blood glucose monitoring, diet, physical activity, foot care and medication adherence were the self-care behaviours of interest. Generally, women engaged in less physical activity than men in all included studies that measured this self-care

behaviour. On the other hand, women generally had better blood sugar monitoring than men. Diet self-care findings were inconsistent: (Chiu and Wray, 2011) and (Gavin, Fox and Grandy, 2011) found women to have better dietary self-care, while (Misra and Lager, 2009) and (Shrestha, Kosalram and Gopichandran, 2013) found that women reported poorer dietary self-care. Difference in findings may be explained by the characteristics of population included, or family obligations and spousal support in different settings.

Fourthly, the most common finding across the reviewed articles was the evidence of correlation of better psychosocial outcomes with better levels of adherence to self-care measures (Connell, Fisher and Houston, 1992; Ponzo, Gucciardi and Weiland, 2006; Gucciardi, Wang and DeMelo, 2008; Kacerovsky-Bielesz *et al.*, 2009). Similarly, self-efficacy predicted more frequent blood glucose monitoring and adherence to medication and dietary regimen. Research also suggested that these associations differ according to gender; for example, men with depression had worse adherence, whereas women were relatively adherent regardless of depressive symptoms (Nau, Aikens and Pacholski, 2007). Moreover, receiving specific social support was positively related to blood glucose in women but not in men (Connell, Fisher and Houston, 1992). Thus, it is important when connecting gender differences to health outcomes to consider the need for somewhat different diabetes care for men and women.

Finally, the qualitative evidence in this review mainly focused on exploring the barriers, challenges and different experiences of men and women, it was found that women tend to express more barriers and psychosocial adjustment problems,

increased struggles with diet and nutrition and feeling less supported by their social network than men. Whereas men concentrated more on the physical limitations they experienced and their need of professional support and more information (Iwasaki, Bartlett and O'Neil, 2005; Wenzel *et al.*, 2005; Mathew *et al.*, 2012).

3.10 Strengths and limitations of this review:

Multiple electronic databases and other search strategies were applied in order to decrease the chance of missing relevant articles. The included studies have been conducted in various settings and countries, with a range of findings across various social contexts and demographic groups. Taken together, this gives a broader picture of the general situation of how gender is related to psychosocial and self-care factors worldwide.

The most prominent limitation of this review is that it was conducted by only one reviewer. Bias is more commonly introduced in such circumstance than it is in a team conducted literature review. The number of included studies is relatively high, which made the process of data extraction and synthesising longer and the chance of missing or misinterpreting information higher.

Another limit was including only English language studies, which could increase the possibility of publication bias. Further literature reviews can expand the search strategy and use more resources.

3.11 Conclusion and further research

The findings from this literature review have demonstrated that psychosocial factors among diabetic patients such as social support, self-efficacy, coping strategies and depressive symptoms vary with gender. Furthermore, men and women's self-care practices may differ.

All in all, understanding the dynamics of gender, psychosocial and self-care variables is desirable in order to tailor health interventions and services to T2DM patients. Despite a rapidly-expanding literature in this area, the existing evidence is limited. While it documents a range of differences in psychosocial and self-care behaviours between men and women with T2DM, there is a very limited discussion of the differences in correlation between psychosocial and self-care behaviours among T2DM women and men. Moreover, it does not present a substantial theoretical or empirical understanding about how gender interacts with these factors and the effect of this interaction on self-care outcomes. Thus, this literature review forms a rationale for further investigation of the correlation between psychosocial and self-care from a gender focused perspective.

In addition, this literature review has identified a range of associations between gender and related variables among T2DM patients in several settings. There is a gap in literature concerning this topic in Middle East in general and in Jordan specifically. This study has aimed to cover this gap and add to the field of knowledge about self-care among T2DM patients in Jordan.

With regard to the secondary aim, the literature review had identified the relevant concepts commonly discussed in the literature on this topic. It had also identified the most prevalent psychosocial variables studied among the reviewed studies which were social support, depressive symptoms, self-efficacy and coping with diabetes. These concepts need to be further explored and conceptualised in order to create a methodological framework for the study.

The subsequent chapter lays out the theoretical foundation for this study to enable explanation and interpretation of the psychosocial variables including self-efficacy, diabetes distress, social support and self-care, their relationship with each other and their interaction with gender.

4. Chapter 4: Theoretical framework of the study

4.1 Introduction

The previous chapter presented a systematic review of the literature, it sought to answer the questions related to exploring the existence of differences between men and women undertaking self-care and related psychosocial factors. In doing so, the previous chapter has provided an analysis of factors concerned with self-care. In this respect, the findings generated from the previous literature review have guided the focus of this research by identifying the importance of gender as a determinant for T2DM self-care and psychosocial variables. It has also identified the most prominent psychosocial factors related to self-care of T2DM patients.

This chapter focuses on how self-care, psychosocial variables (including self-efficacy, diabetes distress, and social support) and gender are conceptualised in the literature and how these concepts are used in the context of this study. This chapter also considers how the conceptualisation of these terms has implications for the data gathering tools with the aim of developing the theoretical approach for this study. The chapter summarises the evidence from literature regarding how specific psychosocial factors are related to diabetes self-care.

The following section (4.2) covers self-care; providing a definition, summarising its prevalence in healthcare research and explaining factors that affect self-care. Sections 4.3-4.5 present self-efficacy, diabetes distress and social support as the

psychosocial factors that this study will focus on. Section 4.6 provides the conceptual framework for gender. The chapter concludes with a summary of what has been discovered (section 4.7) and describes a conceptual model for studying the psychosocial factors that affect self-care behaviours of T2DM in Jordanian patients in relation to their gender (section 4.8).

4.2 Self-care

4.2.1   Definition

The World Health Organisation defined self-care in 1983 as

'The activities individuals, families and communities undertake with the intention of enhancing health, preventing disease, limiting illness, and restoring health. These activities are derived from knowledge and skills from the pool of both professional and lay experience. They are undertaken by lay people on their own behalf, either separately or in participative collaboration with professionals' (WHO, 1983; Webber, Guo and Mann, 2013).

Recently, the World Health Organisation definition of self-care was expressed as:

'Self-care is what people do for themselves to establish and maintain health, prevent and deal with illness. It is a broad concept encompassing: hygiene (general and personal); nutrition (type and quality of food eaten); lifestyle (sporting activities, leisure etc.); environmental factors (living conditions, social habits, etc.); socioeconomic factors (income level, cultural beliefs, etc.); and self-medication' (WHO, 2014a).

Although the definition has only slightly changed, the more recent version of the definition has widened the scope of self-care to include more aspects of people's lives such as socio-economic and cultural factors. While the older definition had included many levels that self-care can operate within including individuals, families and extending to communities, the new definition does not specify and uses the term 'people'. The older definition refers to the importance of acquiring the skills from professional or personal sources.

Levin & Idler (1983) reported that 'Self-care in health refers to those activities individuals undertake in promoting their own health, preventing their own disease, limiting their own illness, and restoring their own health. These activities are undertaken without professional assistance, although individuals are informed by technical knowledge and skills derived from the pool of both professional and lay experience' (Levin and Idler, 1983) p.181. This definition concentrates more on individual capabilities of carrying out self-care actions without the necessity of professional assistance though acknowledging that professionals can provide skills for self-care can, which can be interpreted as a sort of assistance.

Orem et al. (2001) defines self-care as an 'action of mature and maturing persons who have the powers and who have developed or developing capabilities to use appropriate, reliable, and valid measures to regulate their own functioning and development in stable or changing environments. It is the deliberate use of valid means to control or regulate internal and external factors that affect the smooth activity of a person's own functional and developmental processes or contribute to a person's personal wellbeing' (Orem, Taylor and Renpenning, 2001) p.33.

Orem's definition of self-care has developed with revisions and expansions over the period between 1971 and 2001. The definition summarises the prerequisites an individual should have to practice self-care such as maturity which highlights that self-care is practiced by an adult with the capability to handle the responsibility of their own care. Orem describes self-care as being deliberate meaning a patient chooses to engage in the self-care activities knowing and aiming for a desired outcome. In other words, self-care is a 'goal-oriented' action (Orem, Taylor and Renpenning, 2001). The definition also describes self-care as a continuous and constantly evolving process; day-to-day experiences develop the self-care process to become habitual practices by the patient.

The above definitions (although they differ in structure) all include the same basic assumptions, showing that there is broad agreement as to the definition of self-care within the field of health research as an action that aims to promote health of individuals.

4.2.2 Theory of self-care in health research

This study is predominately concerned with Orem's theory of self-care (Hartweg, 1991), which is explored in detail below.

Orem's model for self-care is one of the most commonly used self-care conceptualisations within health research (Hartweg, 1991; Abrahim, Mauleon and Hjelm, 2011). The model includes assumptions that are of particular relevance to this study. Firstly, self-care is an individual activity that is learned through an individual's interpersonal relations and communications. Secondly, Orem specifies

that self-care must be a 'deliberate action': meaning that an individual must act intentionally to undertake a self-care practice (Orem, Taylor and Renpenning, 2001). Hartweg (1991) argues that this assumption can lead to an understanding that when an individual selects and performs a certain self-care practice, it is undertaken with awareness that the act of self-care is being performed in the interests of their own health. By definition this act of self-care is performed by the individual themselves, though it is anticipated by this model that an adult may need assistance to accomplish self-care and this is introduced within the concept of "dependent self-care" (Orem, Taylor and Renpenning, 2001).

Orem summarises three sets of propositions that the self-care model contains, the first set includes seven conditioning factors, the second set contains four self-care statements in health and disease, and finally, the third set states the behavioural and resource demands of self-care (Orem, Taylor and Renpenning, 2001) p.46. These propositions constitute the frame of reference for self-care behaviours as voluntarily incorporated in the daily life of a patient.

As self-care is the action, an individual who adopts this action is referred to as the agent; Orem adds the concept of a 'self-care agency' as a complement to the self-care theory. Self-care agency describes the complexity of the personal capabilities of each individual patient to perform actions to regulate and to meet the continuing requirement for self-care. Orem points that the capability to perform one kind of action is not indicative of acquiring the ability to perform other, different kinds of actions. Due to the differing experiences, personal circumstances and capabilities of each patient, the self-care agency varies (Orem, Taylor and Renpenning, 2001).

Orem explains that there are factors that affect individual's abilities to engage in self-care, these factors can be of an internal and external nature and can affect self-care quantitatively and qualitatively. These factors are named "Basic conditioning factors (BCFs)" and constitute an important part of the self-care model.

Relevant to this study, gender roles are on the list of the BCFs, where gender can affect the performance of self-care and the level of self-care agency an individual has. Other BCFs included in Orem's theory that this study focuses on are; family factors and sociocultural orientations and experiences. Orem considers the assessment of BCFs is necessary and serves as a critical component of the relevant information for determining the presence or absence of self-care deficit. Self-care deficit is the relationship between the abilities of individuals engaged in self-care and self-care demands of these individuals (Orem, Taylor and Renpenning, 2001).

To summarise, Orem's definition of self-care as primarily focused on the individual is of importance because in order to produce the most positive change on a wider scale, it is necessary to understand self-care at an individual level first, which is consistent with the aim of this study. Specifically, an aim of this study is to assess the adherence of T2DM individuals to self-care practices that are included in the healthcare recommendations of T2DM. The assumptions of Orem's model are also consistent with this study as it assumes that the individual carries out these actions intentionally. This is consistent with the requirement of care for T2DM, as self-care is an essential component of the treatment plan for T2DM patients who are required to learn these activities and adhere to them throughout a long period of their lives.

Another implication of the assumption of individual responsibility for learning and carrying out these self-care activities is that patients are more likely to be capable of self-reporting these self-care behaviours as the individual is primarily engaged with these actions. The assumption of personal awareness of self-care behaviour and of the health implication of this behaviour is useful to this study as self-reporting of self-care behaviour would be more difficult were the participant unaware that they were performing such actions.

This study considers self-care of individuals with T2DM and investigates the influence of gender on this care in order to form an idea of how men and women differ in their level of adherence to the required self-care activities. This is related to the Orem model's concept of the basic conditioning factors.

Adherence to self-care can be quantified using a scoring system to assess levels of adherence of individuals to certain self-care behaviours. This is related to the point that self-care agency can be different for different actions of self-care. Thus, this study utilizes measurement tools that comply with Orem's conceptualization of self-care that contained several aspects of T2DM management. This is presented in more detail in the methods chapter

4.2.3 Factors that are related to self-care

Effective self-care for T2DM is essential for achieving desirable diabetes related health outcomes. Thus, it is important to explore and understand factors affecting self-care behaviours of diabetic patients. This should inform and strengthen interventions designed to improve adherence to self-care behaviours in diabetic patients (Didarloo *et al.*, 2012).

The literature cites many factors that influence the effectiveness of self-care; a literature review on the factors that are related to self-care behaviours in T2DM Chinese immigrants living in the US by Zeng et al. 2014 analysed twenty-two journal articles and revealed that variables that are most relevant to T2DM self-care can be grouped under five main headings: sociodemographic characteristics, behavioural and psychological factors, social support factors, language factors and finally cultural factors.

Another literature review that included studies from 1995 to 2002 found that self-efficacy and emotional distress levels were key factors in influencing the adherence to self-care behaviours of T1DM patients (Siguroardóttir, 2005). The author suggested that teaching self-care behaviours should be combined with interventions aiming at enhancing self-efficacy and reducing patients' emotional distress (Siguroardóttir, 2005).

Walker et al. (2015) developed and tested a model of social determinants affecting T2DM self-care behaviours of 615 T2DM patients in the US. Using Structured Equation Modelling (SEM), it was concluded that the social determinants could be reduced into three latent constructs: psychological distress, social support and self-efficacy. Each of these factors can separately and directly influence self-care (Walker *et al.*, 2015). Another study by Gao et al. 2013 used SEM in modelling the effects of self-efficacy, social support and patient provider communication on self-care and glycaemic control in a Chinese population have found that better communication, higher social support, and higher self-efficacy are strongly

associated with better performance of diabetes self-care behaviours (Gao *et al.*, 2013).

Literature demonstrate that diabetes self-care training has developed over time from concentrating mainly on providing knowledge about the disease and how to implement self-care to involving more collaborative models that concentrate on empowering patients and that deal with their daily challenges of self-care (Norris, Engelgau and Narayan, 2001). This shift in the self-care of T2DM has come from the understanding that factors other than knowledge were essential to achieve the desired self-care outcomes and that psychosocial factors must be accounted for when examining the relationship between knowledge and glycaemic control (Goodall and Halford, 1991; Norris, Engelgau and Narayan, 2001; Wardian and Sun, 2014; Tahmasebi, Noroozi and Tavafian, 2015).

Based on the above evidence, it is shown that psychosocial factors in particular have been shown to play a major role in achieving a sustained performance of self-care behaviours. It has been demonstrated that empowering patients is important in the self-care compliance process because the patient takes responsibility for their choices and is aware of the respective consequences. This empowerment cannot be done without understanding the psychosocial characteristics of patients.

The term 'Psychosocial factors' is usually used as a summary label to include socio-environmental and personal conditions that might have the potential to influence the health of individuals over the course of their life. Thus, psychosocial factors research

might focus more on the individual rather than societal level (Gabe and Monaghan, 2013).

Researching into psychosocial factors involve study of both social and psychological factors in illness. Both sociological and psychological areas contribute to the investigation of health risk behaviours and their causes. Such causes involve socio-environmental (social class, marital status, social support) and psychological (risk taking behaviours, stress, distress, and cognitive emotional factors such as self-efficacy domain) (Martikainen, Bartley and Lahelma, 2002).These factors are often interrelated and there is increasing investigation into the interaction between the two (Martikainen, Bartley and Lahelma, 2002).

This study focuses on the effect of three key psychosocial factors on self-care behaviours, these are: self-efficacy, social support and psychological distress. Each of these factors is presented in detail in the following section.

4.3 Self-efficacy

4.3.1 Definition and theory of self-efficacy

Having identified that self-efficacy constitutes a main focus for this study, a conceptual understanding of the term and the empirical evidence of its relationship with T2DM self-care is outlined in detail. This section also outlines the manner in which self-efficacy may be measured and the implications of this on the choice of methods used in this study.

The concept of self-efficacy was introduced by Bandura (1977) in the framework of social-cognitive theory. Bandura defined self-efficacy as people's beliefs or

judgment of their personal capabilities to execute designated levels of performance (Bandura, 1977, 1986, 1989).

Bandura elaborates that self-efficacy is a construct that is specific to the behaviour; an individual's belief of competence differs according to the task. This characteristic of self-efficacy distinguishes it from the concepts of self-esteem; the latter tends to be more general in nature and is more concerned with judgment of self-worth (Bandura, 1997).

Self-efficacy is not concerned with the skills one has but with their personal judgments of what they can do regardless of the skills they possess (Bandura, 1986). In addition, Bandura asserts that perceived self-efficacy is not just a passive estimate of future actions, but is rather considered an active contributor to personal behaviour change (Bandura, 1986).

Moreover, judgments of individual's 'efficacy expectations' should be differentiated from 'outcome expectations'. Bandura explains that efficacy expectations are beliefs of one's own abilities in successfully executing the behaviour, while outcome expectations are the personal estimates of the outcome achieved from performing a certain behaviour (Bandura, 1977). In relation to this, Bandura expects that self-efficacy expectancy is a stronger predictor of attaining certain behaviour than outcome expectancy.

Bandura 1977 states four principal sources that personal efficacy can be derived from: performance accomplishments, vicarious experience, verbal persuasion, and psychological states (Bandura, 1977). Performance accomplishments are based on mastery experiences, for example; previous personal experiences of success can raise mastery and develop self-efficacy. Once a person's self-efficacy levels are

established, the person tends to generalise their belief in their own abilities to be comfortable undertaking similar activities with similar level of mastery required (Bandura, 1977).

Vicarious experiences source of self-efficacy depends mainly on observation of others performing activities successfully and with positive outcomes. However, Bandura considers this source as weaker than one's own accomplishments and vulnerable to change easily (Bandura, 1977) .

Verbal persuasion source relies essentially on external suggestions to the person that they can accomplish a task. It aims to provide encouragement and boost confidence of the individual's capabilities to perform. Self-efficacy derived from verbal persuasion is also weaker than self-efficacy that is derived from a subject's own experiences. Verbal persuasion occurs in the social network that an individual lives within (Bandura, 1977). The stronger the influence of the social support, the higher the probability of the initiation of a new behaviour. This can be applied in the context of self-care of T2DM where social support can influence self-care indirectly through enhancing self-efficacy.

Finally, the psychological states such as fear or anxiety constitute an important source of building up an individual's self-efficacy. Psychological distress for example can threaten personal beliefs of capability of action performance and can extend to hinder coping with stressful situations leading to avoidance behaviour (Bandura, 1977). Thus it is important to acknowledge psychological states when attempting to strengthen beliefs of the individual's self-efficacy (Bandura, 1989).

Bandura suggests that self-efficacy can influence individual performance of certain behaviour in many ways. Firstly, self-efficacy influences a person's choices of

activities, usually individuals choose to carry out activities they believe match their capabilities; whilst they tend to avoid activities that they believe exceed their capabilities. Additionally, self-efficacy has an effect on the level of effort spent on a certain activity as well as the persistence of practicing this activity. Higher self-efficacy makes the individual more persistent in completing a specific activity and helps them overcome the barriers that may face when carrying out this particular behaviour (Bandura 1997). Moreover, self-efficacy judgments affect personal psychological status. People with high self-efficacy tend to have a greater control over their negative psychological state and are expected to better manage stressful situations than people with low self-efficacy (Bandura, 1997).

Based on the above discussion, social cognitive theory with the central concept being self-efficacy provides the theoretical basis for this study. It is expected that measuring a patient's perceived ability to perform specific self-care tasks can predict that patient's level of adherence to those tasks. Bandura recommends that self-efficacy should be measured in relation to domains of self-care activities (e.g. diet or exercise etc.), as it is task-specific and can vary with different patients (Bandura, 1997). This is consistent with the measurement tool of this study as will be discussed in the methods chapter.

4.3.2   Self-efficacy in relation to self-care of T2DM

Up until this point, it has been identified that enhancing self-efficacy is fundamental to activate self-care practices in patients. Lacking self-efficacy explains why some patients do not adopt self-care practices despite having the knowledge of its positive outcomes (Norris, Engelgau and Narayan, 2001). Bandura's theory has been widely

applied to chronic disease care, including diabetes self-care (Lorig *et al.*, 1999; Polly and Sawin, 2009).

The hypothesised theoretical effect of self-efficacy on self-care behaviours among diabetic patients has been supported by empirical studies in literature. In a study that evaluated the association between psychosocial, sociodemographic, and environmental variables with diabetes self-management for 463 T2DM patients; self-efficacy was found to be directly correlated with diet and exercise domains of self-care (King *et al.*, 2010). The researchers concluded that interventions targeting improvement of T2DM self-care should focus on enhancing self-efficacy (King *et al.*, 2010). A similar study, (Aljasem *et al.*, 2001) found self-efficacy to be a strong predictor for initiation and maintenance of blood sugar monitoring, dietary adherence and adherence to medication among 309 T2DM patients in Kuwait. The study also showed that self-efficacy explained 10% of the variance in self-care behaviours with patients' characteristics and diabetes-specific barriers being controlled (Aljasem *et al.*, 2001). A study by Williams & Bond 2002 supported self-efficacy relationship to self-care behaviours. It showed that self-efficacy expectancy accounted for 26% of the variance of the dietary adherence, exercise and blood sugar monitoring self-care behaviours and that outcome expectancy was correlated with exercise and dietary behaviours of 94 diabetic patients. In a study by Bohanny et al 2013, self-efficacy explained 15% of the variance in self-care behaviours including dietary behaviours, exercise, blood sugar monitoring and foot care of 150 T2DM patients in the Marshall Islands.

The empirical evidence shows that self-efficacy is task-specific, as Bandura has explained. Many studies found that self-efficacy is related to certain self-care domains but not to others. For example, a study has found that self-efficacy was related to diet, exercise, sugar monitoring, foot care but not medication adherence (Sarkar, Fisher and Schillinger, 2006). On the other hand, a study in Saudi Arabia found that self-efficacy subscales predicted their corresponding self-care behaviours (AL-Aboudi, 2016). The highest self-efficacy scores were related to adherence to medication, followed by foot care with blood sugar monitoring, exercise and the adherence to diet self-care behaviours having the lowest self-efficacy scores. The researcher explained this finding could be related to the level of difficulty of these tasks; medication adherence for example, is considered an easier task than adhering to diet or exercise requirements which involves more effort and practice from the patient (AL-Aboudi, 2016). This supports Bandura's theory that people's choice of activities is dependent on their judgment of their capabilities of performing that activity (Bandura, 1997).

The effect of self-efficacy on self-care was shown to be similar regardless of race or ethnicities. Sarkar et al. 2006 explored the association between self-efficacy and self-care behaviours of 408 T2DM from diverse ethnicities including Asian, Islander, African American, Latinos and White living in the US. The study found that the associations between self-efficacy and self-care behaviours were consistent across these different races and ethnicities (Sarkar, Fisher and Schillinger, 2006). Similar findings were reported in Bean et al's study which included Europeans, South Asians, and Pacific Islanders T2DM patients (Bean, Cundy and Petrie, 2007).

Bandura's self-efficacy theory identified four sources for self-efficacy as discussed in section 4.3.1 above. Albikawi et al. (2016) applied Bandura's four sources for self-efficacy when they conducted a quasi-experimental study in Jordan to evaluate the effectiveness of self-efficacy enhancing intervention on self-care behaviours of patients with T2DM. Participants in the intervention group received a standard diabetes education program in addition to a Diabetes Self-Efficacy Enhancing Intervention Package (DSEEIP). The package components were developed based on the four sources of self-efficacy identified in Bandura's theory which included; a diabetes self-care management booklet, a DVD, a self-efficacy enhancing rehearsal counselling session, and a follow-up conversation by telephone to enhance performance accomplishment using verbal persuasion. The control group received standard diabetes education only. The researchers found that the self-care behaviours (as measured by the Summary of Diabetes Self-Care management Activities scale) had improved significantly two weeks, and three months in the group which received the intervention package (Albikawi, Petro-Nustas and Abuadas, 2016). This study proves that utilising these four sources improved self-efficacy which in turn improved patient's self-care.

In summary, the empirical evidence substantially supports a positive relationship of self-efficacy to self-care behaviours in line with Bandura's social cognitive theory.

4.4 Diabetes distress

4.4.1 Definition and theoretical concept of diabetes distress

Evidence from literature suggests that psychological comorbidity is highly prevalent in patients with T2DM and that most diabetic patients acknowledge their need for psychological care (Anderson and Freedland, 2001; Ali *et al.*, 2006; Snoek *et al.*, 2011; Lloyd *et al.*, 2012; Svenningsson *et al.*, 2012; Winchester *et al.*, 2016). A wide spectrum of the psychological comorbidities that diabetic patients may suffer from is reported in literature; diabetic patients may exhibit varying degrees of a range of depressive disorders or diabetes-related distress (Fisher *et al.*, 2008). There has been a long standing confusion in terms of definition, measurement and treatment of these psychological conditions. For example, depressive symptoms, depressive disorder, general distress and diabetes distress were all often collected under the term "depression" and this has led to a lack of clarity regarding which depressive disorder is most prevalent (Fisher *et al.*, 2010). A distinction among these terms was deemed to be important in order to resolve this confusion.

Depression and depressive symptoms are defined utilising a more clinical psychiatric terminology, with less emphasis on the social perspective. The assessment of depression relies more commonly on the presence or absence of distinctive symptom clusters pre-defined by clinicians (WHO, 2014b). On the other hand, distress refers to a broader emotional experience reported by diabetic patients (Fisher *et al.*, 2010). Distress is concerned more with worries, and struggling that can be related to the burden of a chronic disease (Fisher *et al.*, 2010).

Diabetes distress is defined as patient's concerns about disease management, support, emotional burden, and access to care (Fisher *et al.*, 2009; Egede and Dismuke, 2012; Islam *et al.*, 2013; Winchester *et al.*, 2016).

Diabetes distress is distinct from depression; Coyne 1994 argues that diabetes distress concept is derived from a different conceptual basis than depressive disorders. He explains that the distress concept has emerged from research on coping and regulation of emotions related to stress. Thus, distress can be perceived to have a stronger correlation with both psychological and social factors (Coyne, 1994). On the other hand, research on depression has emerged from mental illness and clinical psychiatry fields (American Psychiatric Association, 2013).

Fisher et al. points out that distress is situation-specific, meaning that distress levels are dependent on a patient's perception of a chronic health stressor and the patient's judgment of available coping resources. Thus, distress is linked to specific stressor, whilst depression focuses on the diagnosis of symptoms irrespective of the cause (Fisher *et al.*, 2009); therefore being distressed does not mean being depressed. This distinction implies that diabetes distress cannot be measured as a proxy for clinical depression (Coyne, 1994; Nouwen, 2015).

Stressors that cause diabetes distress are mainly related to the disease (such as worrying about symptoms or complications) and its management (such as feeling burnout from self-care requirements) (Polonsky *et al.*, 1995). Other stressors can be unrelated to diabetes and instead can be caused by the general life of patients such

as work or family. They can also be related to personality characteristics or previous experiences (Fisher *et al.*, 2009).

Empirical research has supported this distinction; one study explored the relationship of depressive disorders and diabetes distress with management outcomes of 506 T2DM patients at baseline, nine and eighteen months. The study concluded that diabetes distress, but not clinical depression or depressive symptoms, is associated with poorer glycaemic control and self-management of diabetes in both short and long term periods (Fisher *et al.*, 2010). Moreover, (Zagarins *et al.*, 2012) examined the relative effects of change in depressive symptoms and change in diabetes distress on change in glycaemic control. The researchers conducted a diabetes self-management education intervention in 234 T2DM patients. Glycaemic control (HbA1c), depressive symptoms, and diabetes distress were measured twice at 6 months intervals. Results showed that reduction in diabetes distress, and not reduction in depressive symptoms, was associated with an improvement in HbA1c ($P < 0.01$) and ($P = 0.23$) respectively. Ascher-Svanum et al. (2015) analysed data from a 24-month study that assessed glycaemic control measured by HbA1c levels in relation to depression, depressed mood, and diabetes-related distress in 985 patients with T2DM who used insulin therapy in five European countries. The study reported higher HbA1c among patients with depression or distress at baseline than patients without. Initiation of insulin therapy led to a decline in the prevalence of depression among these patients whereas the prevalence of diabetes-related distress remained unchanged (Ascher-Svanum *et al.*, 2015). These findings support the distinction between diabetes related distress as an

emotionally perceived concept and depression as a clinical condition that can improve with improvement of treatment. These findings highlight that alternative approaches to treatment might be needed when addressing depression and diabetes distress and as such diabetes distress requires a more specific approach.

Distinction between diabetes distress and depression has important implications on the way both are measured or assessed as most patients with T2DM who display depressive symptoms are not clinically depressed, rather are distressed (Fisher et al. 2007). As well as implications on the management strategies for both, from literature diabetes distress shows a stronger relationship with self-care and glycaemic control of the patients which suggests that treatment specific to diabetes distress is needed and may be prioritised more than treating depression in patients with diabetes.

4.4.2   Effect of diabetes distress on self-care

Distress is a common experience in individuals with diabetes (Polonsky *et al.*, 1995; Fisher *et al.*, 2007; Gonzalez, Fisher and Polonsky, 2011; Pandit *et al.*, 2014). Diabetes distress reflects patients' emotional response to the disease and the process of self-care (Reddy, Wilhelm and Campbell, 2013; Beverly, 2014). A patient is required to consistently take care of themselves and adhere to the treatment plan, which must be applied to most daily activities of patient's' life such as eating and physical activity plans in addition to controlling their blood glucose.

The chronic nature of the disease as well as the need for continuous care often exerts substantial levels of stress on the diabetic patient and can translate into forms of

distress. Polonsky et al. 1995 developed the Problem Areas In Diabetes (PAID) scale to measure diabetes related distress. The researchers applied the scale on 451 female patients with type 1 and type 2 diabetes, The results showed that diabetes distress scores were associated with glycaemic control represented by HbA1c levels and adherence to self-care behaviours. Adherence to dietary, blood sugar monitoring and insulin intake requirement were found to be the main aspects of self-care to be related to diabetes distress after adjustment for age, diabetes duration, and general emotional distress. Furthermore, the study showed that the frequent issues associated with high levels of distress were mainly worrying about the future, the possibility of developing complications, being scared of living with diabetes and being burned out and overwhelmed by the burden of diabetes self-care (Polonsky *et al.*, 1995; Welch, Jacobson and Polonsky, 1997).

Pibernik-Okanovic et al. (2008) screened 470 patients with T2DM for depressive symptoms and diabetes distress using self-reported measures (Centre for Epidemiologic Studies- Depression scale and Problem Areas in Diabetes scale for diabetes distress). The researchers invited the patients whose scores in the depression scale were indicative of clinical depression (n= 103) for a clinical assessment interview to establish a clinical diagnosis of depression using the Manual for Mental Disorders (DSM-IV) (American Psychiatric Association, 2013) criteria. The clinical assessment revealed that 29% (n =30) of those suggested to be depressed by self-assessment were clinically depressed. Among the 30 patients, 20 patients were found to have diabetes distress as well (Pibernik-Okanovic *et al.*, 2008). These results support that self-assessment of depression might not truly reflect clinical depression

and that diabetes distress can be captured within depression measures. The researchers further examined self-care and glycaemic control outcomes differences in a clinically depressed, clinically depressed combined with diabetes distressed and symptoms-free groups, findings showed that the interaction of depression and distress predicted glycaemic control better than did clinical depression alone (Pibernik-Okanovic *et al.*, 2008). Findings of (Pandit et al. 2014) study support the relative importance of diabetes distress in relation to self-care behaviours and diabetes clinical outcomes in comparison to depression. The study has analysed data from a clinical trial that evaluated a diabetes self-management intervention effect on 666 diabetic patients where depression, diabetes distress and anxiety were assessed. The findings showed that despite the correlation between the three constructs, they were independently related to the outcomes. Moreover, depression and anxiety were less predictive of clinical outcomes than diabetes distress. Pandit and her colleagues concluded that diabetes distress can be more meaningful than depression or anxiety when monitoring or intervention programs are designed to support diabetic patients' health outcomes (Pandit *et al.*, 2014).

On the other hand, a study by Gonzalez et al. (2008) examined the independent relationships of the depressive symptoms and diabetes specific distress with diabetes self-care. The researcher used the Harvard Department of Psychiatry/ National Depression Screening Day Scale (HANDS), the Problem Areas in Diabetes scale (PAID) for diabetes distress, and the Summary of Diabetes Self-Care Activities for self-care outcomes on 848 patients with type 2 diabetes. The results showed that diabetes distress scores negatively predicted levels of diet, exercise and medication

adherence. However, these relationships changed to when depression scores were entered in the analysis to become insignificant where depression scores predicted self-care indices significantly. The authors suggested that specific symptoms of depression have a greater negative relationship with diabetes self-care than diabetes-specific distress (Gonzalez et al. 2008).

An association between diabetes distress and general distress is reported in literature (Polonsky *et al.*, 1995, 2005; Snoek *et al.*, 2000; Rubin and Peyrot, 2001; Fisher *et al.*, 2007). These studies suggest that treating diabetes distress could contribute to decreasing general distress created by other aspects of patient's life which in turn can have a broader effect on improving patient's self-care.

In summary, most studies that found a relationship between depression and self-care were dependant on self-reporting by patients. Measures of depression might have involved distress as these measures might have not have been correctly applied by the patient to assess depression independent of distress. This might have caused the inconsistency in literature in reporting findings of the relationship between depression, distress and self-care. In this study depression is not measured as it requires clinical assessment. This study only uses self-assessment measures and as such, only diabetes distress is examined as the literature suggests that self-assessment of depression can be unreliable (Fisher *et al.*, 2007, 2010). The method of data collection is discussed in further detail in the methods chapter.

4.5 Social support

4.5.1 Definition and theoretical background

Social support plays a critical role in health care for people with chronic health conditions (Connell, Fisher and Houston, 1992). Despite social support being widely recognised as a relevant variable in research on health, the literature has not agreed on a concise definition of social support (Vangelisti, 2009; Stopford, Winkley and Ismail, 2013; Gallo *et al.*, 2014). Numerous definitions have been proposed by researchers, for instance, Cobb (1976) defined social support as "information leading the subject to believe that he is cared for and loved, esteemed and a member of network of mutual obligation" (Cobb, 1976) p.300. Cobb's definition highlights three classes of social support; first, the provided care and love represent an emotional component of support, the second is the esteem support that asserts individual self-worth and the third type represents the individuals' awareness of the presence of the other in a society and the obligation of sharing information of support with them (Cobb, 1976).

Lin (1986) defined social support by dissecting the term itself into its basic components; social and support. Lin argued that the social component represents three levels within each an individual is connected to their social environment. These are; the community, the social network and the intimate and confiding relationships, whilst the support component reflects the essential instrumental and expressive activities supplied by the above three levels. Unlike Cobb's definition, Lin has considered the instrumental or the material components of support and subsumed emotional and esteem provisions under expressive support. Lin also insisted that the

perceptions of social support activities should be differentiated from the actual access to such activities (Lin, Dean and Ensel, 1986).

Van Dam et al. (2005) addressed the issue of the inconsistent conceptualisation of social support and provided the most used three definitions of social support in their review. First, social support is the exchange of resources between at least two individuals that aims to increase the well-being of the receiver. Second, social support is an individual's perception of being valued and being part of a network of mutual communication. Third, social support is the degree to which an individual's social needs are met through individual or community interactions. The review also distinguished social support from social networks, which are regarded by the number and size of social web that surrounds the individual and include all other individuals in a person's environment who provide support (Van Dam *et al.*, 2005). Chew et al. (2011) similarly emphasised that social support is about the behavioural aspect of social network and is qualitative in nature (Chew, Ming and Chia, 2011).

Regardless of the various ways social support is defined in literature, it can be argued that they are similar in their view of social support as an environmental factor linked to people's health and wellbeing (Ozbay *et al.*, 2007; Reblin and Uchino, 2009).

Researchers from a variety of disciplines have studied the ways in which social relationships support individuals' physical and psychological health (Fortmann *et al.*, 2010). Theoretically, two different models have been the basis of the research of social support relationship with health outcomes. First, the indirect or referred to in

other sources as the buffering model which hypothesises that social support acts as a protective "buffer" for alleviation of stressful situations. This model assumes that persons with high social support are less affected by stressful events and this leads to better health outcomes. It also assumes that without the stress factor, the buffering system will not work (Van Dam *et al.*, 2005). Second is the direct effect model, which states that receiving high social support leads directly to better health outcomes such as coping with health problems, or higher adherence to self-care regimen regardless of the stress factors (Van Dam *et al.*, 2005; Strom and Egede, 2012; Stopford, Winkley and Ismail, 2013).

Literature has also conceptually categorised social support as being either functional or structural (Broadhead *et al.*, 1989; Murrell, Norris and Chipley, 1992). Functional social support describes the perception of the provision of emotional, informational or instrumental quality for the individual when they need it (Sherbourne and Stewart, 1991; Gamarra, Paz and Griep, 2009; Vaccaro *et al.*, 2014). Structural support on the other hand refers to the types, frequency and number of social relationships and the degree of connection among these relationships (Gallo *et al.*, 2014; Vaccaro *et al.*, 2014). Both compared, it is reported that functional support is more predictive of regimen adherence across multiple chronic illnesses unlike structural support (Sherbourne and Stewart, 1991; Sherbourne *et al.*, 1992). In addition, social support research have emphasised on the distinction between the perceived and the received social support, Uchino et al. (2012) explains that perceived support refers to the individual's awareness of the availability of support from the resources when needed, whereas received support refers to the giving process of the support from

these resources (Uchino *et al.*, 2012). It is reported that perceived support has been more reliably associated with health benefits than has received support (Gallo *et al.*, 2014).

Different forms of the exchanged social support were identified by researchers, these were categorised into emotional, tangible or instrumental, informational, and companionship network (Cutrona and Suhr, 1992; Ford, Tilley and McDonald, 1998). First, emotional support, which includes the expression of sympathy, reassuring, approval or appreciation provided by resources of support. Second, tangible support, which includes provision of practical assistance, including financial, material or instrumental aid or services. Third, informational support, which is achieved through provision of advice or guidance, and problem solving suggestions. Last, companionship or network support includes the sense of social belonging and engagement or sharing social activities (Ford, Tilley and McDonald, 1998; Chew, Ming and Chia, 2011; Strom and Egede, 2012). Moreover, social support can be positive or negative and can be provided from different sources, including family members, friends, and peers known as informal support and healthcare professionals and organizations referred to as formal support (Van Dam *et al.*, 2005; Strom and Egede, 2012; Frohlich, 2014).

Methods of measurement of social support include observations (Gao *et al.*, 2013) or self-reports, indices of satisfaction (Göz *et al.*, 2007; Tang *et al.*, 2008), or scores of perceived support (Van Dam *et al.*, 2005; Schiøtz *et al.*, 2012).

4.5.2 Social support and diabetes self-care

The connection between social support and self-care is supported by research on chronic diseases in general and in diabetes disease in particular (Osborn and Egede, 2010; Hull, 2013). Evidence suggests that higher levels of social support influence more positive outcomes in participants and can ease barriers to self-care (Shrivastava, Shrivastava and Ramasamy, 2013; Svedbo Engström *et al.*, 2016). Social support was also found to increase the levels of diagnosis acceptance, emotional adjustment, and to decrease stress (Sacco and Yanover, 2006). One longitudinal study of 1431 diabetic patients has reported that decreased social support was strongly associated with increased mortality and diabetes-related complications in older adults ($\geq$ 70 years old) with diabetes (Zhang *et al.*, 2007). Another study reported that social support has modified the negative relationship between cognitive impairment and glycaemic control among cognitive impaired diabetic patients of older age ($\geq$ 50 years old) (Okura, Heisler and Langa, 2009).

A study investigated the pathways between support resources for diabetes self-care and glycaemic control (HbA1c) in 208 T2DM Latinos patients found that patients who perceived higher support resources for diabetes management reported better diabetes self-care and lower depression scores which in turn was associated with better HbA1c levels, the study also showed that the effect of social support on HbA1c was mediated by depression and self-care variables (Fortmann, Gallo and Philis-Tsimikas, 2011). Findings of a systematic review that explored the effect of social support on clinical and psychosocial outcomes, as well as behavioural change showed consistent reporting of a positive relationship between social support and the

improvement of health-care decision making, motivation and clinical outcomes in the included studies. The review also reported that increased social support was associated with better reported behaviour changes in diabetes self-care, particularly, medication adherence, and adoption of a more healthy diet and active lifestyle (Strom and Egede, 2012).

Another systematic review of the empirical work that examines the relationship between social support and chronic illness self-care provided the evidence that social support, particularly disease-specific support, is associated with better self-care behaviours. The majority of studies reviewed were about diabetes, it was found that diabetes specific support has a stronger positive relationship with self-care outcomes than general social support. Additionally, this positive relationship was mainly dependant on the self-care specific behaviour. That is, social support had a stronger relationship to self-care diet and exercise behaviours than medication adherence and glucose monitoring (Gallant, 2003).

Research suggests that different types of social support can be differently related to diabetes management outcomes. For example, Tang et al.(2008) studied multiple dimensions of social support in relation to diabetic patients specific quality of life and self-care domains outcomes. The study measured the amount of social support (rated by 5-point Likert scale), patient's satisfaction with social support, positive and negative attitudes to social support. Results showed that positive support attitudes predict dietary and physical activity self-care domains, while negative support predicts less adherence to medication domain. In addition, satisfaction with social support was associated with blood glucose monitoring and diabetes specific quality

of life. On the other hand, results showed no association between the amount of social support and any of self-care behaviours or diabetes specific quality of life (Tang *et al.*, 2008). These findings support the evidence of the social support influence on diabetes self-care behaviours as well as they show that the functional social support (qualitative aspect) is more predictive of self-care outcomes than the structural support (quantitative) as discussed earlier.

Chlebowy & Garvin (2006) study found no relationship between social support and self-care behaviours or glycaemic control of T2DM patients. Although these findings are not consistent with the majority of findings reported by literature, they are not necessarily conflicting with other studies' findings. Two possible reasons might have attributed to these differences; first, the study has used a general measure of social support rather than diabetes specific social support measure which has been shown to be less related to self-care of chronic diseases in general and of diabetes in specific (Gallant, 2003). Second, the social support dimensions measured in Chlebowy & Garvin (2006) study were the patients' satisfaction with social support and the number of individuals providing social support, these measures have been shown to be less associated with self-care outcomes than other measures (e.g. social support attitudes, perceived social support).

4.5.3 Sources of social support

Researchers have reported variation in the sources of support individuals receive (Ford, Tilley and McDonald, 1998; Strom and Egede, 2012). Evidence indicates that family (Rosland *et al.*, 2008; Heinze *et al.*, 2015), spouses/partners (Cutrona and Suhr, 1992; August and Sorkin, 2010; Stopford, Winkley and Ismail, 2013),

children, friends (Fitzgerald and Davis, 1996; Rosland *et al.*, 2008), as well as health professionals (Goetz *et al.*, 2012) constitute the main support sources and are important in the management process of chronic diseases. Other technology-based interventions sources such as the media and internet-based intervention have been researched in relation to diabetes related outcomes (Van Dam *et al.*, 2005).

Research indicates that family members are the most significant source of support (Naderimagham *et al.*, 2012; Khosravizade Tabasi *et al.*, 2014; Heinze *et al.*, 2015). Furthermore, the consistent findings from the literature supports that patients who receive enough social support from families show improved self-care behaviours (Naderimagham *et al.*, 2012; Khosravizade Tabasi *et al.*, 2014). As self-care for diabetes is demanding on the patient, support from family members can help in maintenance of self-care behaviours as well as in reduction of stress accompanying managing their disease (Rosland *et al.*, 2008). For example, Glasgow & Toobert (1988) have shown that family support was the strongest predictor of adherence to treatment among T2DM patients. Moreover, a systematic review of 29 observational studies (up until 2012) examining the association between social support and glycaemic control (measured by HbA1c) in adults with T2DM has concluded that family support were most frequently associated with reduced HbA1c whilst there was no evidence for a beneficial effect of other support measures such as marital status or network size on HbA1c (Stopford, Winkley and Ismail, 2013).

Support from family can be in different forms including instrumental (e.g. meal planning, glucose testing or medication administration) and emotional (e.g. encouragement and appraisal) (Rosland *et al.*, 2008). It can also be perceived by

patients as negative or positive, supportive or non-supportive. For example, Mayberry and colleagues (2012) examined the relationship between perceptions of family member's supportive and non-supportive behaviours, and medication adherence and glycaemic control (A1C) of T2DM adult patients. The researchers used mixed methods including focus group, patients' medical records and self-completed surveys. The quantitative results showed a negative association between perceiving family members performed non-supportive behaviours and adherence to diabetes medication regimen, and being less adherent was associated with poorer glycaemic control. On the other hand, perceiving family members perform more diabetes-specific supportive behaviours was not associated with medication adherence or glycaemic control. This indicates that negative support attitudes by family may have more influence on patients' diabetes related outcomes than positive support attitudes. In focus group, patients reported that instrumental support that includes actions made by supporters that make it possible or easier for an individual to carry out self-care behaviours was the most common type of social support. Patients reported maintaining medical appointments and doing the grocery shopping as examples of instrumental support they get. However, patients have also revealed that non-supportive family behaviours (e.g. nagging or threatening behaviours to encourage self-care) impaired their efforts to perform these behaviours (Mayberry and Osborn, 2012). In line with these findings, Rose & Harris (2013), in a qualitative study among Arabic, English and Vietnamese-speaking T2DM patients Australians attending diabetes education, explored the challenges these patients face by the involvement of their families and friends in caring for their diabetes. Group interviews with 28 patients (three groups based on patients' native language)

revealed that friends and family were seen as barriers to diabetes self-care particularly among newly-diagnosed patients who are starting to struggle with managing a long life disease. The negative social support was commonly expressed in non-acceptance of their new required lifestyle, or a minimization of diabetes and its impact on the individual. For example, patients complained that family and friends did not support them to adhere to dietary requirements by encouraging them to have fatty food and trying to convince them of the possible wrong diagnosis of diabetes (Rose and Harris, 2013). Another qualitative study reported that patients perceived only instrumental support from family and friends concerning help with diet and exercise as helpful and valuable while they perceived emotional family support as non-constructive and demotivating to patients' diabetes self-care and that informational support was perceived as intrusive and did not meet their needs for support in diabetes care (Oftedal, 2014). These findings suggest that family involvement in the self-care process can be perceived as helping factor, however, it can also create barriers for the patient when it negatively influences their performance of diabetes self-care tasks. Poor knowledge about the disease and its management requirements by family and friends might be an important factor that leads to negative support. This is supported by evidence from interventional studies which shows that training or educational interventions for family of the diabetic individual are effective in improving self-management outcomes for T2DM patients (García-Huidobro *et al.*, 2011; Keogh *et al.*, 2011).

Although social support with its various sources has shown to be related to more favourable diabetes related outcomes, research suggests that sources of support can

vary according to age of patient (Heinze *et al.*, 2015). For example, it was reported that patients in younger age groups tend to list familial members as their strongest sources of support, whereas older group members listed their friends and community members   (Heinze *et al.*, 2015). Familial structure has also been reported to determine source of support individual get help from such as the marital status of the individual. A study of 1477 patients with T2DM from southern California found that married individuals reported their spouses most frequently as sources of social control, with unmarried women naming children and unmarried men naming friends/neighbours most frequently as sources of social control (August and Sorkin, 2010).

In addition, the relationship of family and friends support to self-care behaviours varies according to the specific behaviour. Variable findings were reported in literature, for example, Rosland et al. (2008) found that family and friends' support association with performing glucose monitoring was stronger than with other self-care behaviours (Rosland *et al.*, 2008). Another study by Shaw et al. (2006) reported family and friends' support was significantly associated with diet and foot care behaviours compared to other self-care behaviours (Shaw *et al.*, 2006).

Besides family and friends support, social support provided by health professionals including (general practitioners ,practice nurses, social health workers) is cited to play a crucial role for T2DM patients (Rosland *et al.*, 2008; Goetz *et al.*, 2012). A study examined the effectiveness of a six-month diabetes self-management social support intervention for Mexican American adults with T2DM living in the U.S (McEwen *et al.*, 2010). The intervention was composed of six monthly group

sessions and three individually tailored sessions delivered by trained community health workers. Self-care activities, physical outcomes (HbA1c and BMI) and other diabetes related measures including diabetes distress were assessed prior to and post intervention. Results showed an increase in participants' diabetes self-care activities, mainly, exercise, diet, and foot care. Moreover, diabetes distress and sedentary behaviours decreased post intervention. On the other hand, there were no significant improvement in HbA1c or BMI (McEwen *et al.*, 2010). Qualitative evidence reports that both professionals and T2DM patients perceive social support provided by health professionals as helpful for T2DM patients and that it leads to improvement of diabetes control and positive changes in lifestyle habits particularly, physical activity and dietary changes (Goetz *et al.*, 2012). However, general practitioners report their need for more information about services and facilities that diabetic patients can be advised to use such as self-care groups or sport facilities. In the same study nurses reports their need for dietary counselling training (Goetz et al. 2012).

Level of social support by source has been differently measured by researchers (Vaccaro *et al.*, 2014). Whilst some researchers chose to measure the level of support perceived by these sources as one measure, other studies have examined these sources separately as spouse support (Fung, 2009), professional support (Rosland *et al.*, 2008). In case of family and friends support, the same applied where some studies measured both as one source (Oftedal, 2014) while others made distinction between family and friends as separately two sources (Ilias *et al.*, 2001). However, measured as a single category, was the most common addressed type of social

support related to health outcomes (Fitzgerald and Davis, 1996; Glasgow *et al.*, 2000; Gleeson-Kreig, 2014).

In summary, the literature shows that social support is important aspect in healthcare for chronic disease patients. Numerous correlational studies have shown a positive and significant relationship between social support and adherence to favourable behaviours of diabetes self-care (Van Dam *et al.*, 2005; Rad *et al.*, 2013). Inconsistency in the definition and measurement of social support is found in literature (Stopford, Winkley and Ismail, 2013). This might be due to its multidimensional nature meaning that social support is a complex construct that represents diverse dimensions, including sources, types, and evaluation of social support, each can be researched differently. However, many distinctions have been made in the conceptual understanding of social support, such as the difference between functional and structural social support (Broadhead *et al.*, 1989) , the social support versus the social network (Kaplan and Hartwell, 1987), and the received versus the perceived (Uchino *et al.*, 2012) concepts of social support as well as introducing the buffering versus the direct model for social support research (Miller and DiMatteo, 2013) (Van Dam *et al.*, 2005).

In relation to diabetes self-care, evidence suggests that diabetes specific social support is more predictive of self-care behaviours (Gallant, 2003) and that social support association to self-care is behaviour specific (Strom and Egede, 2012).

Literature has also identified multiple sources of social support. Family and friends were the most prominent source of support (Kadirvelu, Sadasivan and Ng, 2012; Rad

et al., 2013). This is expected as family and friends are considered more intimate in an individual's social network, it is also likely that family members are to be affected in a variety of ways when one of the members has to adhere to certain standards of self-care for a long-life disease such as diabetes (Miller and DiMatteo, 2013). There is evidence that the inclusion of family and friends in the management of diabetes can improve diabetes related outcomes (García-Huidobro *et al.*, 2011; Keogh *et al.*, 2011). However, it is also reported that family and friends support can hinder individual's efforts in self-care (Mayberry and Osborn, 2012).

This section has demonstrated the complexity of social support in relation to diabetes related outcomes research where studies have shown conflicting results of these relationships which might be due to different conceptualisations as well as measurements of social support. Therefore, an understanding of the social support in specific societal context such as Jordan is needed.

Consequently, this study looks further into social support specific for T2DM patients, and measures different aspects of social support including perceived, social support attitudes, social support received and identifies the sources of support reported by these patients. In addition, this study examines the relationship between these aspects of social support and different measured behaviours of self-care. Accordingly, this implicates the choice of the measurement tool for social support, this is discussed in detail in the methods chapter.

4.6 Gender

4.6.1   Definition

The term 'gender,' refers to how people in a society understand the social and cultural roles, values and behaviours of boys and girls, men and women (Pollard and Hyatt, 1999). Lorber writes:

'From the beginning to the end and throughout life, the human experiences of birth and   death, disability and illness are embedded in social contexts. Because gender is such an important part of social life, women's and men's experiences, are different in sickness and in health, when rich and when poor, and in death, their lives are quite far apart.' (Lorber 2002 p.35).

As such, these definitions may carry important consequences; one being that gender is framed and produced socially, which means that gender patterns are interpreted as depending on the existent culture. Furthermore, these consequences are likely to affect a human being during the entirety of their life.

Connell adds 'Being a man or a woman is not a pre-determined state. It is a becoming, a condition that is actively under construction' (Connell 2009 p.5). From this it can be derived that the concept of gender is related to the experience of being masculine or feminine and is differentiated from physical biological differences, secondly that perceptions of gender roles and structures are open to change over time.

4.6.2 Theory of gender in health research

The interest in gender differences in health began when researchers attempted to explain higher mortality rates for men compared to women and higher rates of sickness for women compared to men (Lorber, 2002). The development of 'men die quicker, women get sicker' aphorism occurred in parallel with the feminism movements in the 1970s (Annandale and Hunt, 2000). The relationship between gender and health attracted feminist researchers, whose work focused on the influence of patriarchy on the medicalisation and control of the female (Hayes and Prior, 2003). Medicalisation occurs when non-medical problems become defined and treated as medical problems (Conrad, 1992). These feminists considered patriarchal society responsible for the conception of women's non-medical problems as illnesses, believing these conceptions to be driven by patriarchal medicine's reliance on the male's body (which is thought to be considered superior and healthier) as the reference point by which women's bodies are defined and compared (White, 2002). This interest led to a concentration of studies on issues particular to women's health, in comparison to which studies on men's health or on differences between the health of men and women were relatively few (Hayes and Prior, 2003).

This has changed as the concept of women and health has shifted towards the concept of gender and health, and as the concept of culturally influenced gender differentials has been introduced, and consideration of gender's impact on health become more commonplace (Annandale and Hunt, 2000; Kuhlmann and Annandale, 2010). This shift was mainly triggered by recognition that changes in rates of mortality caused by shifts in gender relationships affect men as well as women.

Furthermore, relying on morbidity rates alone did not provide conclusive proof that women are more sick than men, because these rates could reflect differential reporting behaviour among women and men (Kuhlmann and Annandale, 2010).

Annandale and Hunt (2000) have identified three frameworks that summarise the shift in theoretical, conceptual and empirical approaches of gender and health research focus over time. These are the 'traditional', the 'transitional' and the 'new emerging' frameworks. In the 'traditional' approach, distinction between gender and sex is essential in theoretical approach; this approach considered social relations of gender to always lead to worse health for women. The research mainly focused on women; consequently, studies that implemented this approach were composed of women only samples. This approach however was criticised for not acknowledging that gender structures are changing, and locating gender relationships at a static point in time. The traditional framework also assumes that the gender order which exists at an interpersonal or group level necessarily be applies at a larger scale. This view does not allow for the differing impacts gender roles and relationships may have for different subgroups of people, for example those of differing social class. It was also criticised for failing to recognise similarities emerging between men and women.

The 'transitional' approach emerged with an increasing emphasis on similarities across men and women and differences within women and within men. The 'emerging new' approach moved away from assumptions made by the traditional approach and its focus on women's sickness, to stress the social complexity of gender and health. It has recognised that neither men's nor women's health can be

generalised across all men or all women. It is important to understand that differences will exist within subgroups (Annandale and Hunt, 2000).

The social construction of gender has implications for health (Connell, 2002). Data shows that men's higher rates of smoking behaviour, and their engagement in more violent and risk taking acts have decreased in Western Europe and US (Bird and Rieker, 1999; Spijker, 2007; Rogers *et al.*, 2010). Changes in smoking patterns in particular is reported to be correlated with improved health outcomes as demonstrated by an increase in men's life expectancy (Spijker, 2007). This change over time and its relation to life expectancy is an example of socially constructed gender behaviours affecting health. Such socially constructed effects may also be seen in other areas. For example, in the Middle East and North Africa (MENA) region, life expectancy rates for women are still lower than in other regions despite decreases in the causes of mortality among females in childhood or later in reproductive years (Shafik, 2001; World Bank, 2012). This may indicate the influence of social structure on mortality, which is more likely to disadvantage females compared to males throughout their lives (Shafik, 2001). In addition to gender, factors such as class, race, marital status, parental status, household structure and occupation may also have an effect on the differences in health outcomes between men and women (Doyal, 2000; Rogers *et al.*, 2010).

4.6.3   Why are there gender differences?

Biological and sociological approaches have sought to explain the reasons that underlie documented differences in the health experiences of men and women (Pollard and Hyatt, 1999). Behaviours and psychosocial factors, including attitudes

or reactions of men and women toward different life events and stresses, have been suggested as possible causes of differences in health outcomes for men and women (Denton, Prus and Walters, 2004). Kawachi et al. (1999) have discussed possible explanations of gender differences in health, utilising four theoretical 'lenses'; 'biomedical', 'psychosocial', 'epidemiological' and 'socio-political'. The biomedical `lens' explains gender differences in health in terms of physiological differences between men and women. While this approach is of importance in accounting for some gender differences in illness, it cannot explain differences in health and illnesses between men and women beyond the scope of the reproductive system. Through this lens, women are more highly represented, mainly due to fertility and child-birth related illnesses, as compared with men (Hayes and Prior, 2003). The psychosocial explanation focuses more on gender differences in personality, behaviours, self-efficacy, the experience and reporting of signs and symptoms. The epidemiological 'lens' seeks to explain gender differences in health by exploring the risk factors affecting the health of men and women. For example, comparing which group eats less healthily, smokes more and/or engages more often in high risk behaviours that could lead to poor health consequences. The fourth 'lens' referred to by Kawachi et al as the socio-political lens, provides explanation of gender differences in health using a larger scale information on aspects of cultural, economic, and political domains in society, and relates these to health differences in women and men (Kawachi *et al.*, 1999; Hayes and Prior, 2003).

4.6.4 Measurement of gender

The measurement of gender in social and health survey research is most commonly simplified to a choice between the categories of sex 'male' and 'female' (Hartnell, 2011). This way of measurement is a consequence of using the terms 'sex' and 'gender' concepts interchangeably (Davidson *et al.*, 2006). However, researchers make a distinction between sex which is the biologically given characteristics in male and female, and gender which is the learned social roles that go with being masculine or feminine (White, 2002). The importance of the distinction between sex and gender is related mainly to their utility and how these constructs are being operationalised in research (Davidson *et al.*, 2006). To illustrate, biology has a role in increasing vulnerability for certain health conditions in males and females (e.g. breast cancer in females vs. prostate cancer in males). However, biological factors alone do not explain the health of men and women (Kuhlmann and Annandale, 2010). Social factors sometimes have greater effect on health than biological factors. For example, biological characteristics of presence of a greater area of mucus membrane that facilitates entrance of infectious agents to the body put women at higher risk of Sexual Transmitted Diseases (STDs) during unprotected sex with an infected male (Quinn and Overbaugh, 2005). However, social relations of gender such as women's relative lack of control over sexual activity can explain the increased sexual infections among women because they put women at risk of exposure to infectious agents in the first place (Gabe and Monaghan, 2013). This suggests that sex differences in morbidity and mortality are not determined exclusively by biology and that these differences can be greater, lesser, or even reversed, reflecting the societal and cultural context being studied. Moreover, the

predictive power of gender for health outcomes maybe related to lifestyle choices, social roles, attitudes toward health as opposed to only those determined by biological sex only. Thus, these health outcomes cannot only be interpreted by the operationalisation of sex and gender as an interchangeable construct. It is argued that the interaction of sex and gender is the construct that can be examined in relation to health outcomes. Phillips (2005) explains that differences in health outcomes between men and women can result from social based gender differences, these gender based differences in turn have arisen from the biological sex (Phillips, 2005). Therefore, the identification of which differences are purely derived from the fixed biological attributes of sex and which differences are derived from the social-dependant gender attribute might be difficult. Phillips (2005) recommends that it is more practical for researchers to consider the sex/gender interaction to reflect that sex biological differences and the social constructs together give rise to gender differences in health outcomes. Accordingly, a gender coefficient can be formed by considering social measurable variables interaction with sex should enable research to analyse how gendered social factors can impact health outcomes (Phillips 2005).

4.6.5 Gender as a moderator of the relationship between psychosocial variables and self-care behaviours

Gender is a multi-determined construct that interacts with many factors such as psychological, social, cultural, that differentiate women and men as well as may modify the relationship between these factors and health outcomes (Davidson *et al.*, 2006). Research points to the distinct differences in men and women's psychosocial variables and the effect of these differences on health behaviours such as self-care

(Van Dam *et al.*, 2005; Stopford, Winkley and Ismail, 2013). A gender based analysis of these relationships can reveal the dynamics of the psychosocial variables between men and women and how these influence the patients' health behaviour. For example, the evidence from the literature of lower performance of physical activity by women suggests that this difference may be related to gender stereotyped perceptions of women having more barriers to performance of physical activity in certain societies which could have reflected on women's judgment of their personal capabilities to execute physical activity (lower self-efficacy) rather than actual biological barriers (Ammouri *et al.*, 2007; Bertran *et al.*, 2015). Thus, gender may be an important health determinant to include in studies of factors that determine self-care of diabetic patients.

Researchers can expect a direct association of psychosocial factors with health outcomes. (Hunt *et al.*, 2012) In this case, a correlation between the psychosocial factor and the self-care outcome is present, and the change in the psychosocial variable should result in a corresponding change in the outcome status. However, gender appears to have an association with health behaviours and outcomes as shown in literature (Van Dam *et al.*, 2005; Ponzo, Gucciardi and Weiland, 2006; Strom and Egede, 2012) and there is a good chance that the relationship between the psychosocial factor and the self-care outcome may be altered when gender is assessed as a third determinant that may interact with these psychosocial variables. This is often referred to as a *moderation* effect (Aguinis, 2004) . For example, literature is inconsistent on the association between social support and self-care behaviours such as adherence to dietary requirements of T2DM patients (Miller and

DiMatteo, 2013). Gender might moderate or interact with received social support in the prediction of adherence to dietary self-care. That is, received social support may lead to better dietary adherence in women but not men which can add to the possible explanations of why this association might differ. Thus, perceiving gender as a moderator can empower health educators and researchers to evaluate gender sensitive strategies in order to promote favourable health behaviours among T2DM patients. For example, a health intervention that incorporate self-efficacy dynamics within men and women maybe more likely to influence health behaviours than an intervention that does not. Or a programme that addresses gender role related social support to execute and maintain health behaviours such as dietary adherence may have better chance of improving the health services provided to those patients than a programme that ignores these moderated relationships.

4.7 Summary of the chapter

This chapter has presented a review of the relevant literature on the conceptual understanding of self-care, self-efficacy, diabetes distress, social support and gender. It has explored the empirical evidence regarding the factors that influence self-care of T2DM patients. The relevant terms were explored and conceptualised and a theoretical framework for the study was presented.

The main features of an applied theoretical approach were identified as firstly, self-care conceptualisation was dependant on self-care theory by Orem et al. 2001 incorporating the concepts of diabetes distress (Polonsky *et al.*, 1995; Fisher *et al.*, 2007, 2009, 2010), self-efficacy (Bandura, 1977, 1986, 1989, 1997) and social

support (Van Dam *et al.*, 2005). Secondly, self-efficacy, diabetes distress and social support were identified to be theoretically related to the self-care behaviours of individuals directly. Third, self-care and psychosocial variables differ according to the gender of the patient. Finally, gender can interact with psychosocial variables to result in different self-care outcomes.

Accordingly, a model for further research was developed to suit the purposes of this study, considering the theoretical background and the literature on self-care. This is presented in the following section.

4.8 The study's model for researching self-care and related psychosocial factors

As was explained in Section 4.2, self-care has been conceptualised as an activity that is characterised by being individualised (that is carried out by an individual as well as differs from an individual to another depending on various factors) and deliberate. Research also showed that many different factors may be associated with the level of self-care activities. **Error! Reference source not found.** Figure 4.4 summarises the theoretical model for this study, it describes the relationship between type 2 diabetes self-care and various psychosocial factors. As self-care is a complex behaviour, influenced by many factors, this model includes groups of outcomes that are relevant to this study. This model is useful in determining and evaluating how self-efficacy, diabetes distress and social support influence self-care behaviours.

In this model, three psychosocial variables that are associated to the level of self-care were identified from literature review. These are self-efficacy, diabetes distress and

social support. In the model, the pathways and associations investigated for this research are presented in this model using arrows, for example the psychosocial factors are associated with the level of self-care (straight arrows). All these have the potential to influence self-care. Social support factors refer to the needed, the attitudes, and the received social support from family and friends. These subdivisions of social support are not shown in **Error! Reference source not found.** for the sake of clarity. Differences between the self-care displayed by men and women and the differing influence of the three factors identified is are examined in this model as well as the moderation effect of the patient's gender interaction with each of the psychosocial variables on each of the self-care behaviours measured is examined in this study. The **self-care** box in **Error! Reference source not found.** represents the behaviours of dietary, exercise, blood glucose monitoring, feet care and adherence to medication self-care. A final box containing variables that were considered as covariates (age, duration, education, employment and income) is included to show awareness of factors that are controlled and accounted for when comparing the variables in this study.

The resulting framework will be statistically examined; this is explained in detail in the methods chapter (Chapter 5).

Independent variables	Moderator	Dependant variable

Main psychosocial variables:

-     Diabetes self-efficacy
-     Diabetes distress
-     Social support factors

Gender

Diabetes self-care behaviours

Covariates:

-Age

-Education

-Employment

-Income

-Duration
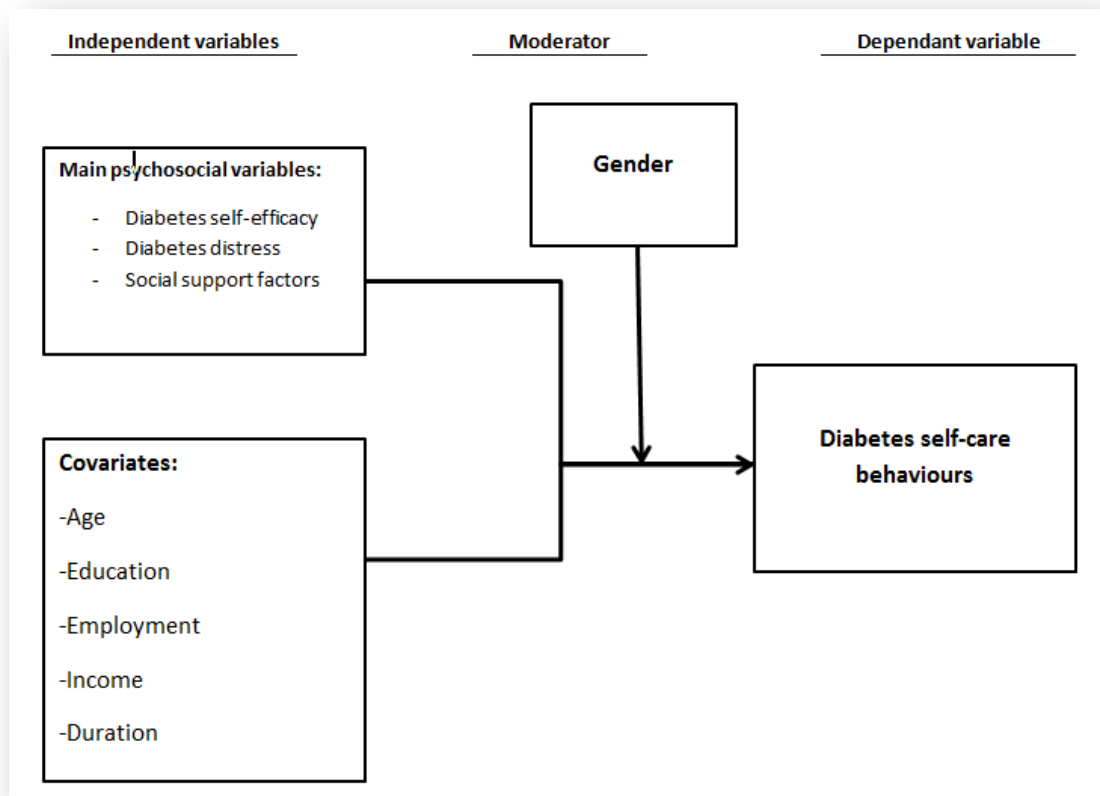
5. Chapter 5: Methods and research design

5.1 Introduction

The objective of this study was to explore the differences in psychosocial and self-care variables between men and women with T2DM and to determine the relationship between psychosocial factors and the level of self-care behaviours and whether this relationship is moderated by the patient's gender.

The data collection process was conducted over two phases, the initial pilot phase and the main study phase.

This chapter is divided into 10 sections. Section 5.2 outlines the planning prior to data collection in which the measures of the study outcomes were chosen and provides detailed information about these measures. The process of how these measures were adopted and translated is presented in section 5.3. Section 5.4 is devoted to present the pilot phase, its objectives, reflections on this phase and how it informed the main data collection process. Following this, the main study phase is described (section 5.5). As the inclusion criteria, procedures of recruitment of the participants, setting for data collection procedure were the same for the two phases, they were mentioned following main data phase as they are shared/ no difference for sake of not repetition/ adjustments based on reflections from pilot are summarised so that its clear what has changed in the data collection plan (sections 5.6 and 5.7). The ethical considerations are discussed in section 5.8. The

data analysis methods chosen to answer the study questions in section 5.9. Finally, the chapter is summarised in section 5.10.

5.2 Planning for the data collection

Prior to data collection, exploratory reading was undertaken to look at how best to measure the factors identified previously. Various questionnaires for measuring self-care, self-efficacy, diabetes distress and social support were identified and selected between based on the alignment between the content of these questionnaires and the theoretical framework outlined in the previous chapter. More details about these measures are provided in the following subsections (5.3.1, 5.3.2 and 5.3.3). In the preparation, these questionnaires were translated to Arabic, details of the translation process are presented in section 5.3.

5.2.1 The purpose of using a questionnaire

Questionnaires are well established tools within social medical science research for acquiring information on participant's social characteristics, past and present behaviour, standards of behaviour or attitudes, and their beliefs and reasons for action with respect to the topic under investigation (Bird 2009). Thus a questionnaire was a suitable tool to meet the study objectives for exploring differences between men and women in their self-reported psychosocial and self-care behaviours.

The suitability of a measurement tool for this study was mainly based upon it reflecting the conceptualisation approaches set out earlier in Chapter 4. Other factors in choosing the measurement system for this study included: the ease of

understanding and filling in the questions, evidence of reliability and validity in literature for the measuring scales. Accordingly, the data collection scales that were used in this study were the Stanford diabetes self-efficacy scale (Stanford Patient Education Research Center, 2009), the Problem Areas in Diabetes (PAID) scale (Polonsky *et al.*, 1995), the Social Support scale (Fitzgerald and Davis, 1996) and the Summary of Diabetes Self-Care Activities tool (SDSCA) (Toobert and Glasgow, 1994).

5.2.2 An overview of the study measures

The participants completed a set of structured questions in Arabic language which included information about the personal characteristics of patients (age, duration of T2DM, gender, marital status, educational level, occupation, household monthly income, and treatment type), in addition to four scales measuring self-efficacy, diabetes distress, diabetes related social support, and diabetes self-care activities. The questionnaire was composed of 6 pages (A4) (Appendix 5). The full questionnaire took approximately 15-20 minutes to complete.

1. Diabetes related self-efficacy

Tool: Stanford diabetes self-efficacy scale

This 8-item scale was originally developed and tested in Spanish for the Diabetes Self-Management study (Appendix 6). The scale has 8 items that assess how confident patients are in doing certain activities. All items are scored on a scale of 1 (not at all confident) to 10 (totally confident); it yields a single total score of the mean of the eight items, higher mean score indicates greater self-efficacy. The

scale reliability is high, the internal consistency was (α= 0.85) and the test-retest after 10-day period was 0.80 (Lorig *et al.*, 1996, 2009). An Arabic version of the scale was used for T2DM patients in Jordan recently, the internal consistency of this scale was (α= 0.81) (Hamdan-Mansour *et al.*, 2016). Although there is limited information about this scale in literature, the components of this scale were more closely aligned with the conceptual framework of this study.

2. Diabetes related distress

Tool: Problem Areas in Diabetes (PAID) Scale

The PAID is a 20- item self-report scale that was developed at the Joslin Diabetes Centre, Boston, Massachusetts (Appendix 7) (Joslin Diabetes Centre 1999). PAID assesses diabetes related distress and psychological adjustment in carrying out diabetes self-care. Each item is rated using a Likert scale from 0 to 4 ("Not a problem" to "Serious problem") reflecting the degree to which the item is perceived as currently problematic.

The scores are added up and multiplied by 1.25, generating a total score between 0 – 100. Patients scoring 40 or higher are considered at a high level of diabetes distress that may require further professional attention (Hermanns *et al.*, 2006) (Polonsky *et al.*, 1995) . Completion of PAID takes approximately five minutes (Polonsky et al., 1995).

The psychometric properties of the PAID were established from its use in three groups of patients with diabetes in USA and Netherland (Polonsky *et al.*, 1995; Welch, Jacobson and Polonsky, 1997). The tool was initially used at the Joslin

Diabetes Centre with 451 female patients with T1DM and T2DM (Polonsky *et al.*, 1995), Cronbach's α was 0.95, indicating a high level of internal reliability. It was subsequently applied to both men and women patients with diabetes (Welch *et al.*, 2003). Welch et al 1997 supported the reliability, internal consistency and concurrent validity through its administration to 256 patients with types 1 and 2 of diabetes, Cronbach's α was 0.90 and test-retest was determined by re-administering the tool two months after its completion (r=0.83).

This scale was used in Arabic language for T2DM Lebanese population; the Arabic version showed a Cronbach's α of 0.91 which is very close to the original scale α (Sukkarieh, 2011). In another study, PAID was translated to Arabic and used in a Kuwaiti T2DM population by (Alragum, 2008). The scale was validated and tested for reliability; the correlation between items and the total score ranged from 0.394 to 0.752 and the internal consistency was (α = 0.93).

With reference to this study's methodological approach, this instrument measures diabetes distress which is distinct from depression as explained earlier (section 4.4.1). The evidence from literature suggest that the PAID has established validity to detect levels of specific distress in diabetic patients (Hermanns *et al.*, 2006; Reddy, Wilhelm and Campbell, 2013; A Schmitt *et al.*, 2016).

3. Social Support

Tool: Social Support Scale

This scale was extracted from the Diabetes Care Profile DCP which is a self-administered questionnaire that consists of 14 scales with 234 items that measure

social and psychological factors related to diabetes and its treatment (Fitzgerald et al., 1996) (Appendix 8). The DCP Social Support subscale consists of three domains that represent social support needs, social support attitudes and social support received. Each domain consists of six items labelled "a" through "f" that make up a total of 18 items, where each item is measured on 5-point Likert scale. The main areas of diabetes related support that this scale measures are meal planning, medicine taking, foot care, physical activity, testing blood sugar and emotional support (DCP, 1998). The cumulative score of each domain is mean score allowing for not more than 50% of the items missing. Item 19 of the subscale comprises a separate question "Who helps you the most in caring for your diabetes? Please circle one answer ". Provided choices are (spouse, other family members, paid helper, doctor, nurse, other health professionals, or no one).

Cronbach's alpha for this scale ranged between .69 and .73 (Fitzgerald and Davis, 1996). Test-retest reliability was assessed for the three domains over a mean interval of 6 months, the scales showed reliabilities of .48 for support attitudes and support needs domains, and .38 for the support received scale (Sacco and Yanover, 2006). An Arabic version of this scale was used for adolescents with T1DM in Jordan, the internal consistency was ($\alpha = .65$) (Al-Akour, 2003).

4. Diabetes self-care

Tool: Summary of Diabetes Self-Care Activities (SDSCA) scale

The study used the Summary of Diabetes Self-Care Activities-Revised scale (SDSCA) measure developed and revised by (Toobert and Glasgow, 1994;

Toobert, Hampson and Glasgow, 2000) to assess adherence to the recommended T2DM self-management behaviours.

The SDSCA is a twelve-item self-reported scale that assesses the frequency of the following diabetes regimen activities: diet, exercise, blood glucose monitoring, and medication adherence (Appendix 9). The respondent is required to recall his/her adherence to self-management behaviours over the past seven days. Answer options are presented on an ordinal scale, and ranges from "0", indicating no adherence in the past week, to "7," which indicates full adherence for the particular behaviour being assessed (Toobert, Hampson and Glasgow, 2000). The total score is calculated as the mean score for each domain separately. The average inter-item correlations within the scales were 0.47, they ranged from r = 0.20 to r = 0.76 for four SDSCA subscales. Test-retest reliability (6 months) ranged from r = 0.00 to r = 0.58 (Toobert, Hampson and Glasgow, 2000) (Weinger *et al.*, 2005).

The Summary of Diabetes Self-Care Activities Measure (SDSCA) is the most commonly used research tool to assess diabetes self-care as reported in literature (Eigenmann *et al.*, 2009) (Andreas Schmitt *et al.*, 2016). Moreover, SDSCA demonstrated evidence of adequate reliability and validity in various settings and languages including; English (Toobert, Hampson and Glasgow, 2000), German (Andreas Schmitt *et al.*, 2016), Turkish (Cosansu and Erdogan, 2014), Korean (Choi *et al.*, 2011) and multi-ethnic groups (Bean, Cundy and Petrie, 2007) . Psychometric properties of An Arabic version of SDSCA were found adequate when used in Lebanese and Saudi settings (AlJohani, Kendall and Snider, 2016; Sukkarieh-Haraty and Howard, 2016).

5. Patients' demographic characteristics

 Socio-demographic questions were researcher-developed. The questions were adapted from the Diabetes Care Profile questionnaire (DCP, 1998), health surveys from the department of Statistics in Jordan available on their website (DOS, 2010b; JPFHS, 2010), and previous research in similar populations (Aljasem *et al.*, 2001; Aljohani, 2011; Sukkarieh, 2011). These factors indicate the social status of Jordanian women and men with T2DM, which, as discussed previously, should relate to their psychosocial and self-care outcomes, and help with interpreting the differences. Age and duration of T2DM were open questions. Education levels were categorised according to the education level system in Jordan, The education system in Jordan is divided into stages, the school stage which is further subdivided into primary or basic school and secondary school. Primary school starts at the age of six and continues to the age of 16. This stage is compulsory and is free to the population. Secondary school education follows; it lasts for two years and can be either academic or vocational. This stage is required in order to get into university based on the students' achievements in a national examination after the secondary school. Higher education includes bachelor degrees, Masters and PhD education (Unesco International Bureau Of Education, 2010). Accordingly, this study contained similar categories for the participants to choose their level of education from. An additional category titled "illiterate" was added to include participants who had less than basic skills of writing or reading Arabic. The employment categories included either being employed, retired, holding only household responsibilities or no current job. Household income

included categories of monthly earnings. Table 5.1 presents a summary of the instruments and constructs that were used in the current study.

Table 5.1 Overview of constructs and measures

Construct	Instrument	Type of scores produced
Diabetes related self-efficacy	Stanford diabetes Self-Efficacy Scale	8-item inventory
Diabetes related distress	Problem Areas In Diabetes (PAID) scale	20-item inventory
Diabetes related social support	Social Support subscale of Diabetes Care Profile (DCP)	19-item assessing three domains of support: needs (6 items), attitudes (6 items) and received (6 items in addition to 1 question about the source of support.
Diabetes related self-care	Summary of Diabetes Self-Care Activities (SDSCA) scale	12-item assessing five domains : diet (5 items), exercise (2 items), blood sugar monitoring (2 items), foot care (2items), medication adherence (1 items)
The social status of the study population	Researcher designed scale Adapted from Diabetes Care Profile and the Jordanian department of statistics surveys and similar studies.	10-item assessing age, gender, education, employment status, household income, marital status; duration of T2DM, status and type of treatment and nationality

5.3 The translation process

A combination of translation techniques was used to translate the survey from English to Arabic adapted from (Beaton *et al.*, 2000) and (WHO, 2013c) guidelines for cross-cultural translation.

A forward translation of the English copy (E1) was done by a translation office in Amman by a bilingual translator who does not have a medical background. The translator was asked to concentrate on using a conceptual rather than a literal approach to produce an Arabic copy which was known as A1. E1 was also translated by the researcher who is a bilingual and has a background of the study field and this second Arabic copy was referred to as A2. A1 and A2 were then revised by a bilingual University English Teacher and the researcher where both copies were compared and discrepancies were resolved in relation to the E1 version. The updated Arabic copy (A1-2) was then sent to another translation office and was translated back into English (back translation) (E2). Both English versions E1 and E2 were reviewed by the researcher. A final copy (Af) was produced and then used in this study. See Figure 5-1 for a summary of the translation process.

Stage 1: translation	Stage 2: Synthesis	Stage 3: Back translation	Final version
•Two translations (A1, A2) from E1. •Informed and uninformed translators.	•A1 AND A2 were discussed. •A1-2 produced.	•Of A1-2 to produce E2.	Af
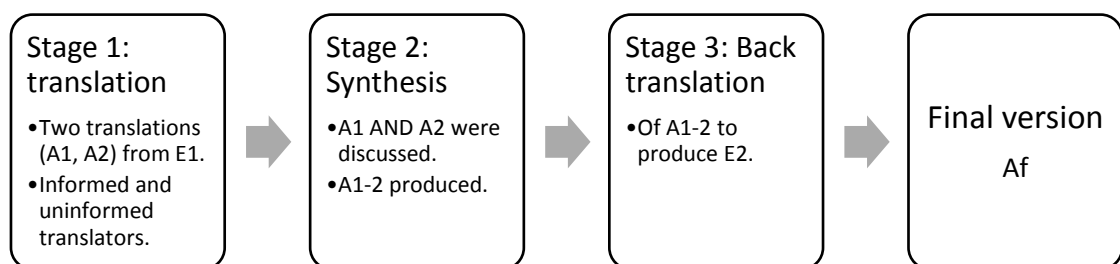
Figure 5-1 Summary of the translation process of the questionnaire used in this study

5.4 The pilot phase

5.4.1 Introduction

This section describes the objectives and results of the pilot phase of the study and explains how they informed further data collection for the main study.

5.4.2 Objectives

The aim of the pilot phase was to collect preliminary data to inform the development of methods for the main study. The pilot phase objectives were:

1. To assess whether the sampling and recruitment techniques were realistic and effective.

2. To assess the reliability and the accuracy of the translation procedure.

3. To conduct a preliminary statistical analyses which informed decisions in relation to the main study data analyses techniques.

4. To determine the sample size needed for the full scale study using the results of the pilot study.

5.4.3 Findings from the pilot phase

The pilot phase took place in September and October 2014 and covered a period of five weeks. First two weeks were in Basma Health Centre, and the last three weeks were in Abu-Nseir Health Centre. While the pilot phase did not necessarily generate findings that significantly altered the pre-planned methods or design, reflecting on the approach undertaken in that phase certainly served as a productive tool for the study in terms of meeting the objectives for this phase listed above as well as identifying the details (especially unexpected ones) that needed to be addressed

before the main data collection was pursued. This is discussed in more detail in sections (5.4.4-5.4.7) below.

5.4.4 Reflections on the translation process

All the used scales were adopted from published sources, and all were found reliable by their original developers. These instruments were translated to Arabic as presented in section 5.3 of this chapter. To test the adequacy of the Arabic version of these instruments, their consistency was statistically analysed. Analysing reliability in the pilot phase context was done in order to find out how consistent these measures in a Jordanian setting are. Consistency findings were compared to the original scale as well as other studies done in similar settings to Jordan (See Table 5.2). Deleting or removing items in order to improve the reliability results were not attempted as changing the scale would lead to being unable to compare this study results to the results of others who have used the same scales.

Table 5.2 Cronbach's coefficient alpha analyses for the study's Arabic version of questionnaires compared to the origin values and values of other Arabic versions

Instrument	This pilot	Original	Other Arabic version/s
Diabetes Distress (20 item)	0.931	0.90-0.95 (Polonsky *et al.*, 1995; Welch, Jacobson and Polonsky, 1997)	0.91-0.92(Alragum, 2008; Sukkarieh, 2011)
Social support (18 items)	0.787	0.65 (Fitzgerald and Davis, 1996)	0.88 (Sukkarieh, 2011)
Self-efficacy (8 items)	0.728	0.85 (Lorig *et al.*, 2009)	0.81 (Hamdan-Mansour *et al.*, 2016)
Self-care (12 item)	0.510	0.47 (Toobert and Glasgow, 1994)	0.72-0.76 (Sukkarieh, 2011; AlJohani, Kendall and Snider, 2016)

As the questionnaire was translated and used in a setting where the common language is Arabic; there were challenges involving the translation process. These are summarised in three main issues as discussed below:

1.   Lingual:

Despite requesting using a conceptual rather than a literal approach, literal translation was still evident in A1, the translator had no background about the research topic and this could be the cause. For example, the term 'diabetes' was translated into the Arabic word 'Hemiah' that literally means 'Dieting' in English instead of "Diabetes". The word 'Hemiah' was changed to 'Sokkary' which is the medical term that is known to Arabic speakers for diabetes disease. Additionally, some questions had a structure that became unfamiliar structurally to the Arabic reader when translated. For example, all the questions in the self-efficacy questionnaire began with "How confident do you feel that you can…?". The question in the English version demands a numerical rating of confidence. The same structure of the questions was hard to keep when translated to Arabic. In A1, the question word "How confident?" was translated in Arabic to what literally means "What is the level of confidence you feel that you can?" in order to convey the same understanding in English. This issue was discussed in stage 2, and it was agreed that it can be substituted with "To what extent do you feel confident that you can...?" as this was found to be more familiar and more accurate in conveying the request of the question in addition to being more grammatically rigourous in Arabic.

2.   Cultural:

Expressions or metaphors that had no equivalent in the Arabic language were present in the English version of the questionnaire. Metaphors are culturally dependent, they are driven by cultural experiences and can convey different meaning across different cultures (Al-Amer et al. 2015). For example, in the questionnaire for diabetes distress, items 8 and 20 used the words 'overwhelmed' and 'burned out' to express emotional distress. There was no straightforward meaning in Arabic for these two terms. The literal meaning of 'overwhelmed by' means 'drowned' or 'covered over completely' in Arabic, which would not make sense when talking about diabetes. Thus, it was agreed to use 'Tagh'alob' that represents a closer meaning, it literally means (overpowered by or defeated). In addition, 'burned out' was translated as 'exhausted'.

3.   Contextual:

As the original questionnaires were designed and used in places like the US, some concepts that would be clear to users in those places do not have an equivalent in the Jordanian context. For example, in the questionnaire of social support, item 19 was: "Who helps you the most in caring for your diabetes? Please circle one answer" and multiple choices given included the term 'the case manager'. The initial use of the questionnaire was in Michigan (Fitzgerald & Davis 1996). The 'case manager' term would not be familiar to or relevant to most Jordanian patients because this position is not available in the healthcare system. Thus, the choice of the case manager was removed from the Arabic version of the questionnaire.

5.4.5 Reflections on the practical issues during sampling and recruitment

During the pilot it became clear that not all patients could complete the questionnaire individually and as such the option to have the questionnaire read to the patient was implemented and further used for the main phase of data collection. In the pilot sample, two thirds of patients preferred assistance for filling in the questionnaire; common causes were (poor sight, left glasses at home, etc.). This preference had yielded two types of collected questionnaires, self-completed and interviewer-administered. Differences between these two groups were considered when analysing the collected data (See Table 6.3 in section 6.2.2 of the results chapter).

The recruitment resulted in 93 patients who filled in the questionnaire; patients showed interest in participating in the research and most were willing to fill in the questionnaire which was a promising result for the main data collection phase. Unfortunately, the response rate could not be determined accurately because the total number of patients who were approached to take part in the study was unknown. This was in part due to poor recording of the number of patients who did not respond to an invitation to participate in the study. In addition to not being able to obtain any records of how many patients visited the clinic on the recruitment days or any accurate records of the usual number of the clinic visitors. This limitation during the piloting phase was acknowledged by the researcher and better recording measures was undertaken for the main phase of data collection. Nevertheless, completion rate could be calculated, a questionnaire was considered not completed if one or more of the scales (Diabetes distress, Self-efficacy, Social support scales, and Self-care) were not completed by a participant. The maximum number of non-completion was for

the Social Support Attitudes and the Social Support Received scales, 7 patients (6.5 %) left these sections blank. The least number of non-completed scales was for the Self-efficacy scale; only 2 patients (1.8%) did not fill in this scale. See Table 5.3 for more details. It is noteworthy to mention that the self-efficacy scale was at the beginning of the questionnaire booklet after the demographic information questions and while both social support attitudes and social support received were printed on one page two-sided, it was suspected that patients might have not seen it, so this was changed so that questionnaire was printed one-sided.

Table 5.3 Completion of the questionnaire by section

	Completed (n)
Diabetes Distress	88
Self-efficacy	91
Social support needed	88
Social support attitudes	86
Social support received	86
Self-care (all domains)	87

5.4.6 The sample size calculation based on pilot data

A sample size calculation was done using GPower program version 3.1.9.2 (Faul *et al.*, 2009). Based on the findings from the pilot phase (N =93). Sample size needed to detect an interaction effect of gender with psychosocial variables on self-care level was calculated. According to (Cohen, 1988), effect sizes values of .02, .15, and .35 can be called "small," "medium," and "large" effects for multiple regression. Effect size was obtained from the change of R^2 Before and after the interaction term is entered to the regression equation. The effect size was equal to 0.10 which is considered as medium effect. Assuming (α) of 0.05 and a power (1-β) of 0.95, the resulting sample size for the interaction effect of gender and self-efficacy was 171, 85 participants in each group. Figure 5-2 shows the resulting sample sizes for the same effect size with varying α and (1-β).

Similarly, sample size for the interaction effect of gender and diabetes distress was calculated with an interaction effect size of 0.30 with (α) of 0.05 and a power (1-β) of 0.95 was a total of 55 participants Figure 5-3.

As the response rate could not be calculated as explained earlier in the pilot chapter, estimates from literature were used. The response rates ranged between 70-94% in literature studying T2DM patients in Jordan (Batieha, Jaddou and Ajlouni, 2000; Ajlouni *et al.*, 2008; Al Habashneh *et al.*, 2010) therefore a 20% non-response rate was assumed for this study, the final sample sizes were 205 to detect an interaction effect of gender and self-efficacy and 66 to detect an interaction effect of gender and diabetes distress. Consequently, the highest sample size number was considered for the main data collection phase as this number should also allow for examining other objectives of this study.
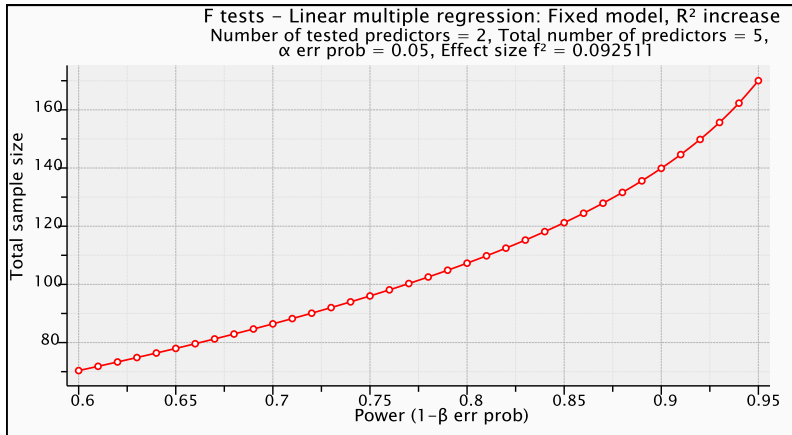
Figure 5-2 GPower analysis for the sample size needed for detecting gender*self-efficacy interaction effect
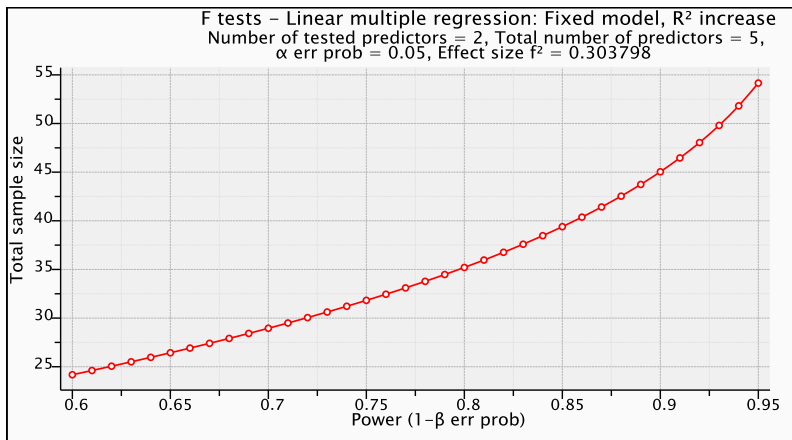
Figure 5-3 GPower analysis for the sample size needed for detecting gender*distress interaction effect

5.4.7 Implications of the pilot phase for the main data collection

The purpose of the pilot study was to collect preliminary data to inform the development of methods for the main study. Ninety-three participants agreed to fill in the questionnaire and provide data about the behaviours they do for caring for their diabetes as well as distresses accompanying their T2DM. They also reported their level of self-efficacy, their social support needs as well as the support they receive and attitudes from the surrounding subjects toward their T2DM. Some necessary adjustments were done to the data collection plan and methods as described above.

To summarise, the methods used to collect data were shown to be feasible and suitable for the setting. The translation process was conducted according to WHO guidelines and the questionnaires used were tested for consistency and the results were found to be mostly consistent with the Cronbach's alpha of the original questionnaires developed by their authors. It was therefore decided that these questionnaires could be appropriately used in the main data collection phase.

The statistical analysis plan went through many phases of editing until the final plan was formalised and tested. The syntax for the analysis plan was saved for applying onto the second part of data to be collected. Although at this stage final conclusions about the findings of data analysis can be fully drawn, the preliminary results were promising in terms of findings answers to the main research questions.

The sample size was calculated according to the preliminary results of the multiple regression analysis used to test the interaction effect of gender and psychosocial variables on self-care. 205 subjects are needed to detect for an interaction effect. By

including the pilot data of the 93 participants, a minimum of further 112 participants where therefore required.

5.5 The main study phase

This phase took place in April-June 2016 over the period of seven weeks. The recruitment was slower in Abu-Nseir centre due to fewer patients visiting this centre compared to Basma health centre in addition to delays due to national holiday (Independence Day) that coincided during that period and the approaching month of Ramadan which as mentioned by one of the staff there "does affect the number of visitors who prefer to move their monthly visit till after Eid".

5.6 Inclusion criteria

Eligible participants were adult attendees at family medicine clinics self-identified to have T2DM. There was no criterion of a specific age for inclusion of participants. This was decided being aware that results might be different in different age groups which could facilitate exploring any differences across age groups. In addition, by recruiting all ages, eligible population for recruitment from the two clinics is maximised and so increase both the size and diversity of the study's sample.

Following the recent political instabilities in the Middle East, many Arabs from different neighbouring countries have come to settle in Jordan. It was expected that a proportion of non-Jordanian might participate in this study as most use the governmental health clinics are provided governmental health services. As they share the same language and similar background and culture, their inclusion was

not expected to affect the findings. Subjects were considered eligible if they are living in Jordan irrespective of their original nationality. Nevertheless, the nationality was documented in the demographic characteristics of the participants.

5.7   Participants, setting of the study and procedure

A sample of adults diagnosed with T2DM was recruited from two family medicine clinics in Amman; Princess Basma Comprehensive Health Centre and Abu-Nseir Comprehensive Health Centre (Figure 5-4 and Figure 5-5). The permission to collect data in these centres was obtained from the Ministry of Health in Jordan.

The two clinics were chosen based on their location in Amman. Princess Basma Comprehensive Health Centre receives patients who are mostly residents of the East Amman areas. On the other hand, Abu-Nseir is a comprehensive health centre which receives patients who reside in West Amman. In East Amman, residents tend to be the urbanised poor; the area is conservative, more populous and has vast Palestinian refugee camps. In contrast, in Western Amman, residents usually are considered to be relatively wealthy with a higher socio-economic status (Potter, 2007; Potter *et al.*, 2009). Therefore, these locations were chosen to reflect different social and economic characteristics of the residents.

Being governed by the Ministry of Health, both clinics have the same system of regulating patients' visits. Most patients come to these clinics for follow-ups and renewal of prescriptions. Patients are usually invited to the nursing room where the nurse takes measurements of weight, blood pressure and a blood sample for HbA1c (for patients who are due this measurement). After that, patients sit in the waiting area till they are called for their appointment. The participants were

approached and informed of the study in the nursing room by the researcher or the data collectors; they were also offered the information sheets. Interested participants were given an envelope containing a copy of the questionnaire to fill in during the waiting time and were instructed to seal the envelope when finished and to hand it back in a box in the nursing room which was put there for this purpose. It was originally planned that the questionnaire was to be self-completed; however, during the pilot phase, it was noted that a high number of patients requested assistance in filling in the questionnaire. Thus, two data collectors who were university students were trained by the researcher for this purpose. The training mainly involved familiarisation with the questionnaire forms and the communication skills with patients and the data collectors were instructed to document the patient's answers immediately on the questionnaire forms. Besides training, data collectors were blind to the main objectives and hypotheses of the study. Blinding data collectors is considered important as it decreases the likelihood of interviewer bias (Choi and Pak, 2005). Moreover, the lack of personal involvement by the researcher in the questionnaire filling was anticipated to reduce the likelihood of researcher bias (Choi and Pak, 2005).

Figure 5-4 Princess Basma Comprehensive Health Centre

Figure 5-5 Abu-Nseir Comprehensive Health Centre

5.8 Ethical considerations

5.8.1 Ethical approval

The study received the ethical approval for the pilot study from the Ministry of Health in Jordan and then an updated protocol for the main study was provided and the ethical approval was obtained for the main study as well (Appendix 10).

5.8.2 Permission to use the scales

Permission to use and translate the social support subscale of the Diabetes Care Profile (DCP) was obtained from the author by email for no cost (Appendix 11). For The Summary of Diabetes Self-Care Activities Measure (SDSCA), a fee of 25$ was paid to obtain the permission to use as instructed by the scale authors (Appendix 11). The Stanford self-efficacy and the Problem Areas in Diabetes (PAID) scales were available for free download and use without permission (Stanford Patient Education Research Center, 2009; DAWN, 2015).

5.8.3 Informed consent

A cover letter that explains the nature of the research project and requests that the recipient completes and returns the questionnaire was included in the questionnaire booklet (Appendix 5). Respondents who took the information sheets and the envelope containing the questionnaire were considered interested in taking part in the study and returning the questionnaire after completion was considered as providing implicit consent. This practice is cited in the University of Sheffield ethics guidelines (University of Sheffield, 2014). The research letter, the information sheet (for the patients) were in Arabic (See Appendix 12 for the English versions). It was made clear that participation is voluntary. In addition, participants were informed that they have the free choice to withdraw from the completing or handing back the questionnaire without giving any reason; they were assured that their withdrawal will not affect their care.

5.8.4 Measures to ensure confidentiality of personal data

Participants were assured that their answers will be kept confidential. They were informed that their name was not required. The place for completing the questionnaire was the waiting area in both centres; separate rooms were not available by both centres. However, the interviewer administered questionnaires were conducted in the least crowded side of the waiting area of each health centre so that an acceptable level of privacy could be maintained.

All data gathered from the patients during the course of the research were kept strictly confidential. All paper copies of the questionnaire were kept in locked drawers in the PhD office, and the data entered into the SPSS software for analysis were kept on the researcher's university computer account that requires a user name and a password for access.

The University of Sheffield ethics policy involving human participants recommends not to keep participants' data for long periods of time (The University of Sheffield, 2014). The data from this research did not include any personal data or respondents' names. This anonymised data will be kept securely for future publication purposes.

5.9 Statistical analysis process

The statistical analyses were performed using SPSS 22.0. The steps for the statistical analysis of this study are presented below:

5.9.1 Data preparation

The data were coded then screened for accuracy, missing values, and normality according to the SPSS Survival Manual guidelines prior to conducting statistical

analyses (Pallant, 2013). The frequencies for categorical variables were inspected to see if all cases fell into the legitimate categories by looking at the coding manual for each. For continuous variables, the minimum, the maximum and the mean values were observed and values outside the expected range were identified and checked. Where errors found, cases were sorted by the variable that appeared to have an error and the errors were then corrected by looking at the hard copies of the data when needed.

Furthermore, logical inconsistencies that could have resulted from reporting such as contradictory answers were checked. Table 5.4 shows an example of consistency checks where Question 19 of the social support scale is tabulated according to the marital status of the respondents. It is expected that unmarried participants would not report their spouses as a source of support. Tabbing these two variables together showed that results are consistent with this assumption, as no single or widowed patients have reported "spouse" to be their source of help.

Table 5.4 Cross tabulation of question 19 of social support scale * marital status

		Marital status			Total
		Single	Married	Widowed	
Who helps you the most in caring for your diabetes? Please circle one answer	Spouse	0	113	0	113
	Friends	0	1	3	4
	Doctor	0	12	4	16
	No one	2	34	5	41
	Other family members	1	37	11	49
Total		3	197	23	223

Another example is the cross tabulation of the education level with the type of questionnaire completion. It is expected that illiterate patients have chosen to be interviewed for the questionnaire completion. This is shown in Table 5.5

Table 5.5 Cross tabulation of Education * completion

		completion		Total
		self-completed	interviewed	
Education	Primary school	22	70	92
	Secondary school	47	44	91
	Higher degrees	19	14	33
	Illiterate	0	22	22
Total		88	150	238

Additionally, 10% of the questionnaires were randomly chosen where data were proof read by the researcher against the original data identified by ID to check that variables have been entered correctly.

Following data screening, the data were examined for missing values. Missing data can be random or non-random (Schafer and Olsen, 1998). Random missing values may occur when the respondent leave some questions unanswered. This can occur because the respondent was not paying attention or tired or the questions were complex or long. Random errors can also occur during data entry.

On the other hand, non-random missing values usually display a pattern that can be noted for certain questions. Causes of such pattern may be question-related where many respondents did not answer the same question either because it was confusing, or that the appropriate answer was not provided among the answer choices. Other causes might be related to social desirability where the respondent finds the question sensitive (Baraldi and Enders, 2010).

Missing data are considered important because they may reduce the information obtained from respondents leading to loss of data. In addition, missing data may indicate bias in the data especially when they are non-random. This may decrease the accuracy of measuring the desired outcomes (Roth, 1994).

Missing data analysis for this study was run using SPSS. First, missing data were identified by obtaining the frequencies of all study variables. Table 5.6 shows that the percentage for missing values ranged from 0% for both gender and marital status to the highest being 7.5% for adherence to medication scale.

Expectation maximization (EM) was estimated for the entered variables. EM is an effective technique that is often used in data analysis to manage missing data (Schafer and Olsen, 1998). EM mainly checks if the cases with missing values are different than the cases without missing values through estimating the

missing data and then estimating parameters (Roth, 1994; Fox-Wasylyshyn and El-Masri, 2005). In SPSS, a p value equal or less than 0.05 for EM indicates significant differences between missing and non-missing data groups. In this study, none of the variables showed significant EM.

As missing data in this study were considered small and non-random, a list wise deletion method was chosen to deal with missing data. In this case all missing data were eliminated and the specific cases with missing values were removed from the analysis. List wise deletion method produces a complete dataset that allows for the use of standard statistical tests (Baraldi and Enders, 2010), It also makes it less difficult for interpretation of the results in contrast to the pairwise technique which deletes only information that is missing so that each element of a test is based on a part of the whole sample that may lead to inconsistent test results (Roth, 1994; Baraldi and Enders, 2010).

Table 5.6 Missing data in the study variables

	N	Missing		No. of Extremes	
		Count	Percent	Low	High
Age	237	2	.8	3	0
Duration of T2DM	230	9	3.8	0	1
Gender	239	0	.0		
Education	238	1	.4		
Marital status	239	0	.0		
Household monthly income	224	15	6.3		
Employment	237	2	.8		
Diabetes Distress scale	229	10	4.2	0	1
Self-efficacy scale	233	6	2.5	0	0
Support needs scale	225	14	5.9	0	0
Support attitudes scale	222	17	7.1	0	0
Support received scale	223	16	6.7	0	0
Diet self-care	222	17	7.1	0	0
Exercise self-care	222	17	7.1	0	0
Blood sugar monitoring	222	17	7.1	0	18
Foot self-care	222	17	7.1	0	0
Medication adherence	221	18	7.5	0	0

To prepare data for applying statistical tests, the total score for each scale was obtained for each participant according to the recommendations by the scale developers as the following:

1- The total score for the **Self-Efficacy scale** was calculated as the mean score of the 8 items included in the scale (Stanford Patient Education Research Center, 2009). If more than two items missing the scale was not scored as the authors recommended.

2- The total score for the **Problem Areas In Diabetes (PAID)** scale was calculated as sum of the 20 items' scores multiplied by 1.25 to generate a score out of 100 (Polonsky *et al.*, 1995) .

3- **Social support** score was obtained for each domain separately, the subscale contained 3 domains (the support needed, the support received and the support attitudes) each domain had 6 items; the total score for each domain was calculated using the formula: (Σ Q1a-f / Count of non-missing items) where the missing values should not exceed 50% of the items (The Michigan Diabetes Research and Training Centre, 2015).Three items in the social attitudes domain required reversal because they were negative. These were: My family or friends:

1. Feel uncomfortable about me because of my diabetes

2. Nag me about diabetes

3. Discourage or upset me about my diabetes

The social support subscale included an additional item with a question; "Who helps you the most in caring for your diabetes? Please circle one answer?" The frequency of the answer choices was compared between men and women for this question.

4- The total score for the Diabetes Self-Care Activities (SDSCA) scale was calculated as the mean score of days for each domain that included (Diet, Exercise, Blood Sugar Monitoring, Foot care, and Medication). Item 3 in the diet domain "On how many of the last seven days did you eat high fat foods such as red meat or full-fat dairy products?" was reversed (Toobert, Hampson and Glasgow, 2000).

5.9.2 Descriptive analyses

The participant's characteristics were described as means (SD) for continuous type of data (age and duration of disease), and as frequencies and percentages for nominal data. Then, the differences between women and men in these characteristics were examined using Chi square and the independent T-test. Statistical significance was set at a p-value of 0.05. In addition, a descriptive analysis of the instruments (namely, the self-efficacy scale, the PAID scale, the social support scale, and the SDSCA scale) was conducted for all participants and then for men and women separately.

5.9.3 Internal consistency of the measures

Internal consistency in the context of this study was considered as a psychometric property which is associated with the degree of correlation of a scale items to ensure that the various items in a scale deliver consistent scores (Henson, 2001; Streiner, 2003). More specifically, the analysis of internal consistency aimed to find out how consistent these measures are in a Jordanian setting. Internal consistency as one of scale's reliability measures is used widely in behavioural research (Osburn, 2000). This is because internal consistency measures can be derived from one administration within the same test in one sample, in comparison to other estimates

of reliability that may need either two or more administrations such as test-retest, or two or more instruments or both such as parallel forms of reliability tests (Onwuegbuzie and Daniel, 2002). In addition, internal consistency measure is considered more appropriate for self-reported instruments compared to other measures (e.g. inter-rater reliability tests) (Streiner, 2003). Reporting consistency coefficients is recommended even when the focus of research is not psychometric (Onwuegbuzie and Daniel, 2002). This is because reporting internal consistency can be useful for comparative purposes in research as the values of internal consistency reliability coefficient for a scale are unique for the sample scores yielded in a particular study (Onwuegbuzie and Daniel, 2002).

In this study, coefficient alpha was used as an estimator of the internal consistency of the study scales. Coefficient alpha is widely used for composite measures containing multiple components which is the case in this study (Osburn, 2000). The value of Cronbach's alpha indicates the correlation degree of a scale items. A Cronbach's alpha of 0.70 or more is considered adequate in literature (Litwin, 1995; Henson, 2001). However, values below 0.7 are considered more realistic in psychological measures because of the expected diversity of the constructs included in these measures (Field, 2013). Cronbach's alpha can be affected by the length of a scale which could be a downside of this measure (Tavakol and Dennick, 2011). Nevertheless, this effect might not be concerning if the scale is less than 20 items (Streiner, 2003). In this study, the PAID scale was 20 items while all the remaining scales were less than that, thus, Cronbach's alpha would still be considered appropriate to use in this study. Consequently, the internal consistency of the Arabic translated versions for each scale was examined using coefficient alpha, corrected

item total correlation and alpha if item is deleted statistical tests. Corrected item total correlation indicates the correlation between each item and the total score of the scale, this value is acceptable when it is > 0.3 (Field, 2013). Alpha if item is deleted reflects the change in values of Cronbach's alpha when an item is not included in the calculation, as such; it indicates which item could result in a higher alpha if deleted (Field, 2013). For subscales that had low number of items (e.g. two items); internal consistency reliability was tested using inter-item correlation test rather than coefficient alpha. This is because the value of Cronbach's alpha decreases as numbers of items in a scale decrease (Streiner, 2003; Tavakol and Dennick, 2011). Results of each test are presented and interpreted as well as compared to the original published scales in section 6.3 of the next chapter.

5.9.4 Measurement of invariance

As this study can be classified among the comparative research that seeks to identify differences or similarities in psychosocial and self-care variables across gender, it was important to ensure that the measures used to make these comparisons are invariant across gender. Measurement invariance means that the construct is being measured in the same way by the indicators across groups (Milfont and Fischer, 2010). Therefore, any differences when comparing group means, correlations, and path coefficients can be interpreted as actual differences between the groups (Kamody *et al.*, 2014). The main concerns of not measuring the invariance are that the results of the parameter differences between the groups can be affected by differences in how the construct is measured by the scale or by differences in how individuals are responding to various items. These variations are more concerning especially when the measured constructs cannot be directly observed such as

behaviours or attitudes as well as when these measures are dependent on the self-reporting of the individuals (Gregorich, 2006). The unobservable constructs in this case are referred to as latent variables or factors (Field, 2013).

For the assessment of measurement invariance of a scale, a Multigroup Confirmatory Factor Analysis (MCFA) framework was used as recommended in literature (Vandenberg and Lance, 2000; Kremelberg, 2010; van de Schoot, Lugtig and Hox, 2012; Kamody *et al.*, 2014). CFA analysis was undertaken using Amos 21 software (Arbuckle, 2012). CFA analysis is one of the two types of factor analysis; the other is the Exploratory Factor analysis (EFA). While the EFA is considered as a reduction method where it determines whether a large number of variables in a scale can be reduced to a smaller number of factors that reflect the latent constructs examined by that scale, CFA has the number of latent factors predetermined before they are modelled and tested for best fit. CFA can be used to measure construct validity of a scale as well as to test whether group comparisons of sample estimates are reflecting true group differences that are related to the construct of interest (Kremelberg, 2010; Clench-Aas *et al.*, 2011). Testing for construct validity of a scale was not in the scope of this study, thus CFA in this context was used for the measurement of invariance.

Assessment of invariance using CFA exerts successive analyses where constraints to the models are added for each stage, and the model fit is tested hierarchically (Clench-Aas *et al.*, 2011). First, a baseline model (as well as known as the configural model) which is unconstrained is tested for fit (Milfont and Fischer, 2010). Configural invariance model represents an initial step of CFA where the factor

structure across groups is tested (i.e. equal number of factors and the same items between the tested groups).

Second, the metric invariance model is tested. In this model equal factor loadings are constrained for (i.e. the common factors have the same construct meaning across tested groups). Following this, the third model which is called the scalar model constrains factor loadings and intercepts to equality across comparison groups (i.e. both groups share equal item intercepts) (Gregorich, 2006). Typically, the overall model fit at every stage is evaluated by Chi square test (Preti *et al.*, 2013). However, the Chi square has many limitations, one of them is being sensitive to the sample size (Gregorich, 2006; Hooper *et al.*, 2008). Alternatively, other fit indices are shown to be less restrictive and more appropriate (Cheung and Rensvold, 2002; Hooper *et al.*, 2008). These model fit indices include the ratio of Chi square to the degrees of freedom (CMIN/DF), the Comparative Fit Index (CFI), and the Root Mean Square Error of Approximation (RMSEA) which is an indicator of absolute fit (Preti *et al.*, 2013). Accordingly, Chi square, (CMIN/DF), RMSEA and CFI values were used to evaluate CFA results in this study. Cut-off values for these indices as reported in literature (Hooper *et al.*, 2008; Kremelberg, 2010) are presented in Table 5.7.

Table 5.7 Model fit indices values for CFA

Fit index	Threshold
Chi square	>.05 (insignificant)
Chi square/df (CMIN/DF)	< 3 good fit, <5 permissible
CFI	>.95 great, >.90 traditional, >.80 permissible
RMSEA	<.08

Figure 5-6 shows the path model of CFA for measurement invariance of PAID scale. Due to inconsistency in the previous literature about the factorial structure of the PAID scale which ranged from one to three factors (A Schmitt *et al.*, 2016), the latent factors of PAID in this study were predetermined using EFA in SPSS prior to Amos entry. One factor was extracted and kept in the model. The factor included the 20 items. The sample was divided into two subsamples based on gender and the path model was compared for both groups and tested for invariance.
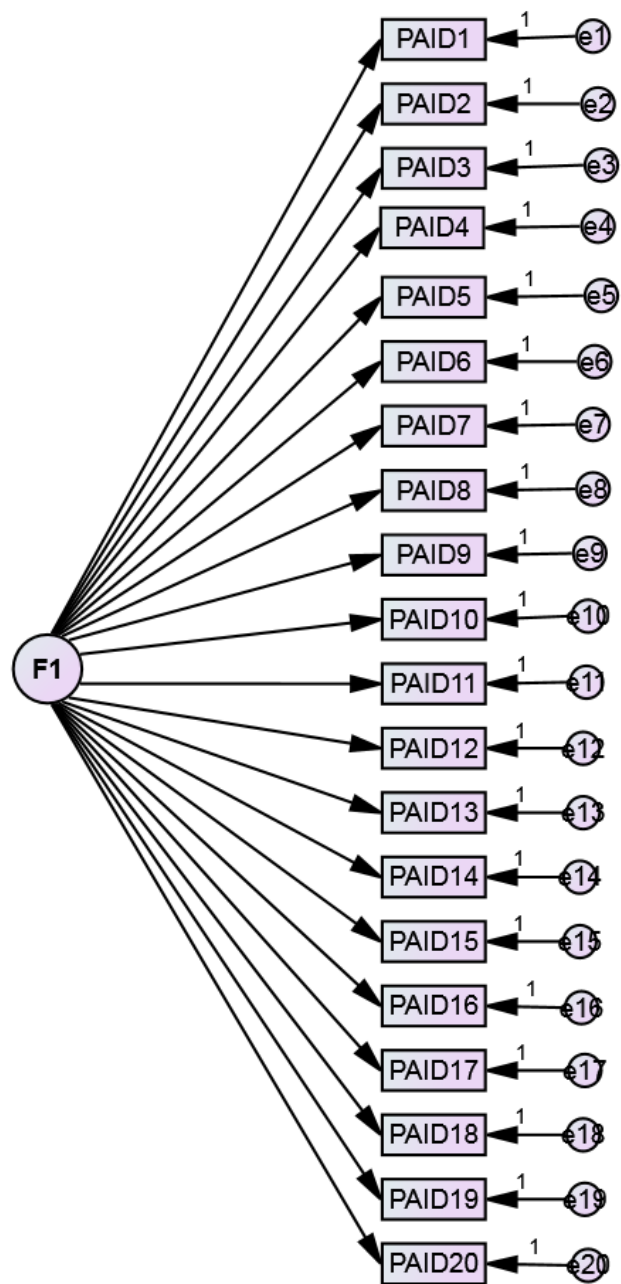
Figure 5-6 The CFA model for testing measurement invariance of PAID scale in men and women groups.

5.9.5   Correlation analyses

Pearson correlation matrix analysis was conducted to explore the associations between T2DM patients' scores on the psychosocial and self-care measures on the data for 239 patients. The strength, direction and the significance of the correlation are observed and reported in the results. Pearson correlation value ranges between +1 and -1, Table 5.8 adapted from (Mukaka, 2012) article shows the interpretation of values of correlations that was used in this study.

Table 5.8 The Pearson correlation coefficients interpretation

Size of correlation	Interpretation
.90 to 1.00 (-.90 to -1.00)	Very high positive (negative) correlation
.70 to .90 (-.70 to -.90)	High positive (negative) correlation
.50 to .70 (-.50 to -.70)	Moderate positive (negative) correlation
.30 to .50 (-.30 to -.50)	Low positive (negative) correlation
.00 to .30 (.00 to -.30)	Negligible correlation

5.9.6   Regression analyses

A multiple regression analysis relating patient's self-care behaviours to the predictor variables was performed for men and women separately in order to identify variables that predict self-care. For each group, five independent multiple linear regression analyses were conducted in order to compare the predictive values of the two regression models and the predictors' coefficients. This test provides information about which predictors are more important for men compared to women and the variation in explaining the self-care behaviours in men and women models. Figure 5-7, shows the statistical model used for the regression analysis for each group.
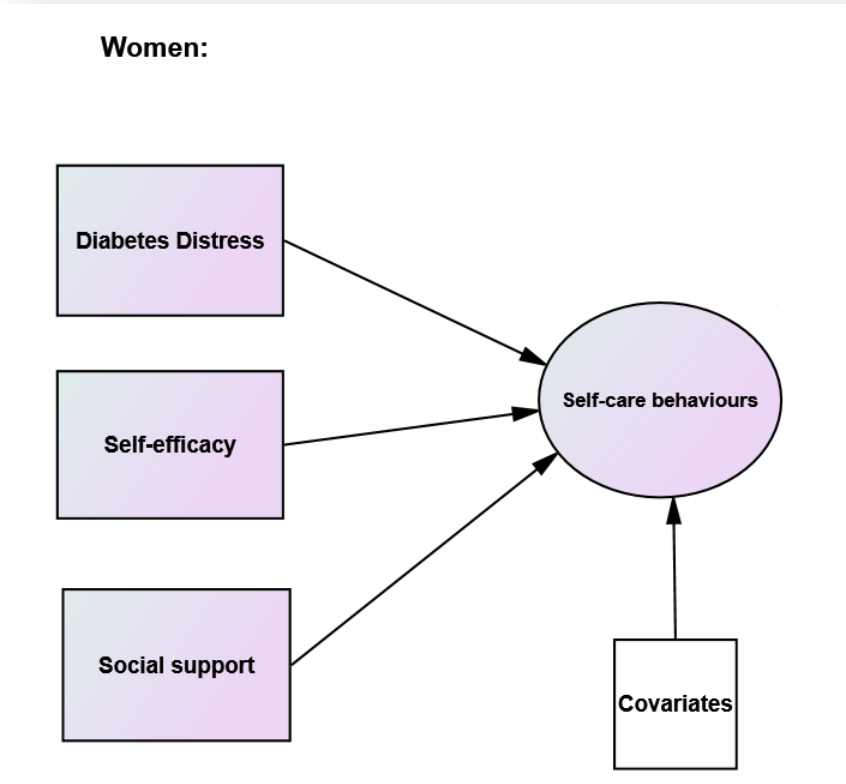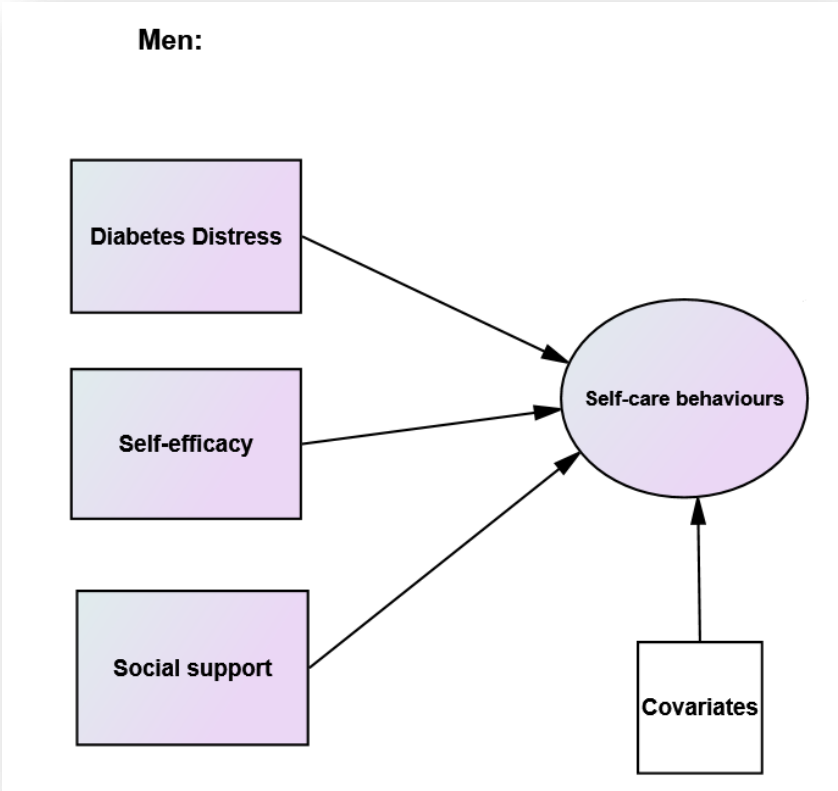
Figure 5-7 Regression analysis done separately for men and women

5.9.7   Moderation analysis

An analysis of moderation by gender was conducted. Conceptually, a variable is considered a moderator when the association between two variables is different according to the level of the moderator (Aguinis, 2004). Figure 5-8 shows a path diagram for the conceptual model of the relationships between the studied psychosocial variables and self-care behaviours outcomes with the hypothesised moderation of this relationship by gender. It is hypothesised that psychosocial variables (X) of T2DM patients in Jordan are associated with their self-care behaviours outcome (Y) and that this association differs or changes according to the patient's gender (M). Self-care in the Figure 5-8 includes the five domains measured in this study tested for separately.

To examine moderation statistically, it is recommended that an interaction term (XM) should be added to the regression model (Aguinis, 2004; Hagger-Johnson, 2014).   The interaction term is the product of multiplying the values of the psychosocial predictor (X) and the gender moderator (M). In this regression model, the interaction term is treated as an additional predictor with its own regression coefficient (Figure 5-9). The regression equation that represents this analysis is:

Y = a + B1 (X) + B 2 (M) + B 3 (X * M) + έ

Where:

Y = the predicted outcome variable

a = the constant coefficient or the intercept (the predicted value of self-care when the predictors = 0)

b1, 2, 3 = the regression coefficient or the slope (the change in self-care for unit change in the predictors)

έ = the random error in the approximation of self-care or the residuals

To assess the presence of moderation, two approaches can be used according to (Aguinis, 2004); the first one is testing the null hypothesis that the regression coefficient B3 of the interaction term is equal to zero. This statistically means that we are testing whether a unit change in the moderator M causes a change in the slope of the regression of Y on X greater than would be expected by chance alone. The second is assessing the change in the squared multiple correlation coefficients R^2 before and after entering the interaction term to the regression model. The null hypothesis here is $\Delta R^2 = 0$ and we are testing whether the addition of the interaction term XM increases the explained variance in the outcome compared to only having X and M in the regression equation. The statistical significance of B3 is always identical to the statistical significance of ΔR^2, therefore, assessing the moderation effect based on either of the two approaches, null hypotheses will be equal. However, Aguinis recommends using the second approach because ΔR^2 can be used to compare the effect sizes across studies unlike B3 which is specific to the scale used in measuring X, Y and M (Aguinis, 2004).

Based on this, the ΔR^2 approach was used for moderation effect assessment in this study. In addition, results of the first approach were still evaluated in order to display the difference in the regression slope across the two gender groups. This difference is presented visually using plots. Moreover, reporting the regression coefficient B3 is useful in adding information about the relative size of the moderating effect referenced to the specific scales used in this study as mentioned earlier.

Covariates were added to the model and controlled for in the regression analysis.
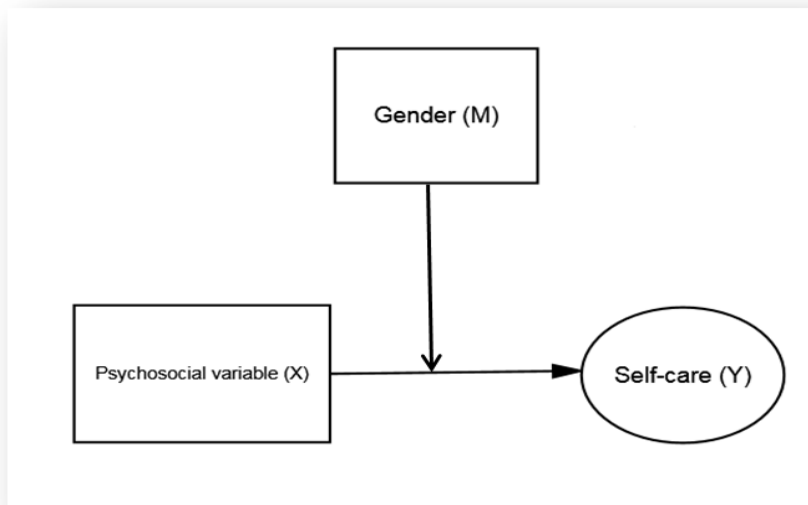
Figure 5-8 the conceptual model for the relationship of psychosocial variables and self-care outcome moderated by gender
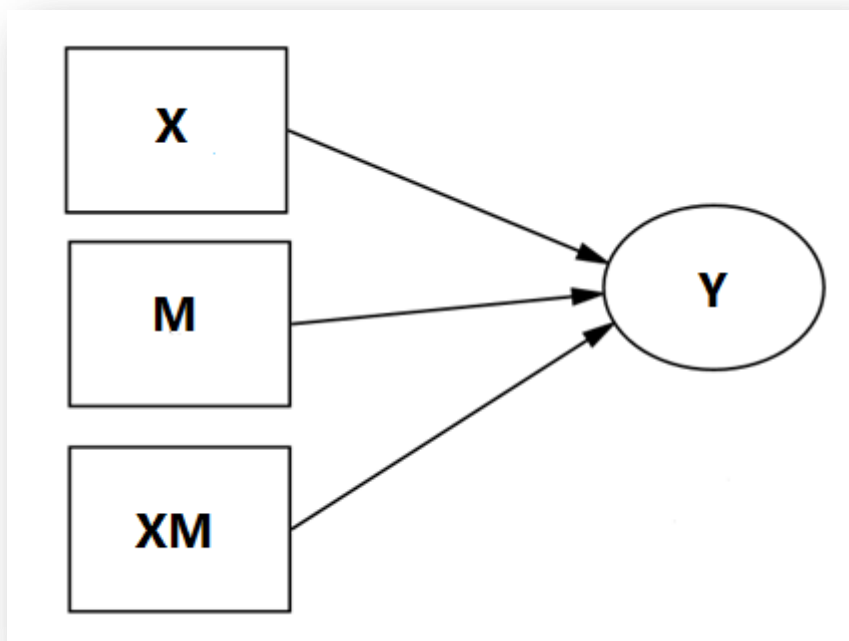
Figure 5-9 the statistical model for the relationship of psychosocial variables and self-care outcome modified by gender

In SPSS, a series of hierarchical multiple regression analyses was performed to examine the path model. The variables were entered in three stages; in the first stage, the factors to control for were entered. This is referred to as model 1 in the analysis. Second, model 2 included the predictor variable to be examined (X) and the moderator (M) represented by a dummy variable of women represented as 1 and the men group as the reference group of 0. Finally, the interaction term of gender and the examined psychosocial predictor (X*M) was entered as model 3. The change of the relationship between the predictors and the self-care outcome as well as the change in squared multiple correlation coefficients R^2 between model 2 and 3 mainly were observed. Moderation was assessed using $p<0.05$ as the significance value of the ΔR^2.

In this study, moderation by gender was tested for the following relationships:

1. The relationship between diabetes distress (PAID score) and self-care (Dietary, exercise, blood sugar monitoring, foot care and adherence to medication) behaviours.

2. The relationship between self-efficacy and self-care (Dietary, exercise, blood sugar monitoring, foot care and adherence to medication) behaviours.

3. The relationship between each of three domains of the social support (Support needs, support attitudes and support received) variables and self-care (Dietary, exercise, blood sugar monitoring, foot care and adherence to medication) behaviours.

The continuous predictors were centered in these regression analyses, centering was done by subtracting the mean from the variable, so that a centered score is a deviation score. This practice is recommended when a moderated regression analysis

is conducted (Cohen and Cohen, 1983; Aiken, West and Reno, 1991) as centering reduces the overlap of the interaction term with the two main effects included in the interaction term. In addition, centering improves the interpretability of the results, they are interpreted at the means of the original scales rather than the zero value which can be meaningless on some scales (Berger, 2015).

To summarise, the statistical analyses carried out in this study are illustrated in Figure 5-10.
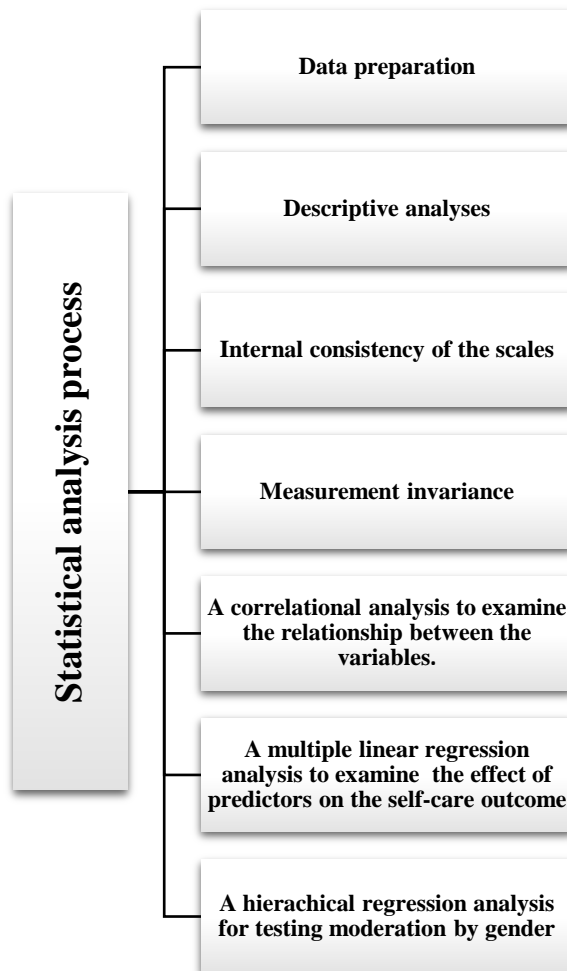
Figure 5-10 a summary of data analysis process

5.10 Chapter summary

This chapter has explained the procedure this study used to meet its aim. A non-experimental quantitative design was used in this study. The participants in this study were T2DM patients from two family medicine clinics in Amman/ Jordan. The preliminary power analyses determined a minimum sample size of 205 patients. The study participants completed a self-reported questionnaire with measures of diabetes related self-efficacy, diabetes distress, social support and diabetes self-care. Although these scales have been used in different settings, some of them have not been previously used with Jordanian T2DM patients. Thus, interpreting the results of these measures in the context of the Jordanian culture will add to the knowledge currently available, particularly with reference to the manner in which T2DM is affected by gender related social structures particular to Jordan. As a paucity of data was found regarding the relationship between health and gender in Jordan, a particular challenge for this study is to ensure the applicability of these concepts in the context of Jordanian culture.

In this study, the questionnaire was administered in two ways; self-administered and interviewer administered informed by the pilot phase findings. Although it is reported in literature that the mode of delivering the questionnaire can affect the quality of data collected, knowledge about how the mode of administration alters the quality of data collected is still inconsistent because of limited number of experimental design studies examining this effect (Bowling, 2005). Nonetheless, respondents of a wellbeing scale were randomised into a self-administered and an interviewer-administered groups in a similar study (Kaplan, Sieber and Ganiats, 1997) and the findings showed that both means produced comparable data and the

effect of the mode of administration on the quality of data was insignificant. Based on that, it was suggested that different modes in delivering the questionnaire would not have a major impact on the quality of the collected data for this study. The results obtained using these methods are presented in the next chapter.

6. Chapter 6: Results

6.1 Introduction

This chapter presents the results of the analysis of the data obtained using the questionnaire that was administered to the study sample. The descriptive characteristics of patients are presented in section 6.2. Section 6.3 describes the internal consistencies of the used scales. The results from the measurement of invariance of the PAID scale are summarised in section 6.4. The chapter also presents the results of the measured variables in this study and provides a comparison of these results between men and women (section 6.5).

The relationship between the psychosocial and self-care behaviours for men and women are examined and presented using correlation and multiple regression analyses (sections 6.6 and 6.7). Finally, the hierarchical regression analyses conducted to test the moderation effect of gender on the relationship of the psychosocial variables with the self-care behaviours are interpreted in section 6.8.

6.2 Descriptive results of the study's participants

6.2.1 Characteristics of the participants

Table 6.1 summarises the demographic characteristics for the participants in this study. The majority of participants were Jordanian. Nine patients were non-Jordanian (2 Iraqis, 7 Syrian). Of the 239 participants, 51.5% (n = 123) were women and 48.5% (n = 116) men. The mean age of participants was 60.05 (SD=10.31) years. The youngest patient was 29 years old and the eldest one was 85 years old. The

majority of the participants were between the ages of 50-69 years (68%, n= 162), followed by ≥ 70 years old (n=45, 20%), then 40-49 years old (10%, n=23). Men were significantly older than women (p=0.003).

The mean duration for having T2DM for the total sample was 9.9 (SD=7.3) years. The mean durations of T2DM for men was 10.3 (SD =7.5) years compared to 9.6 (SD =7.2) years for women which was not significantly different.

The majority of participants were married (88%, n= 211). 98% of men were married compared to 79% of women. 25 participants were widowed, among which there were two widowed men and 23 widowed women. There were three single women but no single men. None of the participants was divorced. A similar pattern was found in the general population in Jordan. The latest population census has reported that 94% of men above 40 years old (which represents the majority of patients in this study) were married compared to 63% of women being married among the same age group. 2% of men aged above 40 were widowed compared to 18% of women. Single men above 40 years old comprised 3% of the census population compared to 6% of women above 40 being single (Population and housing census of Jordan, 2015).

Results for this study shows that the majority of the participants (76.6%, n= 183) had school education (primary and secondary). Thirty-three participants (13.8%) reported having higher degrees. Twenty-two participants were illiterate, 18 were women compared to only four men. A significant difference in education was seen between men and women (Chi square test p <0.001). These findings are consistent with the education profile for the Jordanian population. Recent illiteracy rates among women were found to be 8.9% compared to 4.6% among men. These proportions are higher

among older age groups. Above the age of 60, the illiteracy percentage was 18% among men compared to 45% among women (Population and housing census of Jordan, 2015).

The majority of the study's participants were unemployed (84.1% n=201). This was expected as the participants are of an older age group with a high probability of being retired. The unemployed category included being retired, holding only household responsibilities or no current job as subcategories. Among women, 78.0% (n=96) reported being housewives. 5% (n=6) reported having no current job and 11% (n=14) were retired. On the other hand, 48.3 % (n=56) male participants were retired and 25% (n = 29) were unemployed. None of the men reported holding a household position. This could be culturally explained as in Jordan household responsibilities are mostly assumed by women (Miles, 2002). Significant differences in employment status were noted among male and female participants (Chi square test p <0.001).

For income, as can be seen in

Table 6.2, the majority of respondents (75%, n=180) reported a monthly household income of less than 500 JD (nearly £565 according to currency converter in February 2017). Of those, (65.0% n=117) were participants at Basma Health centre, compared to (35.0% n=63) in Abu-Nseir Health centre. Of the total participants, 18% reported a monthly income that ranged between 500-1499 JD. Only one participant reported an income of 1500-3000 JD. One participant reported an income >3000 JD per month.

Table 6.1 Participants' demographic characteristics

Characteristic		Women		Men		Total		P
Age Mean ± SD		n= 123		n= 116		n= 239		**0.003**
		58.16 ±9.99		62.10 ±10.28		60.05 ±10.31		
T2DM duration in years Mean ± SD		n= 121		n= 109		n= 230		0.535
		9.65 ±7.21		10.25± 7.53		9.93 ± 7.35		
		Frequency	Column%	Frequency	Column%	Frequency	Column%	
Nationality	Jordan	117	95.1%	113	97.4%	230	96.2%	0.35
	Other	6	4.9%	3	2.6%	9	3.8%	
Marital status	Single	3	2.4%	-	-	3	1.3%	**0.000**
	Married	97	78.9%	114	98.3%	211	88.3%	
	Widowed	23	18.7%	2	1.7%	25	10.5%	
Education	Primary school	56	45.5%	36	31.0%	92	38.5%	
	Secondary school	39	31.7%	52	44.8%	91	38.1%	**0.000**
	Higher degrees	9	7.3%	24	20.7%	33	13.8%	
	Illiterate	18	14.6%	4	3.4%	22	9.2%	
Employment status	Employed	6	4.9%	30	25.9%	36	15.1%	**0.000**
	Unemployed	116	94.3%	85	73.3%	201	84.1%	

Health Centre	Basma	73	59.3%	68	58.6%	141	59.0%	0.90
	Abu Nseir	50	40.7%	48	41.4%	98	41.0%	
Type of treatment	Insulin	13	10.7%	15	12.9%	28	11.7%	
	Pills	85	70.2%	83	71.6%	168	70.3%	0.72
	both	23	19.0%	18	15.5%	41	17.2%	

Table 6.2 Household monthly income from all sources in Jordan Dinars

Monthly income	Frequency	Percent
<500	180	75.3
500-1499	42	17.6
1500-2999	1	0.4
>3000	1	0.4
Would rather not say	9	3.8
patient left blank	6	2.5
Total	239	100.0

6.2.2 Differences in characteristics between self-completed and interviewer-completed participants

Nearly 63% of patients chose to complete the questionnaire with the assistance of an interviewer. An analysis to explore the differences in characteristics of patients between the patients who self-completed the questionnaire and the patients who were assisted by an interviewer was done to explore how patients' demographic characteristics are related to their preference in filling in the questionnaire.

Table 6.3 shows significant differences between the two groups, mainly in age, duration of T2DM, gender, education level and employment status. Patients who were interviewer assisted comprised an older age group (mean = 62.2, SD= 10.1) compared to self-completion group (mean = 56.4, SD= 9.66). Similarly, interviewer-completion patients had a longer duration of T2DM compared to self-completion group, with means = 11.0, SD=7.5 and 7.9, SD= 6.65 respectively. This might be partly related to other factors such the increased probability of having more health issues with increased age and duration of T2DM such as the presence of diabetes related complications that could affect a patients' vision.

A gender difference arose in relation to the completion type, whereby 71.5% of women requested to fill in the questionnaire with the interviewer assistance compared to 54% men. This could be explained by the differences in education level found between men and women of the study's population, especially the higher rate of illiteracy among women compared to men (18 illiterate women and 4 illiterate men).

Table 6.3 Self-completed and interviewer-completed participants' characteristics

		Completion type				
		self-completed		interviewed		P value
Age of patients (Mean ,SD)		56.4 ± 9.66		62.2 ± 10.1		*0.000*
T2DM duration (Mean,SD)		7.9 ± 6.65		11.0 ± 7.5		*0.003*
		Count	row %	Count	row %	
Gender	Male	53	45.7%	63	54.3%	*0.006*
	Female	35	28.5%	88	71.5%	
Health centre	Basma	54	38.3%	87	61.7%	0.570
	Abu-Nseir	34	34.7%	64	65.3%	
Education	Primary school	22	23.9%	70	76.1%	*0.000*
	Secondary school	47	51.6%	44	48.4%	
	Higher degrees	19	57.6%	14	42.4%	
	Illiterate	0	0.0%	22	100.0%	
Marital status	Single	1	33.3%	2	66.7%	0.367
	Married	81	38.4%	130	61.6%	
	Divorced	0	0.0%	0	0.0%	
	Widowed	6	24.0%	19	76.0%	
Household monthly income from all sources in Jordan Dinars	<500	63	35.0%	117	65.0%	0.387
	500-1499	12	28.6%	30	71.4%	
	1500-2999	0	0.0%	1	100.0%	
	>3000	1	100.0%	0	0.0%	
Employment status	Employed	21	58.3%	15	41.7%	*0.013*
	Unemployed	66	32.8%	135	67.2%	

6.2.3 Differences in participants' characteristics between the pilot and the main data groups

Because no changes were required to the methods or the instruments used in the pilot data collection stage, it was decided to keep the pilot data collected previously in the final dataset. However, analyses of the differences between the characteristics of the pilot data population and the characteristics of the new data population were carried out.

Table 6.4 shows that significant difference between pilot and the main data groups were mainly in the marital status, and T2DM duration. In the piloted group, most patients were married which is similar in the main data group. However, the percentage of widowed participants had increased from 4% to 14% of the total sampled in both groups which could have contributed to this difference. The piloted population had shorter durations of T2DM in comparison to the main data group.

Table 6.4 Description of the piloted and the main data participants' characteristics

		Data				P value
		main		pilot		
Age of patients (Mean ±SD)		61.03 ±9.67		58.48 ±11.13		0.065
T2DM duration (Mean ±SD)		10.70 ±7.36		8.73 ±7.21		***0.047***
		Count	Column%	Count	Column%	
Gender	Male	74	50.7%	42	45.2%	0.405
	Female	72	49.3%	51	54.8%	
Education	Primary school	61	41.8%	31	33.7%	0.095
	Secondary school	56	38.4%	35	38.0%	
	Higher degrees	14	9.6%	19	20.7%	
	Illiterate	15	10.3%	7	7.6%	
Marital status	Single	2	1.4%	1	1.1%	**0.044**
	Married	123	84.2%	88	94.6%	
	Divorced	0	0.0%	0	0.0%	
	Widowed	21	14.4%	4	4.3%	
Household monthly income from all sources in Jordan Dinars	<500	114	83.8%	66	75.0%	0.193
	500-1499	21	15.4%	21	23.9%	
	1500-2999	0	0.0%	1	1.1%	
	>3000	1	0.7%	0	0.0%	
Employment status	Employed	21	14.4%	15	16.1%	0.883
	Unemployed	124	84.9%	77	82.8%	

6.3 The internal consistency of the scales

All the used scales were adapted from published sources, and all were found reliable by their original developers. These scales were translated as presented in the methods section of this study. To test the reliability of the Arabic version of these instruments, their internal consistency was statistically analysed.

6.3.1 Self-efficacy scale

The self-efficacy scale was found to have adequate internal consistency (α= 0.768). The original scale internal consistency was 0.85. No increase in α was shown when any of the eight items were deleted meaning that all items appeared to be worthy of retention. All items showed a good correlation with the total scale, the lowest correlation was between the scale and item 4 (How confident do you feel that you can exercise 15 to 30 minutes, 4 to 5 times a week?), r = 0.334, and the highest correlation was between the scale and item 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?) r = 0.589. (Appendix 13a)

6.3.2 Diabetes distress (PAID) scale

Internal consistency of PAID scale was α= 0.923, which is very near to the original questionnaire developed by (Polonsky *et al.*, 1995) which had an internal consistency of 0.90. All items correlated with the total scale with r $\geq$ 0.30. The lowest r was 0.342 which refers to item 1 ("Not having clear and concrete goals for your diabetes care?"), and the highest correlation was with item 6 ("Feeling depressed when you think about living with diabetes?") with r= 0.714 (Appendix 13b).

6.3.3 Social Support scale

The social support scale reliability was evaluated for each of the three domains: support needs, support received and support attitudes. Each had 6 items. The domains showed a high average internal consistency represented by 0.85 for the support needs domain, 0.70 for support attitude domain and 0.84 for the support received domain.

All items in the support needs domain correlated with an $\alpha = 0.58$ or more. The highest item-total correlation was for item 6 ("I want a lot of help and support from my family or friends in handling my feelings about diabetes") with r= 0.68 and the lowest correlation was for item 4 (I want a lot of help and support from my family or friends in doing enough physical activity) with r=0.57.

In the support attitudes domain, items 8, 10 and 12 were reversed and recoded. All item-total correlations were above 0.34. The highest correlation was for item 10 (My family or friends discourage or upset me about my diabetes) r = 0.54.

The support received items correlated with an $\alpha = 0.6$ except item 13 "My family or friends help and support me a lot to follow my meal plan" which was the lower with an $\alpha = 0.42$. Appendix 13c.

6.3.4 Self-care (SDSCA) Scale

The internal consistency for this scale was assessed using the average inter-item correlation in direction with the scale authors' recommendations because the subscales contained in the SDSCA are formed with a small number of items (Toobert, Hampson and Glasgow, 2000). The Cronbach's α value was 0.61 for the five diet items, 0.38 for the two exercise items, 0.76 for the two self-monitoring of

blood sugar, and 0.66 for the two foot care items. The inter-item correlation values for the two items in each of the blood sugar, exercise and foot care domains were 0.61, 0.25, and 0.50 respectively. The internal consistency results of the original SDSCA scale showed that the subscales average internal consistency was >0.47 (Toobert, Hampson and Glasgow, 2000). This is consistent with the results of the average internal consistency in this study whereby subscales achieved an average internal consistency of > 0.50 except for the exercise subscale average internal consistency which was 0.38 in this study's sample compared to 0.75 in the original study. Appendix 13d.

6.4 Measurement of gender invariance

Evaluation of measurement invariance for the diabetes distress constructs across the gender groups was done by conducting a Multigroup Confirmatory Factor Analysis (MCFA) in Amos. The sample was split into two separate files, one for men (112) and the other for women (117).

A one-factor model for the diabetes distress construct measured by 20 items was identified for comparison across the two groups using exploratory factor analysis (EFA) prior to the MCFA analysis. The one-factor model was examined for fit by a sequential assessment of models where each model is nested in the previous one as suggested in literature for measurement of invariance (Kremelberg, 2010; Milfont and Fischer, 2010). The model fit indices used for the models evaluation in this study were the Chi-square (χ^2), CMIN/DF, CFI, and RMSEA with their cut-off values as listed in the methods chapter.

The results of this analysis are shown in Table 6.5. The first step was to test whether the one-factor structure is equal across the two groups which refer to the baseline or the configural model in the analysis. The results show good model fit for the gender groups (CMIN/DF = 1.593, RMSEA = 0.051, CFI= 0.879) indicating that the factorial structure of the construct is equal across men and women in the sample of this study.

In the metric model, the fit indices also showed a good fit, which indicates equal or invariant factor loadings of the one-factor model across gender groups. Finally, the results of the scalar model fit indices shows a good RMSEA of 0.055 and a good CMIN/DF of 1.68 but a marginal CFI index of 0.845.

Chi square (χ^2) was significant for all the models tested, indicating that the observed covariance matrix was not similar to the predicted covariance matrix. However, the chi square use is problematic as it has limitations (Milfont and Fischer, 2010). Thus, to further investigate the difference between the three models, model comparison was closely inspected using the difference in chi square statistic ($\Delta\chi^2$) starting from the least constrained model (the configural model) down to the model that has the largest constraints (the scalar model). The results showed that the difference in chi square between the configural and the metric model was not significant ($\Delta\chi^2 = 24.246$ p= 0.187) indicating that the addition of the equal loadings constraint to the model did not affect the model fit. On the other hand, the difference between the metric and the scalar model was ($\Delta\chi^2 = 71.621$ p= 0.000) indicating that a significant decrease in the model fit occurred when the equality of intercepts constraint was added. Thus, the factorial structure and the loadings can be considered the same in men and women, although there is some indication that women and men

might be using the response options to the items differently when controlling for their underlying levels of the latent construct of diabetes stress. However, the deterioration of model fit is minimal, and whilst this may suggest an area which requires further exploration in future work, the model with the intercepts equality constraint still meets the criteria for 'passable' fit statistics. It is therefore justified to continue to use means of the diabetes distress scale in the comparative analyses between men and women

Table 6.5 Fit indices for invariance test for Diabetes Distress scale for gender groups

Model	Chi-square	P	CMIN/DF	CFI	RMSEA
Configural	541.557	.000	1.593	.879	.051
Metric	565.803	.000	1.576	.876	.050
Scalar	637.424	.000	1.682	.845	.055

6.5 Levels of diabetes self-efficacy, diabetes distress, social support and self-care behaviours among the study's participants

In this section, the means for self-efficacy, diabetes distress, the social support domains and self-care behaviours are presented in Table 6.6 These results are compared for men and women.

Table 6.6 Levels of diabetes self-efficacy, diabetes distress, social support and self-care behaviours for T2DM men and women participants

	Total			Men			Women			
Scale	N	Mean	SD	N	Mean	SD	N	Mean	SD	Sig. (2 - tailed)
1. Self-efficacy	233	6.27	2.13	112	6.45	2.18	121	6.10	2.08	0.211
2. Diabetes distress	229	31.56	22.81	112	22.57	20.00	117	40.14	22.08	*0.000*
3. Social support										
Needs	225	2.62	1.21	110	2.53	1.30	115	2.73	1.19	0.279
Attitudes	222	4.16	0.65	108	4.20	0.68	114	4.12	0.61	0.355
Received	223	2.73	1.14	109	2.96	1.18	114	2.51	1.05	*0.003*
4. Self-care										
Diet	222	4.49	1.51	110	4.31	1.66	112	4.65	1.33	0.090
Exercise	222	1.93	1.89	110	2.20	1.95	112	1.66	1.79	*0.032*
Blood sugar monitoring	222	1.58	2.09	110	1.60	2.09	112	1.56	2.11	0.907
Foot care	222	2.61	2.51	110	1.95	2.22	112	3.26	2.61	*0.000*
Medication	221	6.58	1.34	109	6.55	1.37	112	6.60	1.32	0.794

6.5.1 Self-efficacy

This 8-item scale assessed how confident patients were in doing certain activities. All items were scored on a scale of 1 (not at all confident) to 10 (totally confident); the score for the scale was calculated as the mean of the eight items, higher mean score indicates greater self-efficacy (Lorig *et al.*, 2009). In this study, the mean score of the participants was 6.27 (SD = 2.13). The mean score for men was 6.45 (SD = 2.18) with a minimum score of 1.25 and a maximum score of 10. For women, the mean score was 6.10 (SD=2.08) with a minimum score of 1.00 and a maximum score of 10. There were no significant differences in the total self-efficacy score between men and women.

6.5.2 Diabetes distress

The PAID instrument measured the level of diabetes distress for T2DM patients. PAID score ranges from 0 to 100. The mean score of the participants was 31.56 (SD= 22.81). The average score for men was 22.57 (SD=20.00) with a minimum score of zero and a maximum score of 87.50. For women, the mean score was 40.14 (SD=22.08) with a minimum score of 3.75 and a maximum score of 100. Women have reported significantly higher diabetes distress than men (two sample t-test $p = 0.0001$).

6.5.3 Social Support

The Social Support Scale contained three subscales: perceived support needs, support attitudes and support received. The overall score of the scale ranges between 1 and 5. On the support needs, the mean score was 2.62 (SD= 1.21). There was no significant difference between men and women in the mean scores for support needs (two sample t-test $p = 0.279$). Although there was no statistically significant gender

difference in the overall score of support needs, men and women differed in reporting their specific needs, the difference between men and women was significant in two items, firstly, "I want a lot of help and support from my family or friends in getting enough physical activity", the mean for men was 2.27 (SD= 1.5) and the mean for women was 2.85 (SD= 1.6) (two sample t-test p =0.005). Secondly, the item "I want a lot of help and support from my family or friends in handling my feelings about diabetes", the mean for men was 2.53 (SD= 1.6) and the mean for women was 3.10 (SD = 1.6) (two sample t-test p =0.007).

The support attitudes mean for the study population was 4.16 (SD = 0.65). There were no significant differences between men and women in their mean scores for the support attitudes (two sample t-test p = 0.355). When scoring the support received, the mean score was 2.70 (SD= 1.13). Women reported significant less support received by family and friends compared to men (two sample t-test p = 0.003).

About 50% of the total participants answered "spouse" and 22% "other family members" to the question "Who helps you the most in caring for your diabetes?". However, the primary source of support differed significantly according to gender (One-way ANOVA test p= .0001). The majority of men (78%, n=78) considered their spouse to be the most important source of diabetes related support, while only 25% (n=29) of the women perceived their spouse as the most helpful.

Figure 6-1 shows that more women reported getting support from other sources than men. For example, 41 women reported other family members (mainly their sons or daughters) as the most helpful persons compared to only 8 men. Similarly, 13 women chose the doctor as the most helpful compared to 3 men. Friends were the least reported source of support for the study participants, no men reported receiving

help from friends compared to only four women who did. Finally, 27 women chose "no one" compared to 14 men. As more men were married than women as reported earlier, a separate analysis for the same question was done among the married group in order to explore the differences between married men and women reporting sources of social support (See Figure 6-2). The result showed that 78% of married men reported their spouse as the main source of help compared to 25% of married women who chose their spouse. 44% of married women compared to 9% men chose other sources of help including the doctor, other family members or friends. 23% of married women chose "no one" compared to 12% of married men.
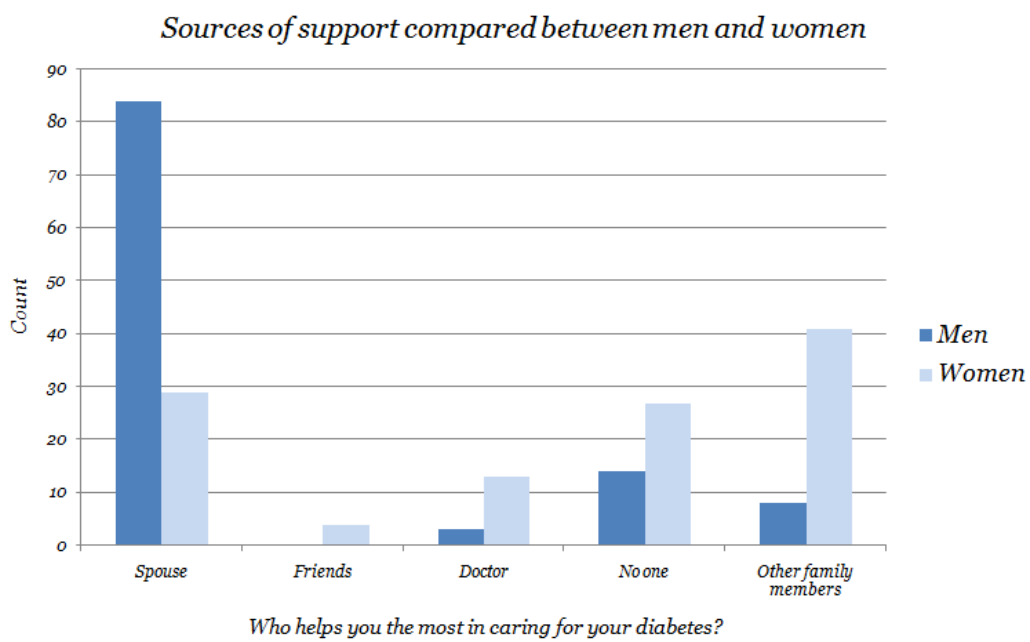
Figure 6-1 Bar chart comparing answers of men and women to question 19 in the social support scale
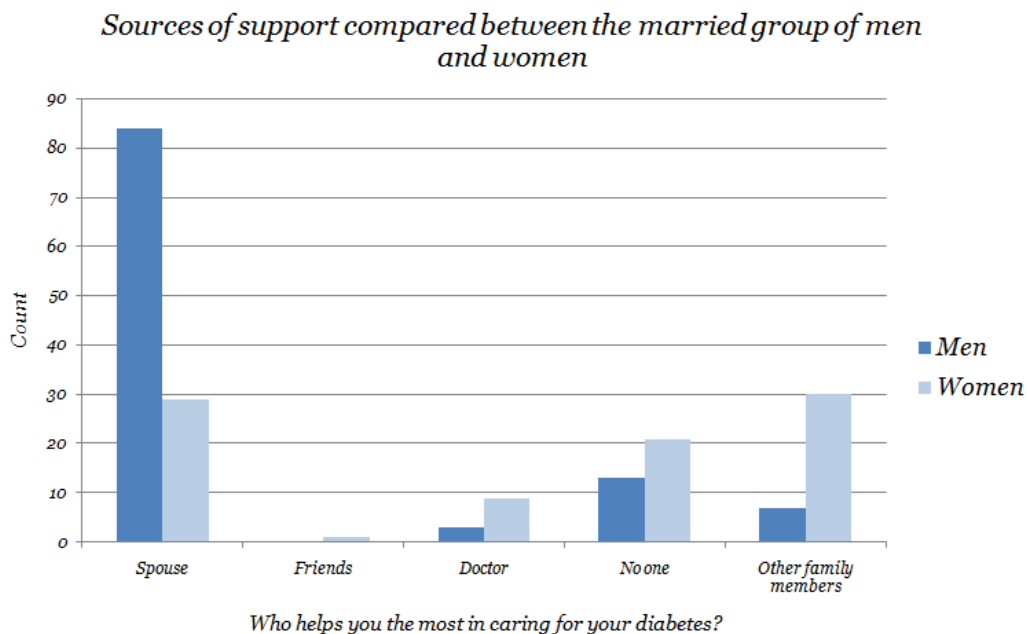
Figure 6-2 Sources of support compared between the married group of men and women

6.5.4 Self-care behaviours

The average of scores for each subscale of SDSCA was obtained as recommended in the scoring guidelines of the original SDSCA authors (Toobert and Glasgow, 1994). The mean scores of SDSCA range between 0 and 7 where 0 means no adherence and 7 means full adherence for everyday during the past week. Participants of this study demonstrated varying levels of self-care according to the specific behaviour. Generally, patients' self-care practices were below optimal level with reference to recommendation by the American Diabetes Association, (ADA 2016). The most frequently reported behaviours were adherence to medication (mean = 6.58, SD =1.34 days) followed by adherence to healthy diet (mean = 4.5 ,SD= 1.5 days). For the five items about diet, the means were above 4 days on the scale of 1 – 7 except for intake of high-fat-content food. The 30-minute exercise was suboptimal for T2DM patients in this study, the mean was 1.9 (SD= 1.9) days in a week period

which is less than what is recommended by the ADA (ADA 2016) of at least 3 days or 150 minutes per week. The exercise subscale shows that the practice of general physical activity such as house chores was higher than the practice of specific exercise such as swimming, biking, etc. (2.94, SD= 2.8 and .92, SD= 1.9 respectively). The mean score of the foot care subscale was 2.6 (SD= 2.5) days in the past week which is not consistent with the ADA recommendations of daily feet inspection and care (ADA 2016). The mean of items 11 and 12 asking about feet care shows that patients check their feet more frequently than checking the inside of their shoes before they wear them, (3.43, SD= 3.174 and 1.80, SD= 2.617 respectively). The least frequently reported self-care behaviour was blood sugar monitoring (1.6, SD= 2.09 days).

Regarding gender differences in self-care practices, men practiced significantly more exercise than women, the mean score of exercise for men was 2.2 (SD= 1.95) days compared to 1.6 (SD= 1.8) days for women (two sample t-test p = 0.032). Women cared for their feet more frequently than men (3.2, SD= 2.6 days compared to 1.9, SD= 2.2 days) (two sample t-test p = 0.0001). The mean days for dietary self-care was 4.65 (SD=1.33) for women compared to 4.31 (SD= 1.66) for men. Although the difference in the overall diet score was not statistically significant, item 3 of the diet subscale (On how many of the last seven days did you eat high fat foods such as red meat or full-fat dairy products?) differed significantly where women showed more adherence to decreasing fat intake than men (1.39, SD=1.515 and 2.12, SD= 2.126 respectively) (two sample t-test p = 0.004).

6.6 The relationship between diabetes self-care and: self-efficacy, diabetes distress and social support variables

Table 6.7 presents the correlation matrix for the psychosocial and the self-care variables. The correlations of diabetes distress with patients' self-efficacy and with the support attitudes toward T2DM were negative (- 0.303, $p<0.0001$ and -0.261, $p<0.0001$ respectively). Thus, as the patient's distress is higher, their self-efficacy and the support attitudes from family and friends towards their T2DM are more likely to be lower. On the other hand, support needs increase proportionally with diabetes distress (0.483, $p<0.001$). Among self-care practices, diabetes distress is negatively associated with dietary practices (-0.208, $p=0.002$), exercise (-0.148, $p=0.030$) and adherence to medication practices (-0.141, $p=0.017$).

Self-efficacy is negatively correlated with patients' support needs (-0.223, $p<0.001$). Patients with higher self-efficacy levels also show higher level of all the included self-care practices.

An increase in the support needs is associated with decreased rates of adherence to healthy dietary practice (-0.414, $p<0.001$), exercise (-0.200, $p=0.003$), and medication self-care practices (-0.221, $p=0.001$). Increased support needs are associated with an increase in performing blood sugar monitoring (0.141, $p=0.05$). For support received, as patients receive more support, their dietary self-care practice and their adherence to medication decrease (-0.263, $p\leq 0.01$ and -0.123, $p= 0.073$) respectively.

Table 6.7 Bivariate correlation matrix for psychosocial variables and self-care behaviours (N=214)

		1	2	3	4	5	6	7	8	9
1	Diabetes Distress	1								
2	Self-efficacy	-.303**	1							
3	Support needs	.483**	-.256**	1						
4	Support Attitudes	-.261**	.151*	-.301**	1					
5	Support Received	.057	.003	.428**	.040	1				
6	Dietary self-care	-.208**	.327**	-.414**	.279**	-.263**	1			
7	Exercise	-.148*	.392**	-.200**	-.071	-.030	.229**	1		
8	Blood sugar monitoring	.037	.134*	.149*	-.046	.142*	.057	.033	1	
9	Foot care	.163*	.134*	.121	-.081	.075	.038	.118	.126	1
10	Adherence to medication	-.141*	.182**	-.221**	.057	-.123	.272**	.134	-.006	.026

** $p \le 0.01$ (2-tailed). *. $p \le 0.05$ (2-tailed).

6.7 Prediction of self-care behaviours in men and women

Multiple regression analysis was performed separately for men and women to see whether there are differences in predicting self-care domains between men and women. Findings are summarised in Table 6.8. The results show differences in the predictors of the self-care practices between men and women.

For women, 36.3% of the variability in the dietary self-care behaviour can be explained by reference to age, T2DM duration, education, marital status, income, employment, self-efficacy, diabetes distress, social support needs, attitudes and support received $F_{(13,89)}= 4.235$, $p<0.0001$. Among these, self-efficacy and support needs play a major role in predicting the dietary self-care frequency: $B = 0.143$, $p=0.026$ and $B = -0.364$, $p=0.012$ respectively.

While in men, the results of the regression indicated that the examined predictors explained 40% of the variance in the dietary self-care $F_{(13, 73)} = 3.475$, $p<0.0001$. Self-efficacy was found to significantly predict dietary self-care in men: $B = 0.173$, $p=0.032$), and support attitudes of family and friends toward T2DM ($B = 0.846$, $p= 0.007$).

For exercise self-care, the model of the examined predictors explained approximately 23.5% and 19.5% of the variance in exercise behaviour for men and women respectively. Self-efficacy was found to be a strong predictor for exercise practices in both men and women ($B = 0.388$, $p =0.001$ and $B= 0.295$, $p= .004$). In women, support attitudes predicted exercise self-care ($B = -0.636$, $p= 0.05$).

Results of regression of the blood sugar monitoring behaviour show that the examined predictors can explain 25.7% of the variance in men's self-care behaviours compared to 10.5% in women. T2DM duration was the only significant predictor of

blood sugar monitoring in men (B= 0.128, p<0.0001) while none of the examined variables were significant predictors for blood sugar monitoring in women.

The foot self-care regression model showed differences between men and women. The explanatory value of the model for men was 29% F (13, 73) = 2.41, p=0.009 compared to 14.7% F (13, 89) = 1.259, p= 0.253 for women. Predictors for foot care in men were self-efficacy (B = 0.311, p =0.007) and the T2DM duration (B=0.121, p<0.0001).

Lastly, medication adherence regression model explained 32.8 % of men's behaviour F (13, 72) = 2.77, p = 0.003 compared to 24.7% of women's behaviour F (13, 89) = 2.27, p = 0.012. The examined psychosocial variables were not found to predict this behaviour in men or women regression models.

These analyses suggest that predictors of self-care behaviours are different for women compared to men. They also suggest that the examined regression models explain the variance in self-care behaviour in men better than in women for the examined self-care behaviours.

Table 6.8 Summary of multiple regression analyses for variables predicting women's and men's self-care domains

	Variable	Women B	SE B	β	P	Men B	SE B	β	P	Total B	SE B	β	P
Dietary self-care	*(Constant)*	4.792	.319		.000	1.508	4.165		.000	4.324	.196		.000
	Self-efficacy	.143	.063	.215	.026	.195	.173	.233	.032	.174	.048	.248	.000
	Diabetes distress	-.002	.007	-.037	.732	.006	.003	.040	.725	-.002	.005	-.031	.701
	Support needs	-.364	.142	-.311	.012	-.311	-.132	-.099	.470	-.212	.106	-.172	.047
	Support attitudes	.351	.205	.155	.089	.652	.846	.341	.007	.625	.165	.263	.000
	Support received	-.120	.118	-.097	.310	-.226	-.161	-.115	.326	-.157	.095	-.121	.099
	R2	.363				.400				.341			
	Adjusted R2	.272				.296				.284			
	F, p	4.23, p<0.0001				3.47, p<0.0001				5.99, p<0.0001			
Exercise self-care	*(Constant)*	1.641	.503		.002	2.323	.384		.000	2.32	.285		.000
	Self-efficacy	.295	.100	.320	.004	.388	.109	.423	.001	.345	.070	.373	.000
	Diabetes distress	.001	.010	.008	.949	.005	.013	.045	.722	.004	.008	.048	.591
	Support needs	-.257	.223	-.159	.253	-.197	.252	-.119	.435	-.231	.154	-.142	.136
	Support attitudes	-.636	.322	-.203	.052	-.248	.421	-.080	.559	-.394	.240	-.126	.103
	Support received	-.018	.185	-.010	.925	.200	.225	.116	.378	.067	.138	.039	.626
	R2	.195				.235				.195			
	Adjusted R2	.080				.102				.125			
	F, p	1.659, p=0.084				1.658, p= 0.089				2.807, p= 0.001			
Blood sugar monitoring	*(Constant)*	.945	.613		.127	1.656	.405		.000	1.822	.331		.000
	Self-efficacy	.125	.122	.117	.307	.211	.115	.214	.071	.132	.082	.129	.107
	Diabetes distress	-.002	.013	-.023	.857	-.022	.014	-.197	.116	-.003	.009	-.036	.702
	Support needs	.322	.272	.171	.240	.393	.266	.220	.144	.302	.179	.168	.093

		Women				Men				Total		
	Support attitudes	.298	.393	.082	.451	-.557	.445	-.168	.215	-.006	.279	-.002	.983
	Support received	.159	.226	.080	.482	.037	.238	.020	.876	.127	.160	.067	.428
	R2	.105				.257				.118			
	Adjusted R2	.023				.128				.042			
	F, p	0.82, p=0.637				1.99, p= .033				1.556, p= 0.090			
Foot self-care	(Constant)	3.115	.737		.000	1.535	.394		.000	2.17	.367		.000
	Self-efficacy	.201	.147	.152	.174	.311	.112	.313	.007	.234	.091	.191	.011
	Diabetes distress	.001	.015	.006	.963	-.006	.013	-.053	.663	.004	.010	.036	.683
	Support needs	.451	.327	.195	.171	-.049	.258	-.028	.849	.180	.199	.084	.366
	Support attitudes	-.627	.473	-.140	.188	-.344	.433	-.104	.430	-.325	.310	-.079	.295
	Support received	-.008	.272	-.003	.975	.482	.204	.270	**.020**	.169	.178	.075	.341
	R2	.147				.290				.236			
	Adjusted R2	.025				.167				.170			
	F, p	1.205, p=.288				2.359, p=0.011				3.57, p<0.001			

		Women				Men				Total		
Medication adherence	(Constant)	6.526	.323		.000	6.913	.173		.000	6.73	.171		.000
	Self-efficacy	.070	.064	.114	.282	.049	.050	.110	.330	.073	.042	.137	.084
	Diabetes distress	.007	.007	.122	.305	-.009	.006	-.177	.141	.000	.005	-.004	.965
	Support needs	-.177	.143	-.165	.219	-.020	.114	-.025	.863	-.051	.093	-.055	.581
	Support attitudes	.115	.207	.055	.582	.038	.190	.025	.843	.066	.144	.037	.648
	Support received	.073	.119	.064	.543	-.095	.101	-.115	.351	-.051	.082	-.052	.536
	R2	.247				.328				.138			
	Adjusted R2	.140				.210				.063			
	F, p	2.29, p=.011				2.77, p= .003				1.84, p=0 .032			

- B= Unstandardized beta coefficient
- SE B= Standard Error
- β= Standardized Coefficients Beta
- P is considered significant at p<0.05.
- Age, T2DM duration, income, marital status, employment, and education of study patients are controlled for.
- Age, duration, self-efficacy, social support needs, attitudes, received and diabetes distresses are centred.

6.8 Does gender moderate the relationship between psychosocial variables and self-care behaviours?

A three staged multiple regression analysis was conducted to test the hypothesis that gender moderates the relationship between the psychosocial variables and the self-care behaviours in the T2DM Jordanian patients.

Appendix 14a shows the results of examining the moderation effect of gender on the relationship between diabetes distress (DD) and the five components of self-care behaviours. For dietary self-care adherence, model 1 $R^2 = 0.303$ and F (6, 194) = 14.055, p = 0.002. Model 2 shows $R^2 = 0.33$, F(2, 192) = 11.814, p=<0.0001. The coefficients for gender is statistically significant at p= 0.009. At this stage, a 1-point increase in diabetes distress score would predict a decrease of 0.003 days in dietary self-care frequency. The difference in dietary self-care between men and women was 0.179 days in favour of women, assuming their diabetes distress score is equal. Finally, in model 3, adding the interaction term results in no difference in R^2. This shows that the patient's gender did not function as a moderator in the relationship between diabetes distress and dietary self-care.

Similarly, going through the same analysis for diabetes distress and the other components of self-care, the addition of the interaction term of gender with any of the components did not result in any improvement of the regression model, ($\Delta R^2 = 0.000$, p = 0.916) for the exercise component, ($\Delta R^2 = 0.002$, p = 0.507) for the blood sugar component, ($\Delta R^2 = 0.007$, p = 0.205) for the foot care component and ($\Delta R^2 = 0.015$, p = 0.076) for the medication adherence component. This indicates that gender did not moderate the relationship between the diabetes distress and: the

exercise, blood sugar monitoring, the foot care or the adherence to medication components of self-care.

Appendix 14b summarises the analysis of the moderation of gender on the relationship between **self-efficacy and self-care outcomes**. Results have revealed that an increase in self-efficacy score by one point increases dietary self-care frequency by 0.171 days which is significant at p= 0.000. Being a woman increases frequency of adherence to dietary self-care by 0.529 days. In model 3, the coefficient of the interaction term is 0.049. Adding the interaction in model 3 did not change the explanatory variance of model 2, $\Delta R^2 = 0.001$, p = 0.571. This indicates that gender did not modify the relationship between self-efficacy and dietary self-care adherence.

Similarly, gender did not act as a moderator for the relationship between self-efficacy and adherence to exercise self-care level ($\Delta R^2 = 0.001$, p = 0.359), neither did it for the relationship between self-efficacy and sugar monitoring behaviour ($\Delta R^2 = 0.0001$, p =0.880). gender was also not a moderator for the relationship between self-efficacy and foot care ($\Delta R^2 = 0.008$, p = 0.171) or medication adherence ($\Delta R^2 = 0.0001$, p = 0.829).

For social support, analysis for the moderating effect of gender was conducted for the three domains separately (Appendices 14c,14d,14e). In general, the addition of the interaction terms of each domain of social support with gender did not make a difference in the explained variance of the self-care outcomes. The change in R^2 before and after entering the interaction terms of: support needs and gender , support

attitudes and gender, and support received and gender were not significant for all the tested relationships.

From the previous analyses, the moderation effect of gender on the relationship between the psychosocial and the self-care domains was not supported. This means that the null hypothesis could not be rejected for all of the interaction effects tested. Thus, it is suggested that the relationships between the psychosocial predictors and self-care outcomes are not changed across the levels of both genders.

7. Chapter 7: Discussion and conclusion

7.1 Introduction

This chapter aims to review and critically evaluate the key findings of this study in the context of the relevant existing literature. Prior to this, a brief restatement of the aim of the study, the study questions and objectives is made. Also, the theoretical model and method design are presented to facilitate the subsequent discussion regarding how the study findings answered the proposed questions.

The aim of this study was to examine the relationship between self-efficacy, social support, diabetes distress factors and self-care behaviours in men and women with T2DM in Jordan.

The following research questions were addressed:

1) Do men and women with T2DM living in Jordan differ in their psychosocial variables and self-care activities?

2) What is the relationship between psychosocial variables and the level of self-care among T2DM patients in Jordan?

3) Does gender moderate the relationship between psychosocial variables and self-care?

The objectives outlined below highlight the process by which the proposed questions of the study were investigated

4- Investigate whether men and women with T2DM who visit diabetes outpatient clinics have different psychosocial variables (including: self-efficacy, social support and diabetes distress) and self-care behaviours (including: exercise, diet, blood sugar monitoring, feet care, and adherence to medication).

5- Examine the relationship between self-care behaviours and: self-efficacy, diabetes related distress and social support variables in men and women and whether this relationship is moderated by gender.

This study has identified gaps in research on gender differences in self-care and its relationship to the psychosocial characteristics of T2DM in the Middle East in general and Jordan in particular (Chapters 2 and 3).

A theory guided approach that focused on how self-care and the studied psychosocial factors are related and the differences between men and women in regard to these variables and their association was used to form the conceptual model for this study (Chapter 4).

The study followed a cross sectional design that used a translated questionnaire to measure the patients' levels of self-care, self-efficacy, diabetes distress, perceived social support needs and social support received. It also measured the patients' perceived attitudes of their families and friends' towards diabetes and their most helpful source of support. The data was analysed using correlational and regression methods (Chapter 5).

Section 7.2 presents the discussion of the key findings in relation to existing knowledge and empirical evidence in the field. Following this, the strengths of this study and the

possible limitations are discussed in section 7.3. Section 7.4 and 7.5 cover the implications of current findings for both clinical practice and research fields are explained. Finally, the chapter brings this thesis to a close providing the concluding remarks in section 7.6.

7.2 Key findings of the study

7.2.1   Self-efficacy

The mean score (out of 10) for self-efficacy of this study population was 6.27 (SD = 2.13). Only one study that used the same measure of self-efficacy in Jordan was found, the study reported a mean score of 6.55 (SD= 1.9) among 793 T2DM Jordanian patients attending the National Centre for Diabetes, Endocrinology and Genetics (NCDEG) (Hamdan-Mansour *et al.*, 2016). The researchers have interpreted this mean as indicative of moderate to high self-efficacy; however, the study has not reported what cut-off value was used for this classification and how this value was chosen. Another study conducted in the Marshal islands reported a mean score of 7.7 (*SD* = 2.2) in 150 T2DM patients visiting diabetes clinics (Bohanny *et al.*, 2013). This mean is higher than the level of self-efficacy in the population of the current study. This could be due to the different setting and population (Bohanny *et al.*, 2013). This mean was also interpreted as high and again no cut-off was reported. Depending on the interpretation of these studies, it can be inferred that the self-efficacy level of the population in the current study is also moderate to high. Regarding gender differences, no significant differences in the total self-efficacy score was found between men and women in the current study and the previous studies mentioned did not consider this.

7.2.2 Diabetes distress

7.2.2.1 High levels of diabetes distress in this study

This study has assessed the level of diabetes distress among T2DM patients living in Jordan using the Problem Areas In Diabetes self-reported scale (PAID). The mean score for PAID in this study was 31.56 (SD= 22.81). This value is considered high with comparison to the mean value in Norwegian population of 23.1 (SD=18.0) (Graue *et al.*, 2012), American population 25.0 (SD= 20.9) (Welch, Jacobson and Polonsky, 1997), Dutch 22.5 (SD=19.8), English 27.8 (SD=23.2) (Snoek *et al.*, 2000), and Turkish 27 (SD=19) (Huis In T Veld *et al.*, 2011). While all the mentioned settings are western, these high level of distress in this study compared to those reported in literature may reflect cultural differences between the Jordanian Arabic culture and other cultures in expressing and reporting distress. A study in Malaysia reported a mean PAID score of 39.4 (SD=19.4) which is higher than in this study (Jannoo *et al.*, 2014). When comparing our result with studies done in similar settings to Jordan, only two studies that used Arabic version of PAID were found; one is (Sukkarieh, 2011) study that measured diabetes distress for 140 Lebanese T2DM patients; the mean score for diabetes distress was 11.94 (SD=10.42). The low score of distress was interpreted by the researcher as indicative of denial given the finding of a high percentage of uncontrolled HbA1c among the study population. It is also recommended by the questionnaire authors that low PAID scores can indicate denial of the condition (Joslin Diabetes Centre, 1999). Another study in Kuwait has reported a mean score of 21.71 (SD=18.08), the study included 120 adults with T2DM over the age of 55 in Kuwait (Alragum, 2008).

Although sharing similar culture, this study population still has higher distress reported. A possible explanation could be attributed to health services provided to the patients in this study. It might be that the education on diabetes distress provided to the patients in this study is not sufficiently informative. This could lead to a decrease in the patients' awareness on how to cope with diabetes distress and hinder them from dealing with their distress which could contribute to the high levels reported. A lack of published studies on the use of PAID in an Arabic speaking population and a lack of studies about how services (aimed to educate patients about diabetes distress) can reduce patient's distress levels means that a comparison of this result with these two settings remain inconclusive.

A cut-off score of 40 was suggested by PAID developer as indicative of severe level of diabetes related distress (burn-out) level (Joslin Diabetes Centre, 1999). In this study sample, 30.6% scored greater than 40. It should be noted that this cut-off score was based on a series of studies using the PAID questionnaire in European samples of diabetic patients (Snoek *et al.*, 2000) (Pouwer *et al.*, 2005); as this study examines a different setting, it might be that a different cut-off value applies given the higher scores of distress reported. No studies in an Arabic setting were found to have examined what the most appropriate cut-off score should be.

Further analysis of PAID scores showed that the frequent issues associated with high levels of distress (scored as serious problem) were "Worrying about the future and the possibility of serious complications" (29.7%, n=71), followed by "feelings of guilt or anxiety when get off track with diabetes management" (27.2%, n=65) and "feeling

overwhelmed by diabetes" (20%, n=49). This is consistent with the findings of the original study by (Polonsky et al. 1995) where patients were more frequently distressed from worrying about the future, the possibility of developing complications, and feeling overwhelmed by the burden of diabetes self-care in addition to being scared of living with diabetes and being burned out by the constant efforts to control their disease (Polonsky *et al.*, 1995; Welch, Jacobson and Polonsky, 1997). This suggests that the similar worries are experienced by T2DM patients in different settings.

7.2.2.2 Differences in diabetes distress levels between men and women

In this study, women have reported significantly higher diabetes distress than men (two sample t-test p = 0.000). The mean score for men was 22.57 (SD=20.00) compared to 40.14 (SD=22.08) for women. Moreover, 16.1% of men had a score greater than 40 compared to 44.4% of women above the severe distress cut-off score. The tendency for women to report higher level of distress and more problems related to diabetes than men has been reported by many studies (Welch, Jacobson and Polonsky, 1997; Snoek *et al.*, 2000; Gross *et al.*, 2007; Huis In T Veld *et al.*, 2011; Graue *et al.*, 2012). In Kuwait, the difference in the mean scores of PAID between men and women was significant as well (p ≤ .05) (Alragum, 2008).

Referring to the theoretical framework of this study, we discussed that distress levels are dependent on a patient's perception of the stressors (either psychological or social) and the patient's judgment of available coping resources (section 4.4.1). It was also highlighted that gender differences in this study are explained in the scope of social

perspective (section 4.6.3). Accordingly, in this study, the finding of higher distress in women can be explained in line with the social roles in Jordan, where increasing demands of the disease that might be put on women compared to men. Traditionally, Arab women in general have other roles in the family and in the society including being expected to fulfil a greater extent of caring tasks in addition to their disease which can be more challenging for them.

7.2.3 Social support for T2DM patients: unmet supportive care needs for women

In this study, the overall mean for perceived social support needs was 2.62 (SD= 1.21) on a scale that ranged between 1 and 5. The mean score for women for perceived support needs was 2.73 (SD = 1.11), and the mean score for men was 2.52 (SD =1.30). Although there was no statistically significant gender difference in the overall score of perceived support needs, men and women differed in their specific needs. The difference between men and women was significant in two items. Women perceived a greater need for support from friends and family to perform enough physical activity and to manage their feelings about diabetes.

Regarding support received, women reported significant less support received by family and friends compared to men. To measure social support this study has used the three subscales of the Diabetes Care Profile scale. Although measuring and interpreting these three subscales separately is recommended by the scale developers, it was difficult to find similar studies that reported the score of each subscale separately. Therefore, comparison of this study results with other literature studies could not be performed.

However, results of gender differences in social support are consistent with literature in that women perceive more support needs and less support received than men (Brown *et al.*, 2000; Gucciardi, Wang and DeMelo, 2008; Hjelm and Berterö, 2009; Chiu and Wray, 2011; Song *et al.*, 2012; Shrestha, Kosalram and Gopichandran, 2013).

In this study, considering the whole study population the score for support received was higher than the perceived needs of support. This would tend to the conclusion that patients' needs of support were met, however upon closer inspection, men reported higher support received 2.92 (SD 1.17) than perceived needs 2.52 (SD 1.30) while women reported more needs 2.73 (SD 1.11) than received 2.50 (SD 1.06). These results indicate that there are unmet needs for support in women.

Social support can be provided by many sources as discussed earlier in this thesis (section 4.5.3). This study has found family (spouse and other family members) as the main source for support for Jordanian T2DM patients. This result agrees with literature that showed family as the principal source of support (Cutrona and Suhr, 1992; Toljamo and Hentinen, 2001; Rosland *et al.*, 2008; August and Sorkin, 2010; Stopford, Winkley and Ismail, 2013; Heinze *et al.*, 2015). Given the strong role of the extended family in Jordan's social networks, the influence that families have on the self-care behaviours of Jordanian patients is expected to be significant. This study also found men and women to differ in reporting their most helpful source of support. A majority of men perceived their spouse to be their most helpful source while women considered their spouse to be the greatest source of support less often. Furthermore, some women reported their friends as helpful sources compared to no men reporting their friends as helpful sources.

Similar results were found by another study which reported men perceived greater family support, while women reported more support from friends (Kvam and Lyons, 1991).

7.2.4 Suboptimal self-care behaviours

The list of self-care activities from the least practiced to the most practiced were: blood glucose monitoring (Mean=1.6, SD=2.09 days); exercise activities (Mean=1.9, SD=1.9 days); foot care (Mean= 2.8 SD= 2.5 days); diet activities (Mean= 4.5, SD=1.5 days); and adherence to medication (Mean: 6.5 8, SD=1.34 days).

Adherence to medication was the most frequently practiced behaviour. This result was consistent with other studies that measured self-care behaviours of diabetic patients in different settings and countries (Toobert, Hampson and Glasgow, 2000; Tol, Shojaeezadeh and Eslami, 2012). In Jordan, adherence to medication among diabetic patients was measured for the past seven days by Al-Khawaldeh et al. (2012) and Albikawi and Abuadas (2015) ; means were 6.1 ± 1.7 and 6.6 ± 0.92 respectively. In addition, Al-Amer et al. (2011) and Khattab et al. (2010) reported percentages of patients with diabetes who adhered to their medication in the past seven weeks; they were, 72.9% (n=649) and 91.9% (n=917) respectively. The current study found that 87.8% of the study's patients reported they took their diabetes medication every day in the week prior to the survey. These figures reflect a high level of reliance on medications among Jordanian patients in comparison with other self-care requirements as well as reflecting patients' preference to practice behaviours that require the least effort. Alongside this, lower than recommended levels of adherence to the other self-

care practices indicates that patients found following these recommendations challenging. The variance in practicing self-care behaviours is in line with Orem's theory (see section 4.1.2) that assumes self-care to be behaviour-specific, wherein the capability of performance of certain self-care actions does not indicate the ability of performance of another kind of action (Orem et al. 2001).

Participants reported that they did not practice healthful dietary habits at all times. On average, patients followed their healthful eating plan 4.03 ± 2.62 days per week (item 5). The diet subscale mean in this study was 4.5 ± 1.5; which reflected how often participants adhered to various healthy diet practices (i.e. five-a-day fruits and vegetables, spacing carbohydrates, decreasing fatty food and overall adherence to their diet plan) on a weekly basis. The percentage of patients who followed optimal healthful eating practice seven days a week was 25% (n=56). This percentage shows that it can be difficult to maintain a consistently healthy diet for a week, whilst patients with T2DM are still expected to maintain a healthy diet indefinitely in order to minimise their risk of diabetic and cardiovascular complications.

These results are based on Jordanian responses to a US description of a healthy diet which may not be defined identically to a Jordanian description of a healthy diet. Whilst the two general questions related to a 'healthy' diet (items 1 and 5) may be interpreted differently by Jordanians, the 3 specific questions (items 2, 3 and 4) can be transferable and have a higher chance of being interpreted the same. A clarification of dietary habits in the Jordanian culture might help in understanding the dietary self-care situation of patients in this study and the challenges they have regarding following a dietary plan.

Most dishes commonly prepared in the Jordanian cuisine are rice- based and most Jordanians eat bread with every meal (Madanat, Troutman and Al-Madi, 2008; Bawadi, 2012). Meat is added to the meal proportionally with increasing income, however, serving meat is essential in food-containing social activities (Madanat, Troutman and Al-Madi, 2008). In the Arab context, social connections are very strong and demanding; they might negatively influence T2DM patients' efforts in keeping control over their dietary requirements. For example, attending social gatherings, which are usually food-centered, is one of the obligations for maintaining these social connections, refusing to share food or requesting certain dietary requirements might be considered disrespectful (Fritz *et al.*, 2016). In a qualitative study of women with high risk of T2DM in Emirates, sociocultural norms were identified among barriers to weight management. One of the study's interviewed patients reported:

"We try to eat healthy food at home but when we visit our relatives and friends they get upset if we don't eat everything they put on the table" (Ali, Baynouna and Bernsen, 2010) p.222.

This practice occurs similarly in Jordan; Jordanians usually offer their guests large portion sizes and insist on having more food constantly during the visit as a sign of their generosity towards their guests (Bawadi, 2012). Thus, there is a possibility that cultural and social norms add to the difficulty of maintaining optimal diet practice among T2DM patients in Jordan.

Exercise was another form of self-care measured in this study. Patients practiced exercise on average of 1.9, SD= 1.9 days per week. In the current study, 68.5% of the

participants did not achieve the recommended physical activity threshold of at least 30 minutes for three days or more during the past week. Regarding specific forms of exercise, 73% of participants reported not having practiced any specific exercises such as swimming, biking, or walking except for housework activity during the last seven days of the study (mean = 0.92, SD= 1.9). In general, daily exercise is not widely practiced by the Jordanian population (Ammouri *et al.*, 2007; Badran and Laher, 2012; Barghouti *et al.*, 2015). The exercise levels of the patients in this study are comparable to the findings of exercise performance of Jordanian patients with diabetes in other studies. For example, Khattab et al. 2010 and Al-Amer et al. 2011 reported that 68% and 60.7% (respectively) of patients with diabetes have not achieved the 30-minute physical activity in the past seven days.

The causes contributing to low levels of exercise among Jordanian patients appear to be different compared to other populations. For example, in the UK, reasons for physical inactivity among patients with diabetes were mainly perceived difficulty taking part in exercise, feelings of tiredness, being distracted by television, lack of time and lack of local facilities (Thomas *et al.*, 2004). T2DM patients in the UK also reported comorbidities (e.g. arthritis), poor weather and safety concerns as barriers to practice exercise (Booth *et al.*, 2013). Whereas in Jordan, one study has found that the most common reason for not exercising was having no desire, followed by lack of time, while having diabetes was the least common cause reported by diabetic patients (Darawad *et al.*, 2016). Other reasons for not exercising were; poorly designed facilities (e.g. sidewalks) and lack of exercise-encouraging environments (e.g. public green spaces and

parks) in Jordan (Darawad *et al.*, 2016). This suggests that barriers to exercise among Jordanians with diabetes may not be directly due to their diabetes, but largely due to wider social and environmental factors. Causes of low desire to exercise among Jordanians with diabetes may need further investigation in future studies.

Blood glucose monitoring was the least-practiced self-care activity. This result might reflect a relatively low level of knowledge or skill in performing this behaviour. In addition, as the majority of the population in this study have a low income, cost may also be a barrier, (although income and glucose monitoring were not significantly correlated). Although patients showed low levels of adherence to blood sugar monitoring, evidence for the value of routine blood sugar monitoring for T2DM (especially those who are not on insulin treatment) is still debatable as mentioned in Chapter 2, thus, it is difficult to be confident whether their practice was suboptimal.

Lastly, an inadequate level of foot care was found among the population of this study; 38% reported not having checked their feet in the last seven days at all, and 60% reported not having inspected the inside of their shoes at all during the last seven days. Low levels of foot checking were not expected because foot washing is an activity expected to be performed frequently by Muslims as a religious practice which enables the patients to check their feet frequently during the day; regular foot checking is reported in similar communities to Jordan such as Saudi Arabia (Bukhari, 2009; Aljohani, 2011). This result might suggest poor diabetic foot care education by health-care providers among patients in this study, it is however reported that there is a discrepancy between Jordanian diabetic patients' knowledge of diabetic foot care

requirements and their actual practice of foot care. One study found that 53% of patients with diabetes have a "good" knowledge of foot care whilst only 6% of patients were classified as practicing a "good" level of foot care (patients were categorised as either having poor, satisfactory or good knowledge/practice based on their scores) (Abu-Qamar, 2014). Barriers to effective foot care among diabetic patients in Jordan are attributed to both patients and healthcare providers' factors (Abu-Qamar and Wilson 2011). One qualitative study has reported that Jordanian diabetic patients believe that the need for regular diabetic foot examination is not necessary if there are no active ulcers on their feet (Abu-Qamar and Wilson 2011). Patients also report not receiving regular foot examination by their health care providers and that health care providers did not inform them about foot care instead they obtained their information from family and friends (Abu-Qamar and Wilson 2011).

In summary, the above findings support the need for effective diabetes self-care as they reflect possible limitations in the way T2DM self-care is taught and supported by health care professionals in the Jordanian health setting.

7.2.5 Women and men care differently for their diabetes: more exercise for men, more foot care for women

Practicing exercise and foot care were significantly different between genders. Results of this study shows that men engaged in the practice of physical activity more frequently than women. This result is generally consistent with reports of lower levels of physical activity among women than men worldwide (World Health Organisation, 2017). This gender difference, though consistently reported, is of varying degrees in different

contexts and societies. For example, in the UK, more men met the guidelines of physical activity than women (67% of men versus 55% of women) (Townsend *et al.*, 2015). However, populations of Asian (e.g. Indian, Pakistani, Bangladeshi) backgrounds who live in the UK were found to have lower levels of physical activity than their European counterparts in general and among women in particular (Hayes *et al.*, 2002; Lawton *et al.*, 2006). Barriers for women to uptake more physical activity are attributed to social, cultural and economic factors. For example, cultural and social norms contributed to the lower physical activity levels among Arab women living in the US (Qahoush *et al.*, 2010; Bertran *et al.*, 2015). Sociocultural norms were frequently reported to restrict outdoor physical activities among women in Arab culture (Ali et al. 2010; Aljohani 2011; Ammouri et al. 2007; Al-Ali and Haddad 2004; AL-Ma'Aitah et al. 1999). Moreover, sociocultural gender roles of women's greater responsibilities for care of family and household can make it difficult for women to find the time to practice exercise (Al-Ali and Haddad 2004; Ammouri et al. 2007). Moreover, economic factors can hinder women's ability to pay for or access indoor sporting facilities such as gyms and sports centres (Albikawi and Abuadas 2015).

In this study, women reported higher adherence to regular foot care than men. This finding is in accordance with earlier studies conducted to explore gender differences in foot self-care (Yu *et al.*, 2013; Rossaneis *et al.*, 2016). In Jordan, findings of previous studies have been inconsistent when compared to the result of this study. One study has explored foot care knowledge and practice among patients with diabetes and reported no statistically significant association between gender and the level of knowledge (p=0.756) or practice of foot self-care (p=0.283) (Abu-Qamar, 2014). Furthermore,

evidence of differences in foot complications related to diabetes between men and women in Jordan was inconsistent. One study in Jordan reported higher prevalence of diabetic foot ulcerations among men compared to women (Bakri *et al.*, 2012), whereas another study found that gender was not related to the prevalence of amputation among T2DM patients in Jordan (Jbour, Jarrah and Radaideh, 2003). This reflects inconsistency of evidence about both foot care behaviour and diabetic foot consequences among Jordanian men and women with diabetes which may be a topic for further research.

Lastly, a difference between men and women was found in relation to one of the dietary adherence behaviours. Women reported higher adherence to reduction of food with high fat content. Possible explanations could be related to women's greater concern about weight gain; it is likely that they perceive fatty food as a contributor for weight gain which might explain why this was the only area of dietary self-care for which women differed from men. Other reasons could include gender roles as women mainly do the cooking and they are more aware of the amount of fat used in food preparation.

7.2.6   Factors predicting diabetes self-care in men and women

Self-care is an approach encouraged for patients with chronic diseases including T2DM to increase quality of care for these patients and decrease the cost of health services. Self-care approaches for T2DM are adopted by Jordan's healthcare system. However, psychosocial factors explaining self-care behaviours in Jordan's context are still unclear and the difference in applicability to such a model in Jordanian men and women has not been examined before. One of the objectives for this study was to examine a theoretical model of factors that predict patients' adherence to self-care activities (Section 4.8).

The study has examined this model using multiple regression statistical methods (see section 5.9.6) and found differences between men and women in factors influencing their self-care practices. It also found that the examined regression models explain the variance in men's self-care behaviours better than for women. This section discusses these findings in relation to previous studies and explores possible explanations in a Jordanian context.

For all examined self-care behaviours, the psychosocial variables included in regression models (adjusted for age, T2DM duration, employment, education and marital status) could explain 34% of the variance in dietary self-care, 19.5% of the variance in exercise self-care, 23.6 % of the variance in foot self-care, 11.8% of the variance in blood glucose self-monitoring and 13.8% of the variance in adherence to medication behaviour. The relatively low explanatory values of the examined models may reflect that there are other important factors which are related to these variables in relation to diabetes self-care behaviour that are not accounted for by these models. Other factors that could be related to self-care (directly and indirectly) include: knowledge of proper self-care practice (Norris, Engelgau and Narayan, 2001), provider-patient communication (Gao *et al.*, 2013), comorbidities and complications related to diabetes (Villas Boas *et al.*, 2013; Weinger, Beverly and Smaldone, 2014) and other psychological conditions such as anxiety or depression (Lerman *et al.*, 2004). In addition, religion and spiritual factors are found to affect health behaviours (Alsairafi *et al.*, 2016; Duke, Duke and Wigley, 2016). These factors may apply to patients in the Jordanian context, as studies of Jordanian patients with diabetes reveal that patients'

believe that having diabetes is a part of God's will and is in his control (Al-Amer *et al.*, 2015; Al-Hassan, Al-Akour and Aburas, 2016).

In this study, self-efficacy was the most significant factor predicting self-care behaviours of Jordanian patients with diabetes except their adherence to medication behaviour. Similar to this study, Sarkar et al. (2006) and Mishali et al. (2011) have found that self-efficacy predicted diet, exercise, sugar monitoring, and foot care but not medication adherence (Sarkar, Fisher and Schillinger, 2006; Mishali, Omer and Heymann, 2011). This suggests there are other determinants of medication adherence that may be more important such as medication side effects (Kassahun *et al.*, 2016) and complexity of treatment (Grant *et al.*, 2003) as well as system related factors such as accessibility to healthcare and costs of medications (Balkrishnan *et al.*, 2003; Hernandez-Ronquillo *et al.*, 2003). Furthermore, it is reported that medication adherence does not require a high degree of behavioural and lifestyle change as compared to the other self-care behaviours such as diet or exercise which could explain why taking medication is less dependent on self-efficacy (King *et al.*, 2010).

Differences between men and women in factors affecting their self-care behaviour were found in this study, these differences and potential explanations, for each of the self-care domains are discussed below.

Dietary self-care behaviours

The examined factors could explain 40% and 36.3% of dietary self-care behaviours for men and women respectively. Self-efficacy (B= .143, P=.026) and support needed (B=-

.364, P=0.012) were the significant predictors for dietary self-care behaviours of women in this study. For men, self-efficacy (B= .195, p=0.032), and support attitudes of family and friends toward T2DM (B= .846, p= 0.007) predicted dietary self-care of men. This result indicates that women and men share a similar effect of self-efficacy on their dietary self-care which reflects the importance of having confidence in maintaining this specific behaviour as it requires high level of behavioural and lifestyle change. Support needs seem to be an important predictor of diet adherence for women, as their perceived needs increase, the frequency of healthy diet practices over the measured week decreases. This indicates the importance of perceived needs for women as predicting their adherence to diet whilst in men, support attitudes seem to play an important role in predicting their dietary care, unlike women. This difference might reflect that men rely more on their social support system than women, from which the positive attitudes from the surrounding people could improve their dietary self-care.

Exercise self-care behaviours

The exercise self-care model of the examined predictors explained approximately 19% and 23% of the variance in exercise behaviour for women and men respectively. Self-efficacy was found to predict exercise practices in both women and men. Having higher self-efficacy could positively increase the frequency of performing exercise in men and women (B=.294, p=0.004 and B=.388, p=0.001 respectively). Given the low levels of exercise performance by Jordanian's in general and among patients with diabetes in specific mentioned earlier, this behaviour may need the most effort to be changed. This may reflect that having confidence in their ability to perform exercise (an internal

factor) might be more important in determining this behaviour than social support and distress factors which can be considered external factors.

Foot self-care

The foot self-care regression model explanatory value for men was 29% $F_{(13, 73)} = 2.41$, p=0.011 compared to 14.7% $F_{(13, 89)} = 1.259$, p=0.28 for women. Self-efficacy and support received positively predicted foot self-care in men, while the psychosocial factors examined did not predict women's behaviour regarding foot self-care.

Blood sugar monitoring

Results of regression of the blood sugar monitoring behaviour show that the examined predictors explain 26% of variance in men's self-care behaviours compared to 10% in women. None of the examined psychosocial variables was found to predict blood sugar monitoring in models for men or women. This suggests that other factors related to gender can affect the relationship between these variables and blood sugar monitoring, but it is not clear what these might be, although they might relate to gender differences in diabetes education or understanding of how to measure blood glucose.

Medication adherence

Last, medication adherence was also not predicted by any of the examined psychosocial variables for men or women. As discussed above medication adherence may be predicted by other factors that were not measured in this study. However, patients' characteristics could predict medication adherence as such a woman's age (B=.025, p=.022), T2DM duration (B=0.32, p=.046) and being employed (B=-1.21, p =.012). In

men, they included being married (B=2.9, p<0.0001) and monthly income less than 500JD (B=.437, p= .037).

Overall, self-care determinants differed between men and women, however, self-efficacy was a consistent predictor of diet and exercise self-care behaviours for both men and women. The positive effect of self-efficacy on self-care behaviours found in this study is in line with Bandura's social cognitive theory that suggested when people feel confident that they can perform a certain behaviour, it is more likely for this behaviour to be adopted and maintained (Bandura, 1997). Empirically, the predictive value of self-efficacy for self-care behaviours in this study is in concordance with evidence from other studies that reported self-efficacy to influence better T2DM self-care practices (Aljasem *et al.*, 2001; Norris, Engelgau and Narayan, 2001; Williams and Bond, 2002; Sousa *et al.*, 2005; Bohanny *et al.*, 2013).

 The above results also show that the examined psychosocial factors were not found to be predictors of either blood sugar monitoring and medication adherence in men or women. This may be because these behaviours are related more to healthcare provision and socioeconomic factors, than to the psychosocial factors explored in this study.

Foot care in men could be predicted by self-efficacy and support received which might be consistent with the findings of overall poorer foot care among men in this study, whilst better foot care is determined by how much support they received.

It is not obvious why women's self-care behaviours were less explained by the regression model in this study with comparison to men. There is a paucity of studies that investigate factors predicting self-care behaviours separately for men and women

especially in contexts similar to Jordan. I identified one recent study which examined several predictors of women's self-care in Iran using the Health Belief Model (Karimy *et al.*, 2016). The model used by Karimy et al's explained 59.9% of the variance in self-care behaviours of women which is higher than the explanatory value of the model in this study. This can be explained as Karimy et al's study treated self-care behaviours as one measure, although they used the same measure for self-care used in this study (SDSCA). Karimy et al's revealed that self-efficacy was the strongest determinant of self- care of women in their study, other significant predictors were perceived barrier, benefit and susceptibility emerging (Karimy *et al.*, 2016). This is similar to what is found in this study ,with self-efficacy being a strong predictor diet and exercise of women, however because self-care behaviours in Karimy et al's study were treated as one measure, it is hard to determine whether self-efficacy was a predictor for all or some of self-care behaviours in women as in the current study.

These relationships cannot be explained without referral to the Jordanian cultural context especially in terms of gender roles and differences. As discussed previously that women's gender roles might be a factor that affect's women's health behaviours more than men. In a culture where gender roles are more prominent (and in most cases negatively affecting women's health) than other cultures, it might be expected that women's behaviours are more complex to interpret and predict.

In the study, self-care behaviours were considered individually when accounting for factors explaining these behaviours, while other studies have treated self-care scores as one general measure (Wilson *et al.*, 1986; Glasgow *et al.*, 1989; Albright, Parchman and Burge, 2001; Borhaninejad *et al.*, 2016; Gunggu, Thon and Whye Lian, 2016).

7.2.7 Lack of evidence of moderation of the relationship between psychosocial variables and self-care behaviours by gender

No moderation by gender was found in the relationship between any of the measured psychosocial variables and any of the measured self-care behaviours. Other studies found gender to moderate the relationship between depression and adherence to oral medication (Nau, Aikens and Pacholski, 2007) and the relationship between distress and physical activity in another study (Lipscombe *et al.*, 2016). No studies that examined gender moderation for similar relationships were found in an Arab context and so this finding may need to be further explored or confirmed by future studies.

7.3 Strengths and limitations of this study

Strengths and limitations of this study can be grouped into two main areas; those related to methodology and those related to the specific cultural context of the setting and population in this study. These are presented in more detail below.

7.3.1 Strengths and limitations related to the study methodology and methods

7.3.1.1 The theoretical framework of the study

The framework of this study was based on a thorough literature review that identified the conceptual understanding of self-care, self-efficacy, diabetes distress, social support and gender. Theories of self-care by Orem et al. 2001 incorporating theoretical understanding of diabetes distress by (Fisher et al. 2009; 2007; 2010; Polonsky et al. 1995), self-efficacy theory by (Bandura 1977; 1989; 1986; 1997), social support (Van

Dam *et al.*, 2005) in addition to the concept and theories of gender and its relationship to health outcomes (Annandale and Hunt, 2000; Hayes and Prior, 2003; Phillips, 2005) were utilised to form this study framework. These theories have been widely used including their previous use in the field of self-care and psychosocial factors, as discussed earlier in Chapter 4. Empirical evidence regarding the factors that influence self-care of T2DM and differences between men and women in these factors has been identified and summarised systematically. Applying these theories and using the empirical evidence to explore their relevance to a diabetes population in Jordan introduced a valuable approach to assessing these factors and outcomes for men and women in Jordan's primary healthcare system. Utilising this framework has revealed a number of factors that have not been identified in Jordan before. In particular, the model highlighted the role of gender in T2DM self-care outcomes and related psychosocial factors, whereas previous studies had not considered gender roles. More importantly, previous diabetes research in Jordan was mainly concerned about the level of glycaemic control (HbA1c), whereas the model in this study has focused on the factors that affect self-care that could potentially be modified. Identifying these factors provides evidence to suggest how they might be developed in order to provide better outcomes for patients with T2DM, and therefore inform better management strategies.

7.3.1.2 The study design

The exploratory cross sectional design used in this study precludes the generation of evidence for a definitive causal relationship between self-care, diabetes distress, social support, and self-efficacy. Furthermore, the cross sectional nature of the present study

makes it difficult to determine the direction of causality between the examined variables. Thus, reverse causality is possible and could not be excluded. For instance, while this study finds that higher levels of distress are associated with lower frequency of adherence to healthy diet behaviours, it can't be determined whether distress leads to poorer dietary self-care or that poor adherence to diet makes the patient more distressed. Therefore, interpretations of the relationships in this study were limited to identifying the association between variables and the magnitude and direction of these associations. A more thorough examination of these factors with regard to T2DM self-care would require experimental manipulation of variables which was not feasible in this study. However, the quantitative results of this cross sectional study produced information about psychosocial and self-care variables and provided evidence for differences between men and women for a range of relevant factors.

Psychosocial factors are varying and can change for the individual over time. Changes can be spontaneous (within the subject) or by intervention (from outside). Determining the degree to which psychosocial risks are varying is not easy when using single time point measurement (Gabe and Monaghan, 2013).This may have limited the ability to capture these changes in subjects in this cross sectional study. Nevertheless, although this particular study was not longitudinal, it has succeeded in providing original findings on the cross-sectional relationship which could be further explored in future longitudinal studies that could explore changes in both predictors and self-care over time.

7.3.1.3 Sampling and recruitment procedures

One strength of this study is that it had a pilot stage where the sampling and the recruitment plan were examined prior to the data collection phase. The piloting was an informative process that led to the refinement of the subsequent data collection. This is discussed in detail in Chapter 5.

The current study was undertaken in only two health centres in the capital Amman. Furthermore, convenient sampling was employed because it was consistent with the exploratory nature of the study and for feasibility reasons. Utilising this type of sampling may have limited the ability to generalise the study findings. However, these two centres were among the main centres in Amman serving patients living in west and east Amman. Additionally, as a small country, Jordan's population is very homogenous, in fact it is reported to have the most homogenous population of any Arab country ethnically, culturally, and in terms of general demographic characteristics (South, 2007). In this study, participant characteristics were similar to the general population of Jordan (See section 6.2.1); thus, the results of this study are not expected to differ significantly from other T2DM populations in Jordan.

A strength of the recruitment method of this study is that it recruited a sample with sufficient participants that met the sample size and power requirements of the study (Patel, 2003). Moreover, as this study's main aim was to examine gender differences, the recruitment process resulted in a balanced sample of men and women diagnosed with T2DM who were adequately represented in this study. Additionally, adequate information about the study and the involvement of trained data collectors has facilitated

recruitment. However, as self-identification was used in this study, self-selection bias might have been introduced (Patel, 2003).

Another limitation to interpreting the results of self-care behaviours emerging from the recruitment method is that the participants included in this study were chosen upon their visit to health care centres which are mostly visited by T2DM patients to renew their prescriptions or follow up their glycaemic control. This was reflected by the high adherence to medication found among the study population, which may not represent the adherence of the general population with diabetes because patients with less adherence to medication or patients who are managed through lifestyle change only (diet and exercise) were not represented in this study. It is also possible that patients who are keen to manage their diabetes visit these centres more than those who aren't which could have led to an overestimation of the degree of adherence to self-care behaviours which were already found to be suboptimal in this study apart from medication taking. Thus, the real situation of self-care practice could be poorer.

Having found that the majority of the study population were in the lowest category of monthly income (less than 500JD), there is a possibility that the more socio-economically advantaged group was not included. It might be that those with higher economic status refer to private sector of health to manage their diabetes and it is possible that those may have different levels of diabetes distress, self-efficacy, self-care and social support. Consequently, future studies may need to include these populations for a better understanding of self-care in all Jordanian patients with diabetes.

Using two methods of filling in the questionnaire (self- and interviewer- administered) in this study had an advantage of including patients with low literacy skills but might have introduced elements of social desirability. This may be the explanation for reporting of less distress, less support needed, less support received, better social attitudes, better dietary practice and better adherence to medication among the interviewed group. These differences could be related to the social desirability that is patients who were interviewed tried to show more adherence and fewer problems than patients who self-completed the questionnaire.

7.3.1.4 Measurements

A major strength to this study was the comprehensive translation process used to ensure the instrument would yield accurate data. The acceptable psychometric properties of the instruments in this study indicate their usefulness in assessing the self-care practices and psychosocial variables of Jordanians with T2DM and this can extend to other Arab speaking contexts in different countries.

Using validated measures that were driven by theory and which also were proven reliable and valid in other settings as illustrated earlier is strength of this study. The results from using these measures are expected to have validity and can also aid in comparing with other studies. However, all these data collection instruments were using self-report which could be susceptible to response bias if answers are influenced by the desire to give a "right" answer rather than the most accurate answer. However, the use of validated questions means we can consider that these instruments do

provide insight about self-care and diabetes related psychological and social variables as reported by patients.

A limitation of this study regarding measures is the use of a single question on describing a participant's sex as an identifier of his/her gender role. Although this study is concerned with gender differences, it is hard to accurately measure gender roles, thus, interactions of gender and psychosocial measures were used in this study to reflect the influence of gender roles on self-care outcomes. In addition, the separate models for men and women basically represent the main models (which included psycho-socio-demographic variables) with an interaction of gender on each variable.

For self-care measures a frequency of adherence to certain behaviours over the past week was used, this might have led to recall bias. In addition, seven-day recall might not reflect the overall adherence of participants. Future research could address this by using a daily record of self-care activities method, such as use of self-care diaries.

The measurement of psychosocial issues might also have limitations. Usually, these constructs are complex phenomena difficult to capture using quantitative methods. Thus it is problematic to measure and to interpret the findings of these variables. A major example for this complexity is the social support construct. In Chapter Four, the multidimensionality of social support and the inconsistency of its definition in literature were discussed. This was reflected when interpreting results of this study. An example is the relationship between social support needs and self-care behaviours, as support needs increase, all self-care behaviours performance decreased, except

blood sugar monitoring. Thus, it may be difficult to attribute behaviour change to social support in comparison to other factors such as self-efficacy and distress. This may also be an example of reverse causality as those with better self-care having less need or experience of support because they regard the behaviours as something they do routinely and as such have less experience of support.

Regarding measuring diabetes related distress; this study has differentiated theoretically between depression and diabetes distress and has used a specific measure for diabetes distress. This is considered strength of this study. As pointed out earlier (section 4.4), this study has measured diabetes distress more appropriately, using self-reports. In addition, diabetes distress is cause-specific. Thus, this study is expected to have measured distress specific to having diabetes rather than depression as depression is considered to be a more general state of mind. Moreover, finding differences in distress between men and women added to the knowledge which has previously concentrated on gender differences in depression and depressive symptoms. Because distress has a specific reason and women and men were found to be different in distress as well, the study raises the question as to whether these differences in self-report reflect real differences between men and women, and whether underlying reasons for the difference can be explored.

7.3.1.5 Statistical analysis

The appropriate statistical analyses for this study were carefully chosen in order to help answer the study questions. A 0.05 p value was set for significance in this study, this means that there is a 5% chance of rejecting the null hypothesis when it is true (false

negative result), and accepting the alternative hypothesis when it is false (false positive result). When a large number of statistical analyses on the same sample are carried out, a higher chance of false results can occur (i.e. Type 1 errors where the null hypothesis is true but it is rejected because by chance the p-value is less than 0.05) (Liquet and Riou, 2013). This study has addressed this potential pitfall by looking at the actual p value rather than just whether the value falls below the 0.05 boundary.

Being focused on gender differences, it was required that the differences in constructs measured in this study between men and women needed to be untangled from differences in how individuals are responding to various items (reporting differences). Thus, the study has used a measurement invariance statistical analysis (explained in Chapter Five). Knowing that a scale is invariant between men and women helps in ensuring more valid interpretation of differences between men and women and this was a strength of this study.

It is acknowledged that this study was unable to fully explore other possible correlates of self-care, such as the physician and patient relationship, diabetes knowledge, or other affective psychological conditions. Another limitation this study considers is that it didn't examine indirect relationships, for example exploring if distress can be related to self-care through self-efficacy. However, the findings of the relationships of self-efficacy, diabetes distress, and social support to self-care highlight the importance of these variables in promoting healthy diet, physical activity, foot care, blood glucose monitoring and medication taking behaviours.

It should be pointed out that Likert ordinal scales were implemented to measure the respondents' self-efficacy, social support and diabetes distress. These values were treated as continuous data and were analysed accordingly. This might have added to the limitations of the interpretation of the findings of this study because the distance between responses in ordinal scales is not measurable. Thus, descriptive statistics such as means and standard deviations may introduce unclear meanings when applied on ordinal data (Sullivan & Artino, 2013). Nevertheless, analysis of ordinal data as continuous data is still a matter of debate by researchers, there are arguments that parametric tests can be used to analyse Likert scale responses if the data are normally distributed (Sullivan & Artino, 2013). Regarding this study, the analysis methods were pre-planned and followed accordingly where this limitation was acknowledged.

7.3.1.6 The gender analysis approach

Throughout the entire study, a gender analysis approach to the topic was taken. This approach started with a literature review that collected evidence from studies which have measured differences between men and women. This study also used a combination of theories and applied gender conceptualisation to develop a theoretical framework focused on gender analysis. The methods used were developed to be in line with the theoretical approach. These methods included using representative samples of men and women and implementing appropriate statistical analysis of the differences between men and women. Making sure this gender analysis approach is consistently applied at each stage contributes to the uniqueness of this study in comparison to other

studies that measured differences between men and women and also of other studies investigating self-care in the diabetes field.

7.3.2   Strengths and limitations related to cultural context

Jordanian cultural elements that could have impacted this research during data collection are addressed in this section. First, although our findings were mostly similar to those found in other Arab populations such as Lebanese (Sukkarieh, 2011), Saudi (Aljohani, 2011), and Kuwaiti (Alragum, 2008), there still some specificity to Jordanian culture from other Arab contexts. These can be mostly related to economic and political factors specific to Jordan, which is considered less wealthy than neighbouring oil producing countries. These factors could have impacted population health in general and diabetes patients in particular especially with relation to distress.

 For social support, family ties and social obligations in Jordan might also differ from other cultural contexts. For example, although a transformation of family structure that is characterised by a decline in the structure of extended family and an increasing trend towards a nuclear family structure in the Jordanian society is documented, this transformation is still different to western families. As such, the society in Jordan is currently characterised by being a nuclear family with extended relations and obligations to second and third degree relatives (Gharaybeh, 2014). Thus, social support sources and perceptions could be different for Jordanians than other cultures.

From a gender perspective, 13% of households in Jordan has a female "head of household" in 2012 (Department Of Statistics-Jordan, 2012). This reflects differences in

women's responsibilities and position in Jordanian society which also might have an effect on psychosocial health outcomes.

Other ways in which women's position in Jordan might be considered better than other Arab contexts are reflected by a lower gender gap in education, employment, and other social status characteristics (Shafik, 2001; UNICEF, 2011), this might have an effect on their health behaviours and outcomes. Gender sensitive issues such as fewer barriers for women to travel to health centres alone or talk freely to male health providers and data collectors facilitated data collection and there was an equal chance of recruiting and collecting data from both men and women.

Data collection by medical student assistants encouraged patients to participate. This is thought to be culturally driven, as in Jordan those involved in the medical field, including students, are highly valued and respected.

7.4 Implications of the study findings for healthcare practice of T2DM in Jordan

As previously mentioned, this study has limitations regarding its focus on the relationships of psychosocial factors to self-care. Although the study may not be able to provide clear guidelines for use in clinical practice, it has still highlighted a set of psychosocial factors as related to and predicting self-care behaviours for T2DM men and women and has identified differences in these factors between men and women. Thus, the key findings obtained from this study can be used as theoretical justifications to form specific suggestions for various aspects of diabetes self-care practice in Jordan;

mainly, strategies designed for education and support of T2DM patients' in Jordanian primary care settings. These implications are discussed below.

Firstly, this study provided evidence that self-efficacy is a significant predictor of self-care behaviours of Jordanian T2DM men and women. This finding highlights the importance of incorporating components that enhance patients' self-efficacy in both diabetes self-care education and support (counselling) programs. It is therefore important to assess and increase a patient's confidence in their ability to perform specific self-care behaviour as part of the services provided in clinical settings. Similar recommendations of incorporating and enhancing self-efficacy of T2DM in healthcare programs in Jordan were made by other studies (Al-Khawaldeh, Al-Hassan and Froelicher, 2012; Hamdan-Mansour *et al.*, 2016). Evidence for the effectiveness of applying such a practice in Jordan is provided by a recent study that has examined integration of self-efficacy in educational support for T2DM and found it to be successful in increasing the patients' self-care behaviours (Albikawi, Petro-Nustas and Abuadas, 2016) (refer to section 4.3.2 for more details about this study).

Thus, it seems that enhancing self-efficacy to improve self-care is acknowledged by research in Jordan. However, this study expands upon these recommendations by highlighting the importance of understanding gender differences in self-efficacy. Health care professionals can focus on enhancing confidence of practicing self-care behaviours that are different between men and women (For example strategies can be directed to increase women's confidence in performing more exercise and increasing men's confidence in performing foot care).

Secondly, the importance of family support in facilitating theadherence to self-care, particularly adherence to dietary requirements was a key finding in this study. The study found the social support needs, social support attitudes and received support from family and friends predict adherence to dietary self-care. Women received significantly less support than men. They also were found to express more needs for support to perform physical activity and more needs for support to handle their feelings. Women also reported less support by their spouse compared to men. Therefore, on practice grounds, it is important that health care professionals be aware of the differences in the amount of support received and the different sources of support perceived by men and women. This can be provided within training of healthcare professionals on issues of social support. As these differences could be emerging from sociocultural influences of gender roles, especially women's care giving role in the family as discussed previously, health care professionals could seek to address women's support needs.

Some potential suggestions for improving women's self-care could be to involve the family in the women's support programs. The family could be encouraged to help the women increase their physical activity levels and provide more emotional support. It is also important to educate the T2DM women about the important role of their families in providing support for them. T2DM women should also be encouraged to prioritise their own health and balance their own self-care with their role as a care-giver. Women in the survey also identified friends and healthcare professionals as a source of support more than men did; because of this, women may benefit from interventions that enhance these sources of support (e.g. friends support groups and more health professional support).

Thirdly, the current study reports high diabetes distress among Jordanian T2DM patients. It also reveals significantly higher diabetes distress among women than men. Therefore, these results can be used as a theoretical basis to implement psychological assessment for T2DM men and women, mainly regarding diabetes distress. Although this may seem inapplicable as healthcare professionals may not be qualified to treat psychological problems especially in primary care settings, this can still be an opportunity for patients to be screened and discuss the patients' support needs to overcome these distresses. This initial assessment by primary healthcare service could facilitate referral to other qualified services to deliver intervention when appropriate. In addition, educating patients about the psychological consequences that may accompany diabetes is essential for these patients in order for them to cope with these distresses better.

Finally, the current findings in this study also highlight the suboptimal self-care practices by T2DM patients who participated in this study. This suggests the need to promote self-care for adults with T2DM in Jordan's primary health care settings using proper education, counselling and behavioural interventions to encourage optimal self-care behaviours.

Consequently, a first step in providing care plans can be measuring and monitoring levels of self-care; this assessment of a patient's self-care can then be used to develop a tailored professional care plan for each patient. This plan can be monitored and reviewed to ensure better levels of adherence. Given the relatively high rate of adherence to medication, attention towards developing evidence-based approaches to

promote other self-management practices is a priority. More specifically, the low practice of exercise and foot care suggests that these behaviours may need an additional effort from healthcare providers to encourage adherence from patients. Moreover, diabetes educators need to underline that diabetes self-care is an ongoing process and that lifestyle change may be needed. These suggestions could improve the quality of care provided to these patients.

7.5 Implications of the study findings for future research

The current research adds to prior and current literature on health disparities mainly related to patients' gender in the broader field of research on diabetes. As discussed previously other factors related to self-care of T2DM patients could not be examined in this study. Future studies can explore these further; these other factors may include the patient-provider relationship and diabetes knowledge. The findings of this study extend the current understanding of what we know about psychosocial issues related to self-care practice of T2DM men and women in Jordan. It has attempted to fill a gap previously identified in research in Jordan regarding this topic. This section summarises the identified issues that need further investigation, it also provides suggestions for future research to overcome the limitations found in this study.

Generally, the literature of diabetes in Jordan is scarce, with glycaemic control research dominating within this field. Research that focuses more on the psychosocial aspect of management of T2DM is needed in Jordan. As this gap was identified earlier, this study has provided evidence that supports the importance of these factors in relation to self-

care behaviours. Patients of T2DM in Jordan seem to be psychologically and emotionally suffering due to diabetes. Future research could further explore these findings especially regarding the high levels of diabetes related distress. From a research point of view, studies that develop and evaluate the effectiveness of interventions that reduces diabetes distress are needed. With regard to gender differences, experimental studies with appropriately designed interventions are largely absent in Jordan and the Middle East. Consequently, studies that investigate effectiveness of gender-specific interventions are needed to determine whether different approaches to enhance self-care should be used for men and women.

The current study examined three domains of social support in relation to self-care of T2DM men and women in Jordan. The relationships between social support domains and different self-care behaviours varied. Future research can use these results to further clarify which dimensions of support are particularly related to self-care behaviours and which predict self-care behaviours for T2DM patients. The complexity of measuring and interpreting the social support constructs and their relationship to self-care may indicate that future studies could seek to better clarify the distinction between social support received, perceived support needs and attitudes to T2DM.

The findings showed differences in support needs and support received between men and women. In addition, the findings of this study highlighted the potentially important role that friends and family members play T2DM self-care and the different perceptions of men and women of the sources of social support. Future research can investigate the effectiveness of interventions that aim to enhance self-care behaviours taking into

account the specific roles of family and friends. Moreover, qualitative evidence that seeks an in depth understanding of the social and cultural context in which T2DM self-care occurs could reveal how and why these differences occur in Jordan.

Adherence to self-care behaviours was examined in this study and found suboptimal with comparison to the universal guidelines. Men and women differed in their practice for self-care. This was more evident in behaviours of exercise, foot care and specific dietary behaviours related to reducing fat content in consumed food. The suboptimal levels of self-care found in this study were consistent with other studies found in Jordan and other Arab countries as discussed previously. In line with the theoretical framework, this study showed that participants' adherence to medication was the most frequently performed self-care behaviour compared to other behaviours demanding greater efforts such as exercise and diet. Further research can be directed by this result in two ways. Firstly, future studies can focus on the investigation of ways to promote sub-optimal self-care behaviours among T2DM Jordanian patients (e.g. how to promote exercise). Secondly, a qualitative approach can be used to understand the reasons why T2DM patients in Jordan are more likely to engage in certain self-care behaviours than others. Another qualitative area of interest can be the barriers for self-care among women preventing them from adhering to the optimal level of self-care practice; for example, exploring the barriers to practicing exercise by Jordanian T2DM women.

Finally, attention was paid to the cultural issues when designing the current study methods and when interpreting its findings. Another opportunity for future research will be utilising the measures that were used in this study and exploring their culture-specific

appropriateness for the Jordanian setting, as this topic was outside the scope of this study. Future research could also take the key findings of this study and apply them to Arabs who live abroad in different communities around the world within different cultures.

7.6 Publication strategy

The limited evidence found in relation to the topic of this study has been discussed in previous chapters. The dissemination of research results and findings is an integral part of the research process (Derntl, 2014). Publishing through peer-reviewed international journals can be one form of disseminating key components of this research in order to contribute to the current evidence and provide more knowledge to the field of type 2 diabetes care and gender differences in healthcare.

Another justification for the need of publishing key aspects of this study is that it is the first study in Jordan to explore psychosocial factors affecting diabetes self-care including the role of gender differences. In addition, the study identified specific issues requiring attention from health-care planners and decision makers in Jordan. The key messages of this research focused attention on the need to develop strategies to improve patients' self-care practices and primary health-care services.

This section present a publication plan particular to this thesis. The section consists of a list of potential articles that can be derived from the thesis (which chapters can be transformed into articles), and a list of targeted journals.

Firstly, the thesis has presented a detailed translation process in the methods chapter, sections 5.3 and 5.4.4. The adaptation of the English versions of the scales of self-efficacy, diabetes distress, social support and self-care into Arabic language was included. Moreover, the findings of piloting the Arabic version of these scales was documented. A potential paper can summarise the translation and adaptation of these scales and the findings of their use in Jordanian setting. This article can add to the field of adapting measures of psychosocial and diabetes self-are in Arabic speaking settings. Secondly, the systematic review in Chapter three can be transformed into a journal article. As discussed earlier, this review has shown interesting findings in relation to the research about gender differences in factors affecting self-care of type 2 diabetes. The key message of the potential article is that a range of differences in psychosocial and self-care behaviours between men and women with T2DM were found but there is a very limited discussion of the differences in correlation between psychosocial and self-care behaviours among T2DM women and men. Moreover, it does not present a substantial theoretical or empirical understanding about how gender interacts with these factors and the effect of this interaction on self-care outcomes.

Finally, a third potential article can be focussed on the main findings of this study. The model of how different psychosocial factors were examined in relation to self-care and how gender affected these factors can be the key message of this article.

List of potential journals is provided below; these journals were provisionally selected based on their scope of interest. These were identified from the relevant references in

this thesis. In addition, an online journal estimator () was used for listing possible interested journals in this topic using the abstract for each topic.

1) *Journal of diabetes and its complications*

Examples of articles published by this journal:

- (Asuzu *et al.*, 2017)

Asuzu, C. C. *et al.* (2017) 'Pathways for the relationship between diabetes distress, depression, fatalism and glycemic control in adults with type 2 diabetes.', *Journal of diabetes and its complications*. United States, 31(1), pp. 169–174. doi: 10.1016/j.jdiacomp.2016.09.013.

- (Lasaite *et al.*, 2016)

Lasaite, L. *et al.* (2016) 'Diabetes distress in adult type 1 diabetes mellitus men and women with disease onset in childhood and in adulthood.', *Journal of diabetes and its complications*. United States, 30(1), pp. 133–137. doi: 10.1016/j.jdiacomp.2015.09.012.

- (Al-Akour, Khader and Shatnawi, 2010)

Al-Akour, N., Khader, Y. S. and Shatnawi, N. J. (2010) 'Quality of life and associated factors among Jordanian adolescents with type 1 diabetes mellitus.', *Journal of diabetes and its complications*. United States, 24(1), pp. 43–47. doi: 10.1016/j.jdiacomp.2008.12.011.

- (Al-Khawaldeh, Al-Hassan and Froelicher, 2012)

Al-Khawaldeh, O. A., Al-Hassan, M. A. and Froelicher, E. S. (2012) 'Self-efficacy, self-management, and glycemic control in adults with type 2 diabetes mellitus.', *Journal of diabetes and its complications*. United States, 26(1), pp. 10–16. doi: 10.1016/j.jdiacomp.2011.11.002.

- (Al-Amer *et al.*, 2011)

Al-Amer, R. M. *et al.* (2011) 'Depression among adults with diabetes in Jordan: risk factors and relationship to blood sugar control.', *Journal of diabetes and its complications*. United States, 25(4), pp. 247–252. doi: 10.1016/j.jdiacomp.2011.03.001.

2) Diabetes research and clinical practice

Diabetes Research and Clinical Practice is the official journal of the International Diabetes Federation.

Examples of articles published by this journal:

- (Walker, Smalls and Egede, 2015)

Walker, R. J., Smalls, B. L. and Egede, L. E. (2015) 'Social determinants of health in adults with type 2 diabetes--Contribution of mutable and immutable factors.', *Diabetes research and clinical practice*. Ireland, 110(2), pp. 193–201. doi: 10.1016/j.diabres.2015.09.007.

- (Polonsky *et al.*, 2017)

Polonsky, W. H. *et al.* (2017) 'Physician-patient communication at diagnosis of type 2 diabetes and its links to patient outcomes: New results from the global IntroDia(R) study.', *Diabetes research and clinical practice*. Ireland, 127, pp. 265–274. doi: 10.1016/j.diabres.2017.03.016.

- (Rane *et al.*, 2011)

Rane, K. *et al.* (2011) 'Psychosocial problems in patients with newly diagnosed diabetes: number and characteristics.', *Diabetes research and clinical practice*, 93(3), pp. 371–8. doi: 10.1016/j.diabres.2011.05.009.

3) BMC public health

Examples of articles published by this journal:

- (Hempler, Joensen and Willaing, 2016)

Hempler, N. F., Joensen, L. E. and Willaing, I. (2016) 'Relationship between social network, social support and health behaviour in people with type 1 and type 2 diabetes: cross-sectional studies.', *BMC public health*. England, 16, p. 198. doi: 10.1186/s12889-016-2819-1.

- (Gavin, Fox and Grandy, 2011)

Gavin, J. R. 3rd, Fox, K. M. and Grandy, S. (2011) 'Race/Ethnicity and gender differences in health intentions and behaviors regarding exercise and diet for adults with type 2 diabetes: a cross-sectional analysis.', *BMC public health*. England, 11, p. 533. doi: 10.1186/1471-2458-11-533.

4) Journal of Gender Culture and Health

7.7 Conclusions

This study explored associations between self-care and a number of psychosocial factors in 239 women and men in a primary health care setting in Jordan. The study revealed statistically significant differences in psychosocial and self-care behaviours among Jordanian T2DM men and women. Women were more distressed, received less support from family and friends, and practiced less exercise and more foot care than men did. Women identified sources of social support such as friends which were not identified by men. The study also revealed that among the examined psychosocial behaviours, self-efficacy was a consistent predictor of self-care behaviours for both men and women. This study was not able to find a statistically significant moderation effect of gender on the relationship between the measured psychosocial factors and any of the self-care behaviours. According to the researcher's knowledge, this study is the first study to measure psychosocial factors in relation to self-care using a gender analysis approach in a T2DM Jordanian population. Using a gender based approach, the study was able to

contribute to more understanding of T2DM among men and women in Jordan. It is understood that gender differences in T2DM extend beyond biological differences to include social, psychological and cultural factors. The findings of this study suggest that separate models of care are needed for men and women as different factors related to self-care apply to different degrees to men and women. The current study has implications for both practice and research in Jordan and similar settings. The findings suggest that health-care professionals and researchers should be skilled in assessing T2DM population needs and addressing the complexities of psychosocial factors and self-care. In particular, T2DM care plans should respond to the different priorities of men and women by increasing primary healthcare providers' awareness of these gender disparities to improve self-care practice for T2DM patients in a Jordanian setting. Furthermore, the study suggests that diabetes self-efficacy could be a potential target for educational and support strategies designed to improve diabetes self-care regimes.

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Appendix 1: Electronic search strategy

- **Database: Ovid MEDLINE(R), 1946 to November 2013**

  1. (diabet* or type 2 diabetes or T2DM or diabetes mellitus).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]

  2. (Psychosocial or psycho-social or social support or psychosocial factor* or efficacy or depressi* coping or psychological).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]

  3. (Gender or gender-related or men or women or woman or femal* or sex or sex-related or male*).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]

  4. (Self care or self-care or diet or exercise or foot care or self-management or self management).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]

  5. (Quality of life or well being or well-being or wellbeing or satisf*).mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures]

  6. 1 and 2 and 3 and 4

  7. 5 and 6

  8. limit 5 to (human and English language)

  9. limit 7 to (human and English language)

- **Database: Web of Knowledge, All dates to November 2013**

  1. TITLE: (diabet* or type 2 diabetes or T2DM or diabetes mellitus)

  2. *AND*TITLE: (gender or gender-related or men or women or woman or femal* or sex or sex-related or male*)

3. *AND*TOPIC: (psychosocial or psycho-social or psychosocial factor*)

4. Refined by: LANGUAGES: (ENGLISH)

5. Time span: All years.

6. Search language=Auto

- **Database: Scopus: All years-November 2013**

1. (TITLE-ABS-KEY(diabet* OR Type 2 diabetes OR t2dm OR diabetes mellitus) AND

2. TITLE-ABS-KEY(psychosocial OR psycho-social OR social OR psychosocial factor*) AND

3. TITLE-ABS-KEY(gender OR gender-related OR men OR women OR woman OR femal* OR sex OR sex-related OR male*)

4. AND TITLE-ABS-KEY(self care OR self-care OR diet OR exercise OR foot care OR self-management OR self management)

5. AND (LIMIT-TO(LANGUAGE, "English")

- **Database: PsycINFO: All years-November 2013**

1. (diabet* or type 2 diabetes or T2DM or diabetes mellitus).mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures]

2. (Psychosocial or psycho-social or social or psychosocial factor*).mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures]

3. (Gender or gender-related or men or women or woman or femal* or sex or sex-related or male*).mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures]

4. (Quality of life or wellbeing or well-being or wellbeing or satisf*).mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures]

5. (Self care or self-care or diet or exercise or foot care or self-management or self management).mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures]

6. 1 and 2 and 3 and 5

7. limit 6 to (English language and humans and "all adult (19 plus years)" and English) [Limit not valid in PsycINFO; records were retained]

Appendix 2: Template for data extraction for each study

Author/s, year:	
Title	
Journal	
Country/Setting	
Aims	
Design	
Number of participants/F/M	
Population Characteristics	
Measures	
Tools/ Questionnaires	
Main results	
Other comments	

Appendix 3: Tables of included studies by method

Description of studies included in the review (Quantitative studies): (Aim, Study type, Population)			
(Author, year)	Aim	Study type	Population
(Bell *et al.*, 2007)	Examine the ownership of diabetes self-management equipment among older rural adults in North Carolina/USA.	population-based cross-sectional survey	Patients Age: ≥ 65 yrs. old, with T2DM in the community. USA.
(Brown *et al.*, 2000)	Describe differences in metabolic control, knowledge, and health beliefs of Mexican Americans with T2DM based on gender	population-based cross-sectional survey	T2DM patients, Age 35-70 in the community, Northern Mexico border. Texas, USA. Patients recruited by phone.
(Chiu and Wray, 2011)	Investigate gender differences in biological, behavioural, and psychosocial variables, and how these variables explain the gender–functional limitations relationship in adults with T2DM.	Community based cross-sectional survey.	Middle-aged and older adults living with T2DM. USA.
(Connell, Fisher and Houston, 1992)	Describe gender differences in relationship between social support and diabetes outcomes.	Community based setting, Cross sectional.	Older adults >60 yrs. T2DM. Patients recruited by press releases, newspaper and radio. USA.
(Degazon and Parker, 2007)	Determine whether there are gender differences in the types of coping strategies and in the psychosocial adaptation to T2DM of older Blacks (born in the Southern US or the Caribbean and living in urban areas of the Northeast US)	Cross-sectional.	Older adults diagnosed with T2DM. Recruited by convenience sampling from three senior citizen centres and six churches in urban areas in the Northeast US.
(Gåfvels and Wändell, 2006)	Assess and compare coping strategies in men and women with T2DM.	Cross-sectional	Swedish-born T2DM patients, Av. Age= 55 years. recruited In four primary health care centres in Stockholm County.
(Gavin, Fox and Grandy, 2011)	assess whether physician recommendations and actual behaviour differed between men	Population cross sectional survey	T2DM (self-reported) participants, 3 racial-ethnic groups, (African-American, Caucasian and

	and women		Hispanic), USA.
(Gucciardi, Wang and DeMelo, 2008)	Determine whether men and women with T2DM have different psychosocial, behavioural, and clinical characteristics at the time of their first visit to diabetes education centre.	Cross-sectional	T2DM, average age = 54.4 years old. In two diabetes education centres in the greater Toronto area in Ontario. The questionnaire was administered to patients immediately after their appointments
(Kacerovsky-Bielesz *et al.*, 2009)	Investigate sex specific differences in glucometabolic control and social and psychological factors. And to assess how these factors influence glucometabolic control as measured by HbA1c in patients of a metropolitan diabetes outpatients' centre. Germany.	Cross-sectional	T2DM patients, Age 40-80.
(Khunti *et al.*, 2008)	Describe the characteristics of newly diagnosed people with T2DM	Cross-sectional	T2DM, Age mean 60 yrs. old. Patients were referred within 4 weeks of diagnosis by their general practitioner or practice nurse in 13 sites in primary care, involving 17 primary care organizations in England and Scotland.
(McCollum *et al.*, 2005)	Examine sex-based differences in DM and to explore the effects of gender on self-care.	Retrospective cohort study	T2DM mean age 60 yrs. old women were significantly older than the men. Civilian non-institutionalized population .USA.

(Misra and Lager, 2009)	Examine ethnic and gender differences in psychosocial factors in T2DM patients.	Cross-sectional.	T2DM patients, Mean = 54.8 yrs. old. Different ethnic groups: Non-Hispanic, Whites, African-Americans, Asian-Indians and Hispanics. Recruited by convenience clinic-based sample in two health clinics in Bryan and College Station, TX. USA.
(Nau, Aikens and Pacholski, 2007)	Determine the main effects, and interactive effect, of depression and gender on patients' adherence to oral diabetes medications	Cross-sectional	T2DM, Mean age 56.0. In a managed care organization Midwestern USA. Patients identified from medical and pharmacy claims data
(Nielsen, 2006)	Explore the relation between HbA1c (A1C), sex, treatment allocation, and their interactions with behavioural and attitudinal characteristics in patients with T2DM	Cross-sectional, Population-based	Populations of an RCT, Primary care patients received structured personal care or routine care. Six years after diabetes diagnosis, the median (interquartile range) age was 63.0 (53.8–71.4) years for the 459 structured personal care patients and 63.7 (54.6 –71.6) years for the 415 routine care patients (P _ 0.87).
(Raum *et al.*, 2012)	Analyse gender differences in the association of adherence and poor glycaemic control (PGC) in a cohort of patients with T2DMin Germany.	Cohort study	T2DM patients. Mean age was 68.3 (SD 10.3 years) (median age: 70 years). Primary care setting, During regular practice visits, Germany. Recruited according to

			a standardized protocol by 38 general practitioners (GPs).
(Shrestha, Kosalram and Gopichandran, 2013)	Assess the gender differences in care, symptoms, mode of diagnosis and self-management of T2DM.	Cross-sectional	T2DM patients, average age= 57.76 (SD 12.24) men and 55.26 (SD 11.18) women in two hospitals. Patients visiting for the routine check-ups in the outpatient department and diabetic education program conducted by the hospital weekly. Nepal.
(Taru and Tsutou, 2008)	Establish effective dietary self-management behaviour for males and females withT2DM	Cross sectional	T2DM, Mean age=63 yrs. old in an outpatient clinic of the Department of Internal Medicine at Kobe University Hospital, Japan.
(Sriram, Sridhar and Madhu, 2001)	Compare the differences between men and women regarding the psychological adjustments in living with diabetes.	Cross sectional	T2DM. Average age was 49.1, visiting Diabetic clinics of a shipbuilding industry and the port of Visakhapatnam. India
(Yu *et al.*, 2013)	Examine the associations between sex and selected diabetes process of care measures and self-care activities.	Cross-sectional	T2DM. Age (years) females= 62.5, males=63.8.Non-Hispanic white (majority), Non-Hispanic black and Asian/Pacific Islander. Men tended to be older; more frequently married, and had higher levels of education and income.

Description of studies included in the review (Quantitative studies): (Sample size, Findings, Conclusion and limitations)				
Author, year	**Sample size**	**Findings**	**Conclusion**	**Limitations**
(Bell *et al.*, 2007)	Total=698 F=343 M=355	Women owned more equipment for foot care more than men and pillboxes for medication. Men had more exercise equipment and special cookbooks. No difference in ownership of: Glucose monitoring meters or diaries or diet aid equipment.	Gender of patient is associated with ownership of some types of equipment of D.M self-care	Only examined ownership and not utilization of these types of equipment. Specific reasons for not owning these types of equipment are not studied.
(Brown *et al.*, 2000)	T=252 F=161 M=91	Women showed slightly higher knowledge. Males expressed stronger belief of control of their diabetes than females. Males expressed stronger perception of social support for diet than females.	Males and females have different beliefs about ability to control their diabetes and degree of social support for diet. The impact of gender differences on ability to integrate diabetes self-care has not been determined.	Women were more represented in the study.
(Chiu and Wray, 2011)	T=1619 F=861 M=758	Women had better diet and blood glucose self-monitoring behaviours than did men, however, they reported less exercise behaviours, perceived control, self-efficacy, coping, depressive symptoms, and family support than did men. Psychosocial factors made an indirect contribution in the gender–functional limitations by their association with biological and behavioural factors.	Women with T2DM tend to have less favourable levels of biological, psychosocial, and behaviour factors than do men. Interventions promoting psychosocial wellbeing and empowering	The use of self-reported measures.

			perceived diabetes control, coping, and self-efficacy in women with T2DM are needed.	
(Connell, Fisher and Houston, 1992)	T=191 F=110 M=81	No gender difference in the amount of received or desired diabetes-specific social support. Women perceived less attachment social integration and general social support significantly than men. Diabetes specific support: was sig. Correlated with self-care for both men and women.	Findings suggest that relationships between psychosocial variables and gender and health outcomes should be considered in older T2DM adults.	Sample age range was mainly older adults. Self-reported data.
(Degazon and Parker, 2007)	T=212 F=142 M=70	Women used more palliative coping strategies and total coping effort than did men. They felt less able to cope with those situations than did men. No gender differences were observed for the use of either confrontive or emotive coping strategies. Men and women did not differ in	Gender differences in coping strategies are present.	-limited generalisability of findings due to specific characteristics of participants as black emigrants. -Self reported data

		psychosocial adaptation to T2DM.		
(Gåfvels and Wändell, 2006)	T=232 F=111 M=121	Women tend more to use resignation, protest, and isolation coping (used more negative coping strategies). They also tend to have more distress than men. No significant differences between men and women regarding social support (home and workplace) however, women reported more social strains events during life course so far than men.	Differences in coping styles can be connected to gender, this indicate a need for different diabetes care for men and women.	The response rate on the coping questionnaire was 55% (45% among men and 67% among women) which could affect the results. Only Swedish born subjects were included despite that the rate of foreign-born subjects high, this made the power to detect gender differences low.
(Gavin, Fox and Grandy, 2011)	T=3403 F=2034 M=1369	Caucasian women received professional healthcare recommendations for regular exercise more than men.	Differences in health intentions and healthy behaviours were noted across race-gender	The determination of T2DM and obesity were made based upon self-

		Caucasian men follow exercise recommendations and did it regularly more than women. They did more high physical activity and minimal activity more than women, while women tend to do more inactive physical activity. Same as above for African American group. Hispanic group was similar except in intention to follow recommendation, women were more than men. Diet: Caucasian and African American women received more Healthcare professional recommended change in what they eat than did men. Hispanic group, men received slightly higher recommendations for eating. Women intended to follow diet recommendations more than men regardless of ethnicity. They also tried to lose weight in the past 12 months more than men. BMI was significantly (P < 0.0001) higher in women than men in all races.	groups.	report there may be misclassification bias. There was under-representation of the very wealthy and very poor segments of the US population and military or institutionalized individuals were not included. The survey was provided in English only, thus potentially excluding individuals who spoke other languages,
(Gucciardi, Wang and	T=275 F=143	Women were significantly more likely to have higher expectations of the outcome of	Men and women with diabetes have different	Self-report based data, recall bias and

DeMelo, 2008)	M=132	self-management activities, and higher perceived levels of support from professional health care teams. Depressive symptoms were significantly higher among women than among men. No differences in self-efficacy or social support. No sig. difference in any of the self-care activities but women tended to do more foot care than men, and more blood sugar testing	psychosocial, behavioural, and clinical characteristics when they first come to a diabetes education centre. These differences can affect the risk of diabetes, attitudes and behaviour toward self-care, and health outcomes.	overestimation of actual behaviour to provide socially desirable responses are possible. Study participants were all users of the diabetes education centre and, as such, do not reflect all people with diabetes.
(Kacerovsky-Bielesz *et al.*, 2009)	T=257 F=131 M=126.	Women employed more strategies for coping with diabetes, including religion (p=0.0001), active coping (p=0.048) and distraction (p=0.007). Women reported lower satisfaction with social support (p=0.034) but not depressive coping. More women than performed regular physical exercise (p<0.001). Metabolic control was similar in both sexes.	Patients with T2DM mellitus from a metropolitan diabetes outpatient service exhibited only minor sex-specific differences in control of metabolic variables .However; individual coping with the disease was clearly different between both sexes.	Data are confined to patients using the hospital's outpatient service serves which is considered as a tertiary care centre. Self-reported data.
(Khunti *et al.*, 2008)	T=824 M=452 F=372	Men did more physical activity than women. Depressive symptoms more in women. Women were less likely than men to think	Newly diagnosed men and women have different illness beliefs and women express more depression.	Self-reported data.

		they could affect the course of their diabetes.		
(McCollum *et al.*, 2005)	T=1653 F=883 M=770	Diabetic women reported more depression (P < 0.001). Women had more physical and cognitive limitations than did men (both, P < 0.001). Health status indicators were also lower for women than for men.	Self-care abilities are more adversely affected in women than in men.	Self-reported data. Data on physical activity were collected only once during the year, and may not reflect long-term behaviours.
(Misra and Lager, 2009)	Tl=180 F=94 M=86	Women reported greater burden and restriction in their social interactions and less leisure time flexibility. Women were also more likely to report difficulty with Self-care and dietary adherence. Women reported higher social support and a less positive outlook as compared to their male peers. No gender difference was observed in glycaemic control.	Gender variations exist in social support, acceptance of diabetes, quality of life, and adherence behaviours.	Convenience sampling of the subjects that were collected in a clinic and not from a community setting, small sample size and problems associated with self-reported data (e.g., poor recall, socially desirable responses).
(Nau, Aikens and Pacholski, 2007)	T=391 M=195 F=196	There was a significant "gender x depression" interaction effect on adherence. Men with depression had more non-adherence than men without depression, but	The association between depression and medication adherence appears to	Self-reported data and thus may be imperfect for some constructs.

		adherence varied little between women with depression and women without depression. Only social support (P < 0.001) and number of daily doses (P = 0.01) were statistically significant covariates. Self-efficacy was not different.	be stronger in men than in women.	
(Nielsen, 2006)	T=817 M=400 F=417	Similar outcomes among the structured personal care and routine care women groups and the structured personal care and routine care men. The intervention effect on A1C was confined to the structured personal care women Women exercise less and show more adaptive attitudes toward diabetes, but they lack support compared with men.	Six years after the introduction of structured personal diabetes care, the effect in the form of a lowering of A1C was seen in women only. Differences in lifestyle, social support, and attitudes were not related to the intervention, but solely to sex.	The use of self-reported questionnaire data, because patients may have overestimated actual behaviour to provide a socially desirable response.
(Raum *et al.*, 2012)		Non-adherence was found more in men. More men had poor glycaemic control than women (p = 0.03). Men did more physical activity than women. A history of physician diagnosed depression was reported by 12.8% of the participants and was more common among women	Results show gender-specific differences in the association of adherence and PGC. This underlines the need for efforts to improve glycaemic control in patients with T2DM mellitus with a	Relied on patient self-reports only. Non-adherence may have been underreported to some extent by the patients due to social desirability.

		(15.7%).	particular focus on men.	Certain weaknesses are attributed to the questionnaire used, such as inadequate reliability, poor distributional properties.
(Shrestha, Kosalram and Gopichandran, 2013)	T=200 F=100 M=100	Average self-management score of general diet among men was higher than women. (P = < 0.05). The self-management score of foot care was sig. higher among men. More men followed seven days healthful eating plan (P = 0.01). They were better in following the average monthly eating plan compared to women. More men (56%) were following exercise for at least five days in a week compared to women (37%) P = 0.026. Women had lower self-efficacy (35%) in comparison to men (65%) P = <0.05. There was significant association between gender and diet practices which showed men have 0.328 times lesser chances of bad dietary practices compared to women (95%	There are gender differences in reporting certain self-management behaviours	Self-reported information.

		CI: 0.184 - 0.585).		
(Taru and Tsutou, 2008)	T=170 M=93 F=77	Gender differences were identified for dietary self-management behaviours that affect control indices (waist circumference, BMI, HbA1c) of type 2 diabetes mellitus.	Study discloses significant differences in dietary self-management behaviour between men and women with type 2 diabetes.	Self-reported data.
(Sriram, Sridhar and Madhu, 2001)	T=226 M=143 F= 83	Men had significantly higher score on positive well-being. Women had higher score on anxiety. Men were significantly more satisfied, had lesser social worry and also rated their health as being better. Men coping scores were higher than women.	Male diabetics are observed to live more effectively with diabetes	Self-reported data.
(Yu et al., 2013)	T=4839 F=2360 M= 2479	Women had better glycaemic control and adherence to recommended self-care compared to men. Women were also less likely to engage in physical activity than men. Frequency of blood glucose testing was similar by gender. Women examined their feet more frequently than men.	sex disparities exist in diabetes process of care measures and self-care	Self-care activities were ascertained by self-reported measures rather than actual measurements.

Qualitative studies included in the review:			
(Author, year)	(Iwasaki, Bartlett and O'Neil, 2005)	(Mathew *et al.*, 2012)	(Wenzel *et al.*, 2005)
Aim	Understanding of the ways in which Aboriginal peoples with diabetes cope with stress.	Understanding differences in diabetes self-management, specifically needs, barriers and challenges among men and women living with T2DM mellitus.	Comparing experiences of African American men and women with T2DMliving in a rural community
Data collection	Focus groups	Focus groups	Focus groups
Participants	First Nations or Me´tis, individuals diagnosed with T2DM. (mean=43.9) visiting Aboriginal health centre, Winnipeg, Manitoba, Canada,	T2DM participants; first visited the Diabetes Education Centre. Canada. Av. Age: 57 yrs. Majority were foreign-born from various ethnic backgrounds.	African American (self-defined), diagnosed withT2DM, and able to speak English living in the Black community of rural areas of Virginia, United States.
Number of participants	T=26, F =17 M=9	T=35, F=18, M=17	T=5. F=3. M=2
Analysis	Phenomenological cross-thematic.	Thematic analysis	Thematic analysis
Main themes	1. Interdependence/connectedness, 2. Spirituality/transcendence, 3. Enculturation/Facilitation of Aboriginal cultural identity, 4. Self-control/self-determination/self-expression,	2. Identification and disclosure as a person living with T2D.M, 3. self-monitoring of blood glucose levels, 4. Struggles with diet	1. Being diagnosed, 2. Diabetes as betrayal by the body. 3. Provider-individual-family relationship.

		across varying contexts,	4. Self-management,
	5. Leisure as a means of coping with stress	5. Utilization of diabetes resources	5. Difficulty getting help.
		6. Social support.	
Conclusion	Women may perceive more stresses than men.	Differences among men and women and their management experience and needs inform gender-sensitive diabetes, care, counselling and support.	Results indicate differences by gender.
Limitations	Very specific nature of the sample used, less generalisation. the use of focus groups as a data collection technique likely allowed researchers to obtain broad-based rather than in-depth information	Large, urban, culturally diverse study population decreasing representativeness of other and more culturally homogeneous populations of people with diabetes.	Very small sample size. Participants were excluded if they were unable to travel to attend the focus group meeting.

Mixed methods studies included in this review:			
(Author, year)	(DeCoster and Cummings, 2004)	(Ponzo, Gucciardi and Weiland, 2006)	(Hjelm and Berterö, 2009)
Aim	Identify the coping methods of adults with T2DM, explore whether gender influenced coping style, and then analyse the relationship between coping and self-assessed diabetic control.	examine the relationship among gender and ethno cultural factors, family support, depressive symptomatology, and illness perceptions on diabetes self-management	Describe the meaning of support and its impact on the life situation of people diagnosed with T2DM in relation to gender, age and duration of disease.
Methodology quan.	1 item scale:, asking respondents to rate their success at controlling diabetes on a scale of 1-10,)	Cross-sectional (Interviewer assessed questionnaire)	Cross sectional: Norbeck Social Support Questionnaire.
Methodology qual.	In-depth interviews, guided open-ended interview approach.	Focus group	Semi-structured interviews.
Participants	T2DM patients. Average Age=56 yrs., visiting A non-profit primary care clinic in a large mid-south city, Tennessee, USA	Average age 74.1 yrs. Diagnosed T2DM. English speaking. No physical or mental disabilities.1st generation Italian immigrants. Participants recruited from Italian group education class held in hospital for focus group. For quant. Same+ family physician's office	Swedish-born men and women ,diagnosed with T2DM, aged 32–80 years
Number of participants	Total= 34, F=24 M=10	Quan. T= 50. F=25, M=25 Qual. T=7, F=4, M=3.	T=40 M= 24 F=16
Analysis	Qual. Data: Grounded theory analysis. Quan. Data: SPSS. T test	Quan. SPSS (Pearson correlation, t test, chi square) Qual. Not reported.	Qual. Content analysis Quan. SPSS t-test. $x2$-test

Conclusion	Findings suggest that adults with T2DM use a variety of coping methods, with their basic coping styles influenced by race and gender.	Responsibility of meal preparation is women's (84%) Women are significantly having more depressive symptomatology. Women perceive diabetes as serious disease more than men.	Women found support as limited or non-existent when treated outside hospital/specialized care. Some men reported being given informative support and sufficient material support from health care professionals on diagnosis. Men were assumed to need more support and women were considered to have better networks.
Limitations	Small, non-random, non-representative sample limits generalisability and the power of statistical products. Lack of an objective measure of diabetic control (e.g., glycosylated haemoglobin).	Using interviewer-administered questionnaires (social desirability bias). Validation of the measures used in English, cultural issues for Italian participants.	The purposive sampling procedure with recruitment from an in-hospital diabetes specialist clinic was used, where in Sweden, according to the national guidelines for management of these patients recommends management in PHC. The number of informants (40 persons) can be seen as limiting in relation to the statistical analyses

Definitions of confrontive, emotive and palliative coping in (Degazon and Parker, 2007) **study:**

Confrontive coping: allows for constructive handling and facing up to the problem and consists of strategies such as discussing problems, viewing problems objectively, and trying different solutions.

Emotive coping: regulates the emotions and allows for ventilation of feelings and consists of strategies such as expecting the worst, smoking, and drinking when events are perceived to be overwhelming and beyond the person's control to manage;

Palliative coping: eases the discomfort without taking care of the problem and consists of strategies such as prayer, hoping things will get better, and going to sleep.

Positive vs. negative coping in (Gåfvels and Wändell, 2006) **study:**

Score of positive coping in (Gåfvels and Wändell, 2006) was a mean of the scores on self-trust, problem focusing, cognitive revaluation, social trust and minimisation, and the summary score of negative coping was a mean of fatalism, resignation, protest, isolation and intrusion.

DIABETES PSYCHOSOCIAL AND SELF-CARE ASSESSMENT QUESTIONNAIRE

I would really appreciate your participation in the Gender differences among type 2 diabetes patients in Jordan, which aims to investigate differences between men and women experiences living with type 2 diabetes in Jordan. I'm doing my PhD in Public Health at the University of Sheffield-UK. I will be grateful for your help and support in exploring more aspects about diabetes in Jordan. The needed time to do the questionnaire is no longer than 20-30 minutes.

You will be asked about your experience living with diabetes, the support you get your feelings about this disease and care activities you do regarding diabetes.

Note:

- If you are tired, not feeling well or wish to do the questionnaire at another time you can do it later.
- The confidentiality of the participants in this research (all personal and clinical information) will be strictly protected.
- Questionnaire papers will be returned to the researcher who will keep for the

study and publishing purposes.

For more details please do not hesitate to contact me Dr.Israa AlRawashdeh at: PhD office, ScHARR, University of Sheffield, Regent Court, 30 Regent Street, Sheffield, S1 4AD, UK. **Email**:irawashdeh1@shef.ac.uk
If you are not happy with anything, you can contact my supervisor Professor Elizabeth Goyder at: ScHARR, University of Sheffield, Regent Court, 30 Regent Street, Sheffield, S1 4AD, UK. **Email**:e.goyder@shef.ac.uk.

ABOUT YOU:

We would like to know some information about you. Please circle one answer for each question.

What is your age?

_____

What is your gender

*Female   *Male

What is the highest level of education you have completed?

*Primary school   *High school   *Bachelor's degree

*Maters or PhD   * Illiterate   *Other _____

What is your current marital status?

*Single   *Married   *Divorced

*Widowed   *Would rather not say

Where do you currently reside?

*Jordan   *Other (Please specify) _____

Where is your nationality:

*Jordan   *Other (Please specify) _____

What is your current household monthly income from all sources in Jordan Dinars?

*>500   *500-1499   *1500-2999

*>3000   *Would rather not say

Which of the following categories best describes your primarily area of employment?

*Employed   *Retired   *Holding household responsibility

* No current job   *Other e.g. private job _____

How many years have you lived with diabetes?

_____

Do you take medication for diabetes

*Yes   *No

If yes, then please indicate the type of treatment:

| *Insulin | *Pills | *Both | *Other _____ |

HOW CONFIDENT YOU ARE IN DOING CERTAIN ACTIVITIES?

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. Please circle 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 confident at all | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Totally 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 confident at all | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Totally confident |

3-How confident do you feel that you can choose the appropriate foods to eat when you are hungry (for example, snacks)?

| Not confident at all | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Totally confident |

4-How confident do you feel that you can exercise 15 to 30 minutes, 4 to 5 times a week?

| Not confident at all | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Totally confident |

5-How confident do you feel that you can do something to prevent your blood sugar level from dropping when you exercise?

| Not confident at all | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Totally 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 confident at all | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Totally confident |

7-How confident do you feel that you can judge when the changes in your illness mean you should visit the doctor?

Not confident at all	1	2	3	4	5	6	7	8	9	10	Totally 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 confident at all	1	2	3	4	5	6	7	8	9	10	Totally confident

HOW ARE YOU COPING WITH YOUR DIABETES? Which of the following diabetes issues are currently problems for you? Please circle the number that gives the best answer for you.

	Not a problem	Minor problem	Moderate problem	Somewhat serious problem	Serious problem
1-Not having clear and concrete goals for your diabetes care?	0	1	2	3	4
2-Feeling discouraged with your diabetes treatment plan?	0	1	2	3	4
3-Feeling scared when you think about living with diabetes?	0	1	2	3	4
4-Uncomfortable social situations related to your diabetes care (e.g., people telling you what to eat)?	0	1	2	3	4
5-Feelings of deprivation regarding food and meals?	0	1	2	3	4
6-Feeling depressed when you think about living with diabetes?	0	1	2	3	4
7-Not knowing if your mood or feelings are related to your diabetes?	0	1	2	3	4
8-Feeling overwhelmed by your diabetes?	0	1	2	3	4
9-Worrying about low blood sugar reactions?	0	1	2	3	4
10-Feeling angry when you think about living with diabetes?	0	1	2	3	4
11-Feeling constantly concerned about food and eating?	0	1	2	3	4

12-Worrying about the future and the possibility of serious complications?	0	1	2	3	4
13-Feelings of guilt or anxiety when you get off track with your diabetes management?	0	1	2	3	4
14-Not "accepting" your diabetes?	0	1	2	3	4
15-Feeling unsatisfied with your diabetes physician?	0	1	2	3	4
16-Feeling that diabetes is taking up too much of your mental and physical energy every day?	0	1	2	3	4
17-Feeling alone with your diabetes?	0	1	2	3	4
18-Feeling that your friends and family are not supportive of your diabetes management efforts?	0	1	2	3	4
19-Coping with complications of diabetes?	0	1	2	3	4
20-Feeling "burned out" by the constant effort needed to manage diabetes?	0	1	2	3	4

PEOPLE IN YOUR LIFE WHO PROVIDE YOU WITH HELP OR SUPPORT

Please circle one answer for each line.

I want a lot of help and support from my family or friends in:

	Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree	Does not apply
1. Following my meal plan.	1	2	3	4	5	N/A
2.Taking my medicine	1	2	3	4	5	N/A
3. Taking care of my feet.	1	2	3	4	5	N/A

	Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree	Does not apply
4. Getting enough physical activity.	1	2	3	4	5	N/A
5. Testing my sugar.	1	2	3	4	5	N/A
6. Handling my feelings about diabetes.	1	2	3	4	5	N/A

My family or friends:

	Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree	Does not apply
7. Accept me and my diabetes.	1	2	3	4	5	N/A
8. Feel uncomfortable about me because of my diabetes.	1	2	3	4	5	N/A
9. Encourage or reassure me about my diabetes.	1	2	3	4	5	N/A
10. Discourage or upset me about my diabetes.	1	2	3	4	5	N/A
11. Listen to me when I want to talk about my diabetes.	1	2	3	4	5	N/A
12. Nag me about diabetes.	1	2	3	4	5	N/A

My family or friends help and support me a lot to:

	Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree	Does not apply
13. Following my meal plan.	1	2	3	4	5	N/A
14. Taking my medicine	1	2	3	4	5	N/A
15. Taking care of my feet.	1	2	3	4	5	N/A
16. Getting enough physical	1	2	3	4	5	N/A

activity.						
17. Testing my sugar.	1	2	3	4	5	N/A
18. Handling my feelings about diabetes.	1	2	3	4	5	N/A

Q19. Who helps you the **most** in caring for your diabetes? (Check only one box)

1 Spouse

2 Other family members

3 Friends

4 Paid helper

5 Doctor

6 Nurse

7 Other health care professional

8 No one

SELF-CARE: The questions below ask about your diabetes self-care activities during **the past seven days.** If you were sick during the past seven days please think back to the last seven days when you were not sick.

Diet	Number of days
1. On average, over the past month, how many days per week have you followed your eating plan?	1 2 3 4 5 6 7
2. On how many of the last seven days did you eat five or more servings of fruits and vegetables?	1 2 3 4 5 6 7
3. On how many of the last seven days did you eat high fat foods such as red meat or full-fat dairy products?	1 2 3 4 5 6 7
4. On how many of the last seven days did you space carbohydrates evenly through the day?	1 2 3 4 5 6 7
5. On how many of the last seven days have you followed a healthful eating plan?	1 2 3 4 5 6 7

Exercise	Number of days
6. On how many of the last seven days did you participate in at least 30 minutes of physical activity?	1 2 3 4 5 6 7
7. On how many of the last seven days did you participate in a specific exercise session (such as such swimming, walking, biking) other than what you do around the house or as part of your work?	1 2 3 4 5 6 7

Blood Sugar Testing	Number of days
8. On how many of the last seven days did you test your blood sugar?	1 2 3 4 5 6 7
9. On how many of the last seven days did you test your blood sugar the number of times recommended by your health care provider?	1 2 3 4 5 6 7

Foot Care	Number of days
10. On how many of the last seven days did you check your feet?	1 2 3 4 5 6 7
11. On how many of the last seven days did you inspect the inside of your shoes?	1 2 3 4 5 6 7

Medications	Number of days
12. On how many of the last seven days, did you take your recommended diabetes medication?	1 2 3 4 5 6 7

THANK YOU

Appendix 6: Stanford Self-efficacy scale for diabetes (Stanford Patient Education Research Center 2009)

STANFORD PATIENT EDUCATION RESEARCH CENTER

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 confident 1 2 3 4 5 6 7 8 9 10 totally 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 confident 1 2 3 4 5 6 7 8 9 10 totally 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 confident 1 2 3 4 5 6 7 8 9 10 totally confident

4. How confident do you feel that you can exercise 15 to 30 minutes, 4 to 5 times a week?

   not at all confident 1 2 3 4 5 6 7 8 9 10 totally 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 confident 1 2 3 4 5 6 7 8 9 10 totally 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 confident 1 2 3 4 5 6 7 8 9 10 totally 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 confident 1 2 3 4 5 6 7 8 9 10 totally 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 confident 1 2 3 4 5 6 7 8 9 10 totally confident

1

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.

Characteristics

Tested on 186 subjects with diabetes.

No. of items	Observed Range	Mean	Standard Deviation	Internal Consistency Reliability	Test-Retest Reliability
8	1-10	6.87	1.76	.828	NA

Source of Psychometric Data

Stanford English Diabetes Self-Management study. Study reported in Lorig K, Ritter PL, Villa FJ, Armas J. Community-Based Peer-Led Diabetes Self-Management: A Randomized Trial. The Diabetes Educator 2009; Jul-Aug;35(4):641-51.

Comments

This 8-item scale was originally developed and tested in Spanish for the Diabetes Self-Management study. For internet studies, we add radio buttons below each number. There is another way that we use to format these items, which takes up less space on a questionnaire, shown also in the PDF document. This scale is available in Spanish.

References

Unpublished.

This scale is free to use without permission

Stanford Patient Education Research Center
1000 Welch Road, Suite 204
Palo Alto CA 94304
(650) 723-7935
(650) 725-9422 Fax
self-management@stanford.edu
http://patienteducation.stanford.edu

Funded by the National Institute of Nursing Research (NINR)

Appendix 7: Problem Areas in Diabetes Questionnaire (Polonsky *et al.*, 1995) (Joslin Diabetes Center 1999)

Problem Areas in Diabetes Questionnaire (PAID)

DAWN — Diabetes Attitudes Wishes & Needs

INSTRUCTIONS: Which of the following diabetes issues are currently a problem for you?
Circle the number that gives the best answer for you. Please provide an answer for each question. Please bring the completed form with you to your next consultation where it will form the basis for a dialogue about how you are coping with your diabetes.

Patient name:	Completion date:	Interview date:

	Not a problem	Minor problem	Moderate problem	Somewhat serious problem	Serious problem
1. Not having clear and concrete goals for your diabetes care?	0	1	2	3	4
2. Feeling discouraged with your diabetes treatment plan?	0	1	2	3	4
3. Feeling scared when you think about living with diabetes?	0	1	2	3	4
4. Uncomfortable social situations related to your diabetes care (e.g., people telling you what to eat)?	0	1	2	3	4
5. Feelings of deprivation regarding food and meals?	0	1	2	3	4
6. Feeling depressed when you think about living with diabetes?	0	1	2	3	4
7. Not knowing if your mood or feelings are related to your diabetes?	0	1	2	3	4
8. Feeling overwhelmed by your diabetes?	0	1	2	3	4
9. Worrying about low blood sugar reactions?	0	1	2	3	4
10. Feeling angry when you think about living with diabetes?	0	1	2	3	4
11. Feeling constantly concerned about food and eating?	0	1	2	3	4
12. Worrying about the future and the possibility of serious complications?	0	1	2	3	4
13. Feelings of guilt or anxiety when you get off track with your diabetes management?	0	1	2	3	4
14. Not "accepting" your diabetes?	0	1	2	3	4
15. Feeling unsatisfied with your diabetes physician?	0	1	2	3	4
16. Feeling that diabetes is taking up too much of your mental and physical energy every day?	0	1	2	3	4
17. Feeling alone with your diabetes?	0	1	2	3	4
18. Feeling that your friends and family are not supportive of your diabetes management efforts?	0	1	2	3	4
19. Coping with complications of diabetes?	0	1	2	3	4
20. Feeling "burned out" by the constant effort needed to manage diabetes?	0	1	2	3	4

PAID – © 1999 Joslin Diabetes Center

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Problem Areas in Diabetes Questionnaire (PAID)

Ways to identify patient emotional distress

Diabetes can be demanding and cause emotional distress. It is vital that clinicians are able to identify diabetes-related emotional distress in their patients. Validated practical strategies are available to promote an open dialogue and help to flag when serious emotional distress exists.

One tool that has proven very helpful to healthcare professionals is the Problem Areas in Diabetes (PAID) scale, a simple, one-page questionnaire.

Why the PAID scale?

PAID has high acceptability and scientific validity as evidenced by more than 60 scientific papers and scientific research abstracts.

The PAID measure of diabetes related emotional distress correlates with measures of related concepts such as depression, social support, health beliefs, and coping style, as well as predicts future blood glucose control of the patient.
The questionnaire has proven to be sensitive to detect changes over time following educational and therapeutic interventions.

What is the PAID scale?

The PAID is a self-report pencil and paper questionnaire that contains 20 items that describe negative emotions related to diabetes (e.g. fear, anger, frustration) commonly experienced by patients with diabetes. Completion takes approximately five minutes.

Scoring of the questionnaire

Each question has five possible answers with a value from 0 to 4, with 0 representing "no problem" and 4 "a serious problem". The scores are added up and multiplied by 1.25, generating a total score between 0 — 100. Patients scoring 40 or higher may be at the level of "emotional burnout" and warrant special attention. PAID scores in these patients may drop 10-15 points in response to educational and medical interventions.
An extremely low score (0-10) combined with poor glycaemic control may be indicative for denial.

How to use the PAID scale?

In a clinical setting, the PAID can be administered routinely (e.g. annual review) and/or ad hoc as a diagnostic tool.
The patient can be asked to complete the questionnaire before consultation (waiting room) or at the beginning of the consultation. Together with the patient, the clinician can calculate the total score and invite the patient to elaborate on problem areas that stand out (high scores) and explore options for overcoming the identified issues. This may include referral to a mental health specialist.

Novo Nordisk 2006. Adapted from DAWN Interactive 2. Text by Frank Snoek and Garry Welch.

Section V – Support

Q1. **I want** a lot of help and support from my family or friends in:
(circle one answer for each line)

	Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree	Does Not Apply
a) following my meal plan.	1	2	3	4	5	N/A
b) taking my medicine.	1	2	3	4	5	N/A
c) taking care of my feet.	1	2	3	4	5	N/A
d) getting enough physical activity.	1	2	3	4	5	N/A
e) testing my sugar.	1	2	3	4	5	N/A
f) handling my feelings about diabetes.	1	2	3	4	5	N/A

Q2. My family or friends help and support me a lot to:
(circle one answer for each line)

	Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree	Does Not Apply
a) follow my meal plan.	1	2	3	4	5	N/A
b) take my medicine.	1	2	3	4	5	N/A
c) take care of my feet.	1	2	3	4	5	N/A
d) get enough physical activity.	1	2	3	4	5	N/A
e) test my sugar.	1	2	3	4	5	N/A

- 11 -

f) handle my feelings about diabetes.	1	2	3	4	5	N/A

Q3. My family or friends: (circle one answer for each line)

	Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree
a) accept me and my diabetes.	1	2	3	4	5
b) feel uncomfortable about me because of my diabetes.	1	2	3	4	5
c) encourage or reassure me about my diabetes.	1	2	3	4	5
d) discourage or upset me about my diabetes.	1	2	3	4	5
e) listen to me when I want to talk about my diabetes.	1	2	3	4	5
f) nag me about diabetes.	1	2	3	4	5

Q4. Who helps you the most in caring for your diabetes? (check only one box)

☐₁ Spouse
☐₂ Other family members
☐₃ Friends
☐₄ Paid helper
☐₅ Doctor
☐₆ Nurse
☐₇ Case manager
☐₈ Other health care professional
☐₉ No one

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-

Diabetes Care Profile Scale Formulae*

Scale Name	Scale Equation	Special Instructions
Section IV		
Understanding Mgt Practice	$\sum$ Q1a-j / Count of non-missing items	If Section III, Q4 =Yes.
Section V		
Support Needs	$\sum$ Q1a-f / Count of non-missing items	
Support Received	$\sum$ Q2a-f / Count of non-missing items	
Support Attitudes	$\sum$ Q3a-f / Count of non-missing items	Reverse scores for Q3b, d & f.
Section VI		
Control Problems	$\sum$ Q1, Q2, Q3, Q4, Q5a-g, Q6a-h / Count of non-missing items	
Section VII		
Social & Personal Factors	$\sum$ Q1, Q2a-j, Q3, Q4 / Count of non-missing items	
Section VIII		
Positive Attitude	$\sum$ Q4, Q6, Q8, Q9, Q10 / Count of non-missing items	
Negative Attitude	$\sum$ Q1, Q2, Q3, Q5, Q7, Q16 / Count of non-missing items	
Care Ability	$\sum$ Q11a-d / Count of non-missing items	
Importance of Care	$\sum$ Q12a-d / Count of non-missing items	
Self-Care Adherence	$\sum$ Q13, Q14, Q15, Q17 / Count of non-missing items	

* The range of scores range from 1 to 5. Missing items include the values 0, 6 and blanks (Not Applicable responses are not used in the calculations). If 50% of the items of a scale are missing, the scale should be considered as missing.

12/99

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Appendix 9: Summary of Diabetes Self Care Attitudes (Toobert, Hampson and Glasgow, 2000)

Summary of Diabetes Self-Care Activities

English
Spanish

Scoring Instructions:

Mean of items in each section.

Toobert, D. J., Hampson, S. E., & Glasgow, R. E. (2000). The Summary of Diabetes Self-Care Activities Measure: Results from 7 studies and a revised scale. Diabetes Care, 23, 943-950.

1 of 5

The questions below ask about your diabetes self-care activities during the past seven days. If you were sick during the past seven days please think back to the last seven days when you were not sick.

Diet   **Number of days**

1. On average, over the past month, how many days per week have you followed your eating plan?	0	1	2	3	4	5	6	7
2. On how many of the last seven days did you eat five or more servings of fruits and vegetables?	0	1	2	3	4	5	6	7
3. On how many of the last seven days did you eat high fat foods such as red meat or full-fat dairy products?	0	1	2	3	4	5	6	7
4. On how many of the last seven days did you space carbohydrates evenly through the day?	0	1	2	3	4	5	6	7
5. On how many of the last seven days have you followed a healthful eating plan?	0	1	2	3	4	5	6	7

Exercise   **Number of Days**

1.. On how many of the last seven days did you participate in at least 30 minutes of physical activity?	0	1	2	3	4	5	6	7
2. On how many of the last seven days did you participate in a specific exercise session (such as such swimming, walking, biking) other than what you do around the house or as part of your work?	0	1	2	3	4	5	6	7

Blood Sugar Testing   **Number of days**

	0	1	2	3	4	5	6	7
1. On how many of the last seven days did you test your blood sugar?	0	1	2	3	4	5	6	7
2. On how many of the last seven days did you test your blood sugar the number of times recommended by your health care provider?	0	1	2	3	4	5	6	7

Foot Care   **Number of days**

	0	1	2	3	4	5	6	7
1. On how many of the last seven days did you check your feet?	0	1	2	3	4	5	6	7
2. On how many of the last seven days did you inspect the inside of your shoes?	0	1	2	3	4	5	6	7

Appendix 10: Ethical Approval

The University Of Sheffield.

School Of Health And Related Research.

Human Resource Development

Ministry of Health

Jordan

5th January 2014

Teaching Support Unit
Postgraduate Research Administrator:
Dr Monica Latham

School of Health and Related Research
Regent Court
30 Regent Street
Sheffield, S1 4DA

Telephone: +44 (0) 114 2220759
Fax: +44 (0) 114 2722998
Email: malatham@sheffield.ac.uk

To the head of Human Resource *Development at the Ministry of Health, Jordan,*

Israa Al-Rawashdeh is a PhD student at the University of Sheffield-UK, Faculty of Medicine, Dentistry and Health, School of Health and Related Research (ScHARR) -attached is the studentship status confirmation-. She is required to do her study project in Jordan investigating gender related differences among type 2 diabetic patients.

It was agreed with her supervisors that she will do data collection among patients in Jordan as the second step of her study. She is applying now to get the approval for doing her research in the Jordanian Ministry of Health care facilities.

Would you please give her the approval for carrying out her research under the title:
Gender Related Differences among Type 2 Diabetes Patients in Jordan Regarding Psychosocial variables and Self care experiences.

The research will work as follows:

- A small pilot study for improving the tool (questionnaire used).
- Main data collection by distributing the questionnaire among diabetic patients.

Yours sincerely,

Monica Latham

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No.   : Development/Plans/3060
Date   : 21.04.2014   G.
Corr. to : .... H.

Director of .... Hospital

Dear Sir,

Attached herewith please find a copy of the letter of Al-Bashir Hospital/ Head of Scientific Research Ethics Committee No. (M.B.A./Ethics Committee/5829) dated 16.04.2014 related to permitting the Doctorate Candidate: *Israa Mohammad Ahmad Al-Rawashdeh* to conduct a research entitled:

"Gender Related Differences among Type 2 Diabetes Patients
in Jordan Regarding Psychosocial Variables and Self Care Experiences)"

through performing meetings with Diabetes patients (of Type 2) and the out-patients of the Ministry of Health hospitals.

Your directing the relevant personnel to facilitate the above-mentioned researcher's task will be highly appreciated.

With best regards.

Director
Human Resources Development
Dr. Fadwa Al-Shawabkeh
(Signed)

Appendix 11: Permissions to use DCP and SDSCA

Deborah Toobert <Deborah@ori.org>
to me

14/12/2015

Dear Dr. Rawashdeh,

Thank you for contacting me about Summary of Diabetes Self-Care Activities questionnaire (SDSCA). The research for the SDSCA was supported from 1983 through 2009 by the National Institutes of Health, but that support has now ended. If you find this instrument useful, and would like permission to use it in your study and if you would like to keep it available for future use, we are now charging a one-time *total fee* of (*not* per questionnaire):

Students: $25
Research Scientists/Professors $100
Clinicians, health-care practitioners $100
Corporate research rates: $1000

Please click on the following link and select the appropriate price (Please let us know if you are unable to pay, and we can make other arrangements):

http://www.ori.org/sdsca

Once we receive your payment, you will have our permission to use the English version of the Summary of Diabetes Self-Care Activities Questionnaire in your research project and we will be able to provide answers to any questions you may have.   We have attached the 2000 Diabetes Care article with the SDSCA psychometric information. At the end of the article, there is an appendix with the English version of the questionnaire, and the scoring information. We have also attached a user-friendly copy of the English version of the SDSCA instrument.

You will find answers to some frequently asked questions on the website. If you have further questions, please contact me again at:

Deborah J. Toobert, PhD
Senior Research Scientist
Oregon Research Institute
1776 Millrace Drive
Eugene, Oregon 97403
http://www.ori.org/

Phone :(541) 485-2123
Home office (541) 338-8037
Fax: (541) 434-1505
email: deborah@ori.org

DCP tool permission letter request 📁 Inbox ✕

Israa Rawashdeh <irawashdeh1@sheffield.ac.uk>   13/12/2015
to pamcamp

Dear Pamela Campbell,

I am a doctoral student from The University of Sheffield/UK writing my Thesis titled '
The association between psychosocial factors, self-care behaviours and wellbeing in type 2 diabetes patients in Jordan: the role of gender' under the direction of PhD supervisors chaired by Prof. Elizabeth Goyder.

I would like the permission to use the the social support component (Section 5) of the DCP tool in my research study. I would like to translate into Arabic, use and print your survey under the following conditions:

· - I will use the surveys only for my research study.
· - I will acknowledge the The Michigan Diabetes Research Cente MDRC as the source of the items in the survey instruments in any written instruments, reports, or publications resulting from their use or reproduction.

Please direct me how to get the permission for using this tool.
If the permission is granted directly by you, please indicate so by replying to me through the e-mail: irawashdeh1@sheffield.ac.uk

Sincerely,

Dr. Israa Alrawashdeh
Research Doctorate Student- MD, MPH
Faculty of Medicine, Dentistry and Health
School of Health and Related Research (ScHARR)
University of Sheffield
The Innovation Centre
217 Portobello
Sheffield
S1 4DP

Campbell, Pam <pamcamp@med.umich.edu>   14/12/2015
to me

Dear Israa:

Please feel free to use our survey instrument. We just ask that you cite our center as follows: the project described was supported by Grant Number P30DK092926 (MCDTR) from the National Institute of Diabetes and Digestive and Kidney Diseases.

Thank you,

Pam Campbell
Michigan Diabetes Research Center
Michigan Center for Diabetes Translational Research

1. **Research Project Title:**

Self-care behaviours and related psychosocial factors in men and women with T2DM in Jordan

2. **Invitation paragraph**

You are being invited to participate in a project as part of a PhD research study. Before you decide whether to take part it is important that you understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask me if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part. Thank you for reading this.

3. **What is the project's purpose?**

This study aims to investigate whether there are differences among patients of type 2 diabetes in Jordan; it will look at psychosocial and self-care outcomes mainly and compare women and men accordingly.

I have found that there are no similar studies in Jordan. Therefore, I am doing this research in Jordan. I will collect data from patients and do a statistical analysis to get the findings.

4. **Why have I been chosen?**

You have been chosen because you are type 2 man/ woman and your mother tongue is Arabic.

5. **Do I have to take part?**

It is up to you to decide whether or not to take part. If you do decide to take part you will be given this information sheet to keep and you can still withdraw at any time without it affecting any health care that you are entitled to in any way. You do not have to give a reason.

6. **What will happen to me if I take part?**

You will be directed to where you can get the questionnaire booklet from the nursing room by the researcher or the data collectors contained in an envelope. You will be requested to fill a questionnaire that contains questions about you, how do you live with the disease and

how do you care for it. Following completion you are requested to put it back in the envelope and hand it in the assigned box in the nursing room. The questionnaire is in Arabic language. The research letter will be provided with the questionnaire booklet. You can keep the research letter and the information sheet. Note: You can request the help in reading the questions for you if you prefer. Just ask one of the data collectors when you collect the questionnaire envelope.

8. **What are the possible disadvantages and risks of taking part?**

There are no foreseeable risks or discomforts that may be associated with taking part in the research. However, if you felt any discomfort you can withdraw at any stage without being asked for the causes.

9. **What are the possible benefits of taking part?**

Whilst there are no immediate benefits for your participation in this research, it is hoped that this work will assist in understanding more aspects of the experience of living with diabetes among women and men in Jordan and subsequently improving the clinical practice or services provided to type 2 Diabetes patients in Jordan.

10. **What if something goes wrong?**

If you wish to raise a complaint you can contact me at my contact details provided.

12. **Will my taking part in this project be kept confidential?**

All the information that will be collected about you will be kept strictly confidential. Your name is not required. Your answers in the questionnaire booklet will be kept in locked drawer in the PhD office. It will then be analysed using computer software, and kept in a password protected computer. The information might be used in future publication.

13. **What will happen to the results of the research project?**

The results of this research will be presented and discussed in my PhD thesis document and may also get to be published.

14. **Who is organising and funding the research?**

The University of Sheffield in UK is organising and supporting my project in Jordan and The University of Mutah is sponsoring my PhD project.

15. **Who has ethically reviewed the project?**

This research has been ethically approved by the Ministry of Health in Jordan.

16. **Contact for further information**

Israa Al-Rawashdeh

Phone number: **+962....**

If you wish to write:

Contact via e-mail: irawashdeh1@shef.ac.uk

Or via post at:

147, Addustour street, Hai Nazzal

Amman, Jordan

Thank you very much for your participation.

Appendix 13: Internal consistency of the used scales

Appendix 13a : Item-total internal consistency for self-efficacy scale (N = 233)

		Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
1.	How confident do you feel that you can eat your meals every 4 to 5 hours every day, including breakfast every day?	.355	.763
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?	.413	.752
3.	How confident do you feel that you can choose the appropriate foods to eat when you are hungry (for example, snacks)?	.516	.735
4.	How confident do you feel that you can exercise 15 to 30 minutes, 4 to 5 times a week?	.334	.768
5.	How confident do you feel that you can do something to prevent your blood sugar level from dropping when you exercise?	.577	.722
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?	.472	.742
7.	How confident do you feel that you can judge when the changes in your illness mean you should visit the doctor?	.517	.736
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?	.589	.724

Appendix 13b : Internal consistency for PAID scale (N = 230)

		Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
1.	Not having clear and concrete goals for your diabetes care?	.342	.924
2.	Feeling discouraged with your diabetes treatment plan?	.637	.918
3.	Feeling scared when you think about living with diabetes?	.709	.916
4.	Uncomfortable social situations related to your diabetes care (e.g., people telling you what to eat)?	.514	.920
5.	Feelings of deprivation regarding food and meals?	.695	.916
6.	Feeling depressed when you think about living with diabetes?	.714	.916
7.	Not knowing if your mood or feelings are related to your diabetes?	.666	.917
8.	Feeling overwhelmed by your diabetes?	.635	.918
9.	Worrying about low blood sugar reactions?	.591	.919
10.	Feeling angry when you think about living with diabetes?	.660	.917
11.	Feeling constantly concerned about food and eating?	.668	.917
12.	Worrying about the future and the possibility of serious complications?	.668	.917
13.	Feelings of guilt or anxiety when you get off track with your diabetes management?	.494	.921
14.	Not "accepting" your diabetes?	.485	.921
15.	Feeling unsatisfied with your diabetes physician?	.370	.923
16.	Feeling that diabetes is taking up too much of your mental and physical energy every day?	.609	.918
17.	Feeling alone with your diabetes?	.578	.919
18.	Feeling that your friends and family are not supportive of your diabetes management efforts?	.567	.919
19.	Coping with complications of diabetes?	.462	.921
20.	Feeling "burned out" by the constant effort needed to manage diabetes?	.636	.918

Appendix 13c: Internal consistency for social support needs scale (N = 222)

		Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
1.	I want a lot of help and support from my family or friends in Follow my meal plan.	.581	.835
2.	I want a lot of help and support from my family or friends in Take my medicine	.674	.818
3.	I want a lot of help and support from my family or friends in Take care of my feet	.678	.817
4.	I want a lot of help and support from my family or friends in Get enough physical activity	.576	.836
5.	I want a lot of help and support from my family or friends in Test my sugar	.612	.829
6.	I want a lot of help and support from my family or friends in Handle my feelings about diabetes	.683	.816

Internal consistency for social support attitudes scale (N = 220)

		Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
1.	My family or friends: Accept me and my diabetes	.356	.679
2.	My family or friends: Feel uncomfortable about me because of my diabetes (reversed)	.464	.644
3.	My family or friends: Encourage or reassure me about my diabetes	.337	.685
4.	My family or friends: Discourage or upset me about my diabetes (reversed)	.536	.625
5.	My family or friends: Listen to me when I want to talk about my diabetes	.462	.645
6.	My family or friends: Nag me about diabetes (reversed)	.421	.659

Internal consistency for social support received scale (N = 217)

		Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
1.	My family or friends help and support me a lot to Follow my meal plan	.424	.849
2.	My family or friends help and support me a lot to Take my medicine.	.709	.793

3.	My family or friends help and support me a lot to Take care of my feet.	.701	.795
4.	My family or friends help and support me a lot to Get enough physical activity	.633	.810
5.	My family or friends help and support me a lot to Test my sugar	.615	.813
6.	My family or friends help and support me a lot to Handle my feelings about diabetes	.622	.812

Appendix 13d : Item-total internal consistency for dietary self-care scale (N = 219)

		Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
1.	On average, over the past month, how many days per week have you followed your eating plan?	.560	.430
2.	On how many of the last seven days did you eat five or more servings of fruits and vegetables?	.263	.601
3.	SC3r	.197	.621
4.	On how many of the last seven days did you space carbohydrates evenly through the day?	.181	.644
5.	On how many of the last seven days have you followed a healthful eating plan?	.642	.376

Table: Inter-Item Correlation Matrix for dietary self-care scale items

	1	2	3r*	4	5
On average, over the past month, how many days per week have you followed your eating plan?	1.000				
On how many of the last seven days did you eat five or more servings of fruits and vegetables?	.203	1.000			
On how many of the last seven days did you eat high fat foods such as red meat or full-fat dairy products? r*	.306	-.093	1.000		
On how many of the last seven days did you space carbohydrates evenly through the day?	.067	.279	-.019	1.000	
On how many of the last seven days have you followed a healthful eating plan?	.756	.255	.316	.154	1.000
- r= reversed					

Inter-Item Correlation Matrix for exercise self-care scale items

1.	On how many of the last seven days did you participate in at least 30 minutes of physical activity?	1.000
2.	On how many of the last seven days did you participate in a specific exercise session (such as such swimming, walking, biking) other than what you do around the house or as part of your work?	.252

Table: Inter-Item Correlation Matrix for blood sugar self-care scale items

1.	On how many of the last seven days did you test your blood sugar?	1.000

2.	On how many of the last seven days did you test your blood sugar the number of times recommended by your health care provider?	.612

Table: Inter-Item Correlation Matrix for foot care self-care scale items		
1.	On how many of the last seven days did you check your feet?	1.000
2.	On how many of the last seven days did you inspect the inside of your shoes?	.501

Appendix 14: Moderation effect of gender on the relationships between psychosocial variables and self-care behaviours.

Dietary self-care

Variable	Model 1 B	β	P	Model 2 B	β	P	Model 3 B	β	P
(Constant)	4.523		.000	4.238		.000	4.267		.000
Woman	_			.529	.179	.009	.525	.177	.010
DD	_			.000	-.003	.972	.004	.056	.618
DD X Woman	_						-.006	-.070	.476
R^2	.303			.330			.332		
ΔR^2	.303			.027			.002		
F, p	14.055	, 0.000		11.814	, 0.000		10.531	, 0.000	

Exercise self-care

Variable	Model 1 B	β	P	Model 2 B	β	P	Model 3 B	β	P
(Constant)	1.891		.000	2.038		.000	2.045		.000
Women				-.290	-.076	.305	-.291	-.077	.305
DD				.006	.070	.402	.007	.080	.518
DD X Women							-.001	-.011	.916
R^2	.189			.194			.194		
ΔR^2	.189			.006			.000		
F, p	7.517 , 0.000			5.787 , 0.000			5.119 , 0.000		

Blood sugar monitoring

Variable	Model 1 B	β	P	Model 2 B	β	P	Model 3 B	β	P
(Constant)	1.648		.000	1.635		.000	1.588		.000
Women				.027	.006	.936	.034	.008	.919
DD				-.001	-.012	.894	-.007	-.075	.565
DD X Women							.010	.076	.507
R^2	.092			.092			.094		
ΔR^2	.092			.000			.002		
F, p	3.269 , 0.004			2.429 , 0.016			2.202 , 0.024		

Foot Care

Variable	Model 1 B	β	P	Model 2 B	β	P	Model 3 B	β	P
(Constant)	2.671		.000	1.793		.000	1.694		.000

Variable	Model 1 B	β	P	Model 2 B	β	P	Model 3 B	β	P
Women				1.617	.322	.000	1.631	.324	.000
DD				.003	.031	.712	-.009	-.083	.499
DD X Women							.021	.136	.205
R^2	.102			.195			.201		
ΔR^2	.102			.093			.007		
F, p	3.654 , 0.002			5.796 , 0.000			5.349 , 0.000		

	Model 1			Model 2			Model 3		
Variable	B	β	P	B	β	P	B	β	P
(Constant)	6.573		.000	6.483		.000	6.407		.000
Women				.167	.063	.424	.177	.067	.393
DD				.000	-.004	.962	-.010	-.173	.182
DD X Women							.016	.200	.076
R^2	.109			.112			.127		
ΔR^2	.109			.003			.015		
F, p	3.943 , 0.001			3.023 , 0.003			3.073 , 0.002		

(Medication)

In model 1: age, duration, self-efficacy, social support needs, attitudes were accounted for.

Appendix 14b: Summary of the Regression Analysis testing the moderation effect of gender in the relationship between the Self-Efficacy (SE) and self-care behaviours

Dietary self-care

	Model 1			Model 2			Model 3		
Variable	B	β	P	B	β	P	B	β	P
(Constant)	4.510		.000	4.238		.000	4.232		.000
Woman				.529	.179	.009	.531	.179	.009
SE				-.171	-.239	.000	-.195	-.273	.002
SE X Woman							.049	.049	.571
R^2	.252			.330			.331		
ΔR^2	.252			.077			.001		
F, p	10.918	, 0.000		11.814	, 0.000		10.500	, 0.000	

Exercise self-care

	Model 1			Model 2			Model 3		
Variable	B	β	P	B	β	P	B	β	P
(Constant)	1.873		.000	2.038		.000	2.027		.000
Women				-.290	-.076	.305	-.286	-.075	.312
SE				-.330	-.361	.000	-.385	-.421	.000
SE X Woman							.111	.086	.359
R^2	.077			.194			.198		
ΔR^2	.077			.117			.004		
F, p	2.707 , 0.015			5.787 , 0.000			5.234 , 0.000		

Blood sugar monitoring

	Model 1			Model 2			Model 3		
Variable	B	β	P	B	β	P	B	β	P
(Constant)	1.642		.000	1.635		.000	1.633		.000
Women				.027	.006	.936	.028	.007	.934
SE				-.166	-.162	.029	-.176	-.172	.093
SE X Woman							.020	.014	.888
R^2	.069			.092			.092		
ΔR^2	.069			.023			.000		
F, p	2.388 , 0.030			2.429 , 0.016			2.150 , 0.027		

Foot Care

	Model 1			Model 2			Model 3		
Variable	B	β	P	B	β	P	B	β	P
(Constant)	2.636		.000	1.793		.000	1.770		.000
Women				1.617	.322	.000	1.624	.323	.000

	Variable	Model 1			Model 2			Model 3		
		B	β	P	B	β	P	B	β	P
	SE				-.210	-.173	.013	-.319	-.263	.006
	SE X Woman							.220	.128	.171
	R^2	.086			.195			.202		
	ΔR^2	.086			.109			.008		
	F, p	3.036 , 0.007			5.796 , 0.000			5.385 , 0.000		

		Model 1			Model 2			Model 3		
	Variable	B	β	P	B	β	P	B	β	P
Medication	(Constant)	6.569		.000	6.483		.000	6.481		.000
	Women				.167	.063	.424	.168	.063	.422
	SE				-.070	-.109	.136	-.080	-.124	.221
	SE X Woman							.019	.021	.829
	R^2	.099			.112			.113		
	ΔR^2	.099			.014			.000		
	F, p	3.517 , 0.003			3.023 , 0.003			2.679 , 0.006		

Appendix 14c: Summary of the Regression Analysis testing the moderation effect of gender in the relationship between the Social support needs (SSN) and self-care behaviours

		Model 1			Model 2			Model 3		
	Variable	B	β	P	B	β	P	B	β	P
Dietary self-care	(Constant)	4.538		.000	4.238		.000	4.241		.000
	Woman				.529	.179	.009	.526	.178	.010
	SSN				-.297	-.242	.003	-.286	-.233	.019
	SSN X Woman							-.025	-.014	.872
	R^2	.277			.330			.330		
	ΔR^2	.277			.053			.000		
	F, p	12.390 , 0.000			11.814 , 0.000			10.451 , 0.000		

		Model 1			Model 2			Model 3		
	Variable	B	β	P	B	β	P	B	β	P
Exercise self-care	(Constant)	1.911		.000	2.038		.000	2.039		.000
	Women				-.290	-.076	.305	-.290	-.077	.307
	SSN				-.325	-	.019	-.322	-	.060

Variable	B	β	P	B	β	P	B	β	P
					.206			.204	
SSN X Woman							-.007	-.003	.974
R^2	.165			.194			.194		
ΔR^2	.165			.029			.000		
F, p	6.390 , 0.000			5.787 , 0.000			5.117 , 0.000		

Blood sugar monitoring

	Model 1			Model 2			Model 3		
Variable	B	β	P	B	β	P	B	β	P
(Constant)	1.627		.000	1.635		.000	1.615		.000
Women				.027	.006	.936	.044	.010	.896
SSN				.288	.163	.081	.221	.125	.278
SSN X Woman							.145	.056	.572
R^2	.077			.092			.093		
ΔR^2	.077			.015			.002		
F, p	2.705 , 0.015			2.429 , 0.016			2.187 , 0.025		

Foot Care

	Model 1			Model 2			Model 3		
Variable	B	β	P	B	β	P	B	β	P
(Constant)	2.634		.000	1.793		.000	1.717		.000
Women				1.617	.322	.000	1.681	.334	.000
SSN				.084	.040	.645	-.168	-.080	.454
SSN X Woman							.544	.178	.055
R^2	.114			.195			.210		
ΔR^2	.114			.081			.015		
F, p	4.141 , 0.001			5.796 , 0.000			5.639 , 0.000		

Medication

	Model 1			Model 2			Model 3		
Variable	B	β	P	B	β	P	B	β	P
(Constant)	6.584		.000	6.483		.000	6.438		.000
Women				.167	.063	.424	.206	.077	.322
SSN				-.158	-.143	.122	-.305	-.276	.015
SSN X Woman							.315	.195	.046
R^2	.099			.112			.131		
ΔR^2	.099			.013			.019		
F, p	3.534 , 0.002			3.023 , 0.003			3.180 , 0.001		

Appendix 14d: Summary of the Regression Analysis testing the moderation effect of gender in the relationship between the social support attitudes (SSA) and self-care behaviours:

Dietary self-care

Variable	Model 1 B	β	P	Model 2 B	β	P	Model 3 B	β	P
(Constant)	4.5389		.000	4.238		.000	4.227		.000
Woman				.529	.179	.009	1.646	.556	.179
SSA				.499	.210	.001	.643	.271	.003
SSA X Woman							-.268	-.383	.354
R^2	.266			.330			.333		
ΔR^2	.266			.064			.003		
F, p	11.705	, 0.000		11.814	, 0.000		10.589	, 0.000	

Exercise self-care

Variable	Model 1 B	β	P	Model 2 B	β	P	Model 3 B	β	P
(Constant)	1.866		.000	2.038		.000	2.027		.000
Women				-.290	-.076	.305	.989	.261	.656
SSA				-.450	-.148	.036	-.285	-.094	.352
SSA X Woman							-.307	-.343	.450
R^2	.171			.194			.197		
ΔR^2	.171			.024			.002		
F, p	6.646 , 0.000			5.787 , 0.000			5.196 , 0.000		

Blood sugar monitoring

Variable	Model 1 B	β	P	Model 2 B	β	P	Model 3 B	β	P
(Constant)	1.627		.000	1.635		.000	1.650		.000
Women				.027	.006	.936	-1.571	-.369	.443
SSA				-.155	-.046	.542	-.362	-.106	.322
SSA X Woman							.383	.381	.429
R^2	.090			.092			.095		
ΔR^2	.090			.002			.003		
F, p	3.203 , 0.005			2.429 , 0.016			2.225 , 0.022		

Foot Care

Variable	Model 1 B	β	P	Model 2 B	β	P	Model 3 B	β	P
(Constant)	2.631		.000	1.793		.000	1.762		.000
Women				1.617	.322	.000	4.881	.971	.032

Variable	Model 1 B	β	P	Model 2 B	β	P	Model 3 B	β	P
SSA				-.365	-.091	.198	.056	.014	.889
SSA X Woman							-.783	-.659	.145
R²	.110			.195			.203		
ΔR²	.110			.084			.009		
F, p	4.013 , 0.001			5.796 , 0.000			5.420 , 0.000		

	Model 1			Model 2			Model 3		
Variable	B	β	P	B	β	P	B	β	P
(Constant)	6.571		.000	6.483		.000	6.487		.000
Women				.167	.063	.424	-.304	-.114	.810
SSA				-.019	-.009	.904	-.080	-.038	.724
SSA X Woman							.113	.180	.704
R²	.109			.112			.113		
ΔR²	.109			.003			.001		
F, p	3.950 , 0.001			3.023 , 0.003			2.691 , 0.006		

Medication (row label)

Appendix14 e: Summary of the Regression Analysis testing the moderation effect of gender in the relationship between the Social support received (SSR) and self-care behaviours:

Dietary self-care

Variable	Model 1 B	β	P	Model 2 B	β	P	Model 3 B	β	P
(Constant)	4.517		.000	4.238		.000	4.238		.000
Woman				.529	.179	.009	.506	.171	.279
SSR				-.155	-.119	.088	-.160	-.122	.192
SSR X Woman							.009	.009	.956
R^2	.286			.330			.330		
ΔR^2	.286			.044			.003		
F, p	12.930 , 0.000			11.814 , 0.000			10.447 , 0.000		

Exercise self-care

Variable	Model 1 B	β	P	Model 2 B	β	P	Model 3 B	β	P
(Constant)	1.886		.000	2.038		.000	2.021		.000
Women				-.290	-.076	.305	.303	.080	.643
SSR				.104	.062	.412	.219	.131	.201
SSR X Woman							-.225	-.173	.316
R^2	.185			.194			.199		
ΔR^2	.185			.009			.004		
F, p	7.334 , 0.000			5.787 , 0.000			5.257 , 0.000		

Blood sugar monitoring

Variable	Model 1 B	β	P	Model 2 B	β	P	Model 3 B	β	P
(Constant)	1.649		.000	1.635		.000	1.638		.000
Women				.027	.006	.936	-.097	-.023	.901
SSR				.202	.107	.184	.178	.095	.385
SSR X Woman							.047	.032	.860
R^2	.083			.092			.092		
ΔR^2	.083			.009			.000		
F, p	2.937 , 0.009			2.429 , 0.016			2.152 , 0.027		

Foot Care

Variable	Model 1 B	β	P	Model 2 B	β	P	Model 3 B	β	P
(Constant)	2.645		.000	1.793		.000	1.783		.000
Women				1.617	.322	.000	1.930	.384	.027
SSR				.274	.123	.106	.335	.151	.142

	Model 1			Model 2			Model 3		
SSR X Woman							-.119	-.069	.689
R²	.114			.195			.195		
ΔR²	.114			.080			.001		
F, p	4.168 , 0.001			5.796 , 0.000			5.147 , 0.000		

Medication

	Model 1			Model 2			Model 3		
Variable	B	β	P	B	β	P	B	β	P
(Constant)	6.571		.000	6.483		.000	6.506		.000
Women				.167	.063	.424	-.655	-.246	.172
SSR				-.080	-.068	.395	-.239	-.204	.057
SSR X Woman							.311	.341	.058
R²	.104			.112			.129		
ΔR²	.104			.008			.017		
F, p	3.739 , 0.002			3.023 , 0.003			3.128 , 0.002		