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## Social support, diabetes self-care, and depressive symptoms among diabetes patients struggling with glycemic control

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SOCIAL SUPPORT, DIABETES SELF-CARE, AND DEPRESSIVE SYMPTOMS  
AMONG DIABETES PATIENTS STRUGGLING WITH GLYCEMIC CONTROL

A dissertation presented

by

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### **Abstract**

Diabetes mellitus is on the rise in the United States with 8.3% of the population currently affected by the disease. High rates of depression are common among diabetes patients, complicating diabetes self-care. Inadequate self-care leads to impaired glycemic control and disease complications. Social support has been identified as a resource in managing diabetes self-care; however, associations among psychological distress, diabetes self-care, and social support are not often studied for adult patients with diabetes. The purpose of this study was to conduct a cross-sectional, secondary data analysis examining relationships among social support, diabetes self-care, depressive symptoms and diabetes-related emotional distress for 222 diabetes participants (49.5% with type 1 and 50.5% with type 2 diabetes) in poor glycemic control ( $HbA_{1c} > 7.5\%$ ). The present study used data from the Joslin Diabetes Center to assess associations among these variables. Negative associations were found between social support and depressive symptoms as well as depressive symptoms and self-care. However, no relationship was found between social support and diabetes self-care. Therefore, the presence of depressive symptoms did not mediate the relationship between social support and diabetes self-care. Results from this study underscore the importance of considering psychosocial factors such as depressive symptoms, diabetes-related emotional distress, and the role of social support in diabetes treatment.

## Chapter One

### Introduction

Diabetes is a psychologically and behaviorally demanding chronic medical illness that occurs when the pancreas does not produce enough insulin, or when the body cannot effectively use the insulin it produces (Cobden, Niessen, Barr, Rutten, & Redekop, 2010). Diabetes can lead to serious medical complications, such as retinopathy and neuropathy, as well as premature death. However, steps can be taken to manage diabetes in a way that reduces the likelihood of these outcomes (American Diabetes Association [ADA], 2011).

The glucose cycle is the primary area of management in diabetes (American College of Endocrinology [ACE], 2002). The regulation of blood glucose is dependent on glucose entering the bloodstream and insulin allowing an appropriate uptake of glucose into the cells of the body. Glycemia is the presence of glucose in the bloodstream, hyperglycemia is an unusually high concentration of blood glucose, and hypoglycemia is an unusually low concentration of blood glucose (National Diabetes Information Clearinghouse [NDIC], 2008). Glycemic control refers to activities such as following recommended diet and exercise plans, measuring blood glucose levels as recommended, and following a physician recommended medication protocol (ADA, 2011).

Good glycemic control is a critical goal of diabetes care as health complications are more common in patients in poor glycemic control (Cryer, 2002; Katon et al., 2009; Koro, Bowlin, Bourgeois, & Fedder, 2004). Ideal glycemic control would mean that glucose levels were always normal and indistinguishable

from a person without diabetes. However, even patients in good glycemic control of their diabetes typically have blood glucose levels higher than normal much because of side effects of receiving exogenous insulin (Koro et al., 2004).

Type 1 diabetes develops when the body's immune system destroys insulin-producing pancreatic beta cells causing the dysregulation of blood glucose levels. In type 2 diabetes, either the body does not produce enough insulin or the cells ignore the insulin that is produced (ADA, 2011). Insulin is the hormone needed to convert glucose, starches, and other food into energy needed for daily life (Centers for Disease Control and Prevention [CDC], 2010). The pancreas gradually loses its ability to produce insulin in patients with insulin dependent diabetes mellitus (ADA, 2011). Patients with both types of diabetes are at risk to develop complications, particularly if they do not manage their diabetes and maintain glycemic control (CDC, 2010).

Diabetes management is controlled by the individual in conjunction with the treatment team. Diabetes self-care requires daily attention to behaviors such as adherence to recommended diet, exercise, and medications, monitoring glycemic control, and cessation of smoking (ADA, 2011). Patients and health care providers must be involved in monitoring glycemic status in patients as it is of utmost importance in diabetes care (ADA, 2011).

### **Overview of Diabetes Mellitus**

Type 1 and type 2 diabetes patients who have not met glycemic targets (glycated hemoglobin [HbA<sub>1c</sub>] > 7.5%) will be the focus of this study. Type 1 and type 2 diabetes require different forms of treatment and different medical concerns

exist for each type of the disease. Hypoglycemia can lead to seizures or unconsciousness, a condition called hypoglycemic or insulin shock (Yang, Kow, Pfaff, & Mobbs, 2004). Hyperglycemia is an effect of uncontrolled diabetes and over time leads to serious damage to many of the body's systems (World Health Organization [WHO], 2009).

**Glycemic control and diabetes.** Glycemic control is considered the primary goal of self-care in diabetes and glycated hemoglobin (HbA<sub>1c</sub>) the gold standard marker for assessing glycemic control over a two to three month period (ADA, 2011; Boutati & Raptis, 2009). Glycated hemoglobin levels depend on the blood glucose concentration and are routinely measured in people with diabetes. Levels of HbA<sub>1c</sub> are not influenced by daily fluctuations in the blood glucose concentration but reflect the average glucose levels over the prior six to eight weeks (ADA, 2011).

Monitoring HbA<sub>1c</sub> levels can be useful in understanding the effects of diet, exercise, and drug therapy on blood glucose in people with diabetes. The American Diabetes Association (2011) recommended that treatment of diabetes be directed at keeping a glycated hemoglobin level as close to normal as possible ( $\leq 7\%$ ) without episodes of hypoglycemia (low blood glucose levels).

Near normal glycemic control has a tremendous impact on the lives of people with diabetes (Diabetes Control and Complications Trial Research Group [DCCT], 1993). Improved glycemia can prevent or delay microvascular complications (e.g., retinopathy, nephropathy, and neuropathy) and macrovascular complications (i.e., cardiovascular disease, stroke, cerebrovascular disease, and coronary heart disease) in both type 1 and type 2 diabetes (Burant, 2008; DCCT, 1993; Fowler, 2008; United

Kingdom Prospective Diabetes Study Research Group, 1998). Improved quality of life, prevention or reduction of diabetes complications, and decreasing the cost of care are also associated with improved glycemic control (Sousa, Zauszniewski, Musil, Price, & Davis, 2005).

**Type 1 diabetes.** Type 1 diabetes is commonly diagnosed in children and young adults, although disease onset can occur at any age (CDC, 2010). Type 1 diabetes develops when the body's immune system destroys pancreatic beta cells, the only insulin-producing cells in the body (ADA, 2011). People with type 1 diabetes must receive insulin by injection or a pump. Symptoms of type 1 diabetes may occur suddenly and include extreme thirst (polydipsia), frequent urination (polyuria), sudden weight loss, high blood glucose levels, and lethargy (Juvenile Diabetes Research Foundation [JDRF], 2010).

If parents or caregivers suspect that a child's blood glucose is abnormal or a young adult experiences these symptoms it is important to consult a physician immediately. Type 1 diabetes is diagnosed using an Oral Glucose Tolerance Test. This test requires a special diet 24 hours in advance and includes blood glucose testing every half hour over two to four hours (JDRF, 2010). This test would be administered to diagnose existing abnormalities in an individual's blood glucose levels (JDRF, 2010).

Diabetic ketoacidosis is a significant complication of diabetes, particularly type 1, which can lead to severe illness or death. Diabetic ketoacidosis occurs when the body cannot use glucose as a fuel source because the body has no insulin or not enough insulin, and fat is used instead (Eisenbarth, Polonsky, & Buse, 2008).

Infection, trauma, surgery, and missing doses of insulin can lead to diabetic ketoacidosis. Improved therapy for patients with diabetes has decreased the death rate from this condition; however, it remains a tremendous risk as patients often fall into a coma when treatment is delayed (Eisenbarth et al., 2008).

Type 1 diabetes accounts for 5% to 10% of all diagnosed cases of diabetes in adults; however its incidence continues to increase worldwide (ACE, 2002; CDC, 2010; Daneman, 2006; JDRF, 2010). Based on data from 2002 to 2003, a new diagnosis of type 1 diabetes was given to 15,000 youths under the age of 20 in the United States in one year and about 3,700 youth received type 2 diabetes diagnoses in the same year (CDC, 2010). Type 1 diabetes requires complex management as it is often diagnosed in children and requires involvement of the family in diabetes care.

Autoimmune, genetic, or environmental risk factors may contribute to the development of type 1 diabetes (CDC, 2011). The incidence of type 1 diabetes is higher than average among people with other autoimmune diseases, including celiac disease, Hashimoto's thyroiditis (a form of hypothyroidism), Addison's disease, and multiple sclerosis (Barker, 2006). Forty percent of the United States population carries one or more of the human leukocyte antigen genes which lead to increased risk of type 1 diabetes. However, to be at an increased risk the individual needs a copy of these genes from each parent (JDRF, 2010). Environmental risk factors have also been considered for type 1 diabetes, including certain vaccinations, measles, mumps, and rubella infections (Dahlquist, 2001; Hummel, Fuchtenbusch, Schenker, & Ziegler, 2010). However, these studies suggest that low risk exists for

environmental factors. Therefore, the factors that actually trigger the onset of type 1 diabetes remain largely unknown (Daneman, 2006).

The demands of living with diabetes pose chronic stress on young patients and their families. Individuals with type 1 diabetes follow a complex and challenging treatment regimen consisting of daily administration of insulin, vigilant monitoring of diet and exercise, and meticulous correction of care based on the results of frequent blood glucose checks (Wysocki & Greco, 1997). Patients with type 1 diabetes are also at risk for developing microvascular and macrovascular disease. These complications account for the major morbidity and mortality associated with type 1 diabetes (Saydah, Fradkin, & Cowie, 2004). Diabetes treatment, self-care, and the role of social support will vary for patients with type 1 diabetes throughout the lifespan (Silverstein et al., 2005).

**Type 2 diabetes.** Type 2 diabetes accounts for approximately 95% of all diagnosed cases of diabetes in adults (CDC, 2010). This form of diabetes usually begins as insulin resistance, a disorder in which the cells do not use insulin properly. As the need for insulin rises, the pancreas gradually loses its ability to produce it (CDC, 2010). Type 2 diabetes is associated with obesity (body weight > 120% of ideal body weight), older age (>45 years), family history of diabetes (first-degree relative), history of gestational diabetes, impaired glucose metabolism, hyperlipidemia, hypertension, physical inactivity, and race/ethnicity (CDC, 2010).

Individuals who are at risk of developing type 2 diabetes may be diagnosed with pre-diabetes. Pre-diabetes includes blood glucose levels that are higher than normal but not high enough for a diagnosis of diabetes. Many people with pre-

diabetes develop type 2 diabetes within 10 years (NDIC, 1998). Individuals with pre-diabetes have an increased risk of heart disease and stroke; however, type 2 diabetes can be delayed or prevented with modest weight loss and moderate physical activity (NDIC, 1998). The CDC (2011) found that half of Americans aged 65 and older have pre-diabetes, and nearly 27% have diabetes.

In addition to the Oral Glucose Tolerance Test, the fasting plasma glucose test and random plasma glucose test can be used to test for type 2 diabetes. Only the random plasma glucose test cannot be used to test for pre-diabetes. Test results indicating that a person has diabetes should be confirmed with a second test on a different day (NDIC, 2008). The American Diabetes Association (2011) recommends testing to detect pre-diabetes and type 2 diabetes in adults without symptoms who are overweight or obese and have one or more additional risk factors for diabetes. People with pre-diabetes should have their blood glucose checked annually and take steps to prevent type 2 diabetes, including weight loss and increased exercise (NDIC, 2008).

Prevalence of type 2 diabetes in the United States alone is estimated to triple by 2050 to 50 million diagnosed cases (Narayan, Boyle, Geiss, Saaddine, & Thompson, 2006). Type 2 diabetes has been described as a “new epidemic” in the American pediatric population as it is no longer only affecting adults (Kaufman, 2002). The approximately 33% increase in type 2 diabetes in children in the past decade has been found mainly in African-American, Mexican-American, Native-American, and Asian-American children and young adults (Kaufman, 2002). Early-onset type 2 diabetes has been reported in many different countries reflecting the effects of sedentary lifestyle, rising rates of obesity, and dietary changes as part of

globalization and industrialization (James, Rigby, & Leach, 2004; Song, 2008; WHO, 2003).

Diets largely composed of complex carbohydrates with a higher proportion of fats and an increase in more sedentary work have been observed worldwide (WHO, 2003). Lack of physical activity and more passive leisure pursuits are contributing factors in the global rise of obesity (James et al., 2004). Further, groups with lower socioeconomic status have less access to healthcare and education about healthy lifestyle choices, including diet and exercise. These restrictions place individuals at a greater risk for developing type 2 diabetes (WHO, 2003).

Lifestyles, dietary choices, and aging populations have contributed to a significant increase in the number of individuals diagnosed with type 2 diabetes (Narayan et al., 2006). Factors like these caused the crude prevalence of diagnosed diabetes to increase by 176% between 1980 and 2010 (CDC, 2011). During this period, increases in the crude and age-adjusted prevalence of diagnosed diabetes were similar. Therefore, most of the increased prevalence was not caused by changes in the population age structure. (CDC, 2011).

Patients with type 2 diabetes may take oral medication or also require insulin injections as part of their diabetes treatment. Approximately 26% of patients with type 2 diabetes use insulin therapy (CDC, 2011). Hyperglycemia is a product of uncontrolled diabetes and leads to serious damage to many of the body's systems, especially the nerves and blood vessels (WHO, 2009). Diabetes self-care education is extremely important in helping patients with type 2 diabetes to avoid life-altering complications (McGowan, 2011).

## **Overview of Depression and Depressive Symptoms**

Anderson and colleagues (2001) conducted a meta-analysis of 42 studies and found that subjects with type 1 and type 2 diabetes were at an increased risk of experiencing depressive symptoms when compared with non-diabetic control subjects. The increased odds of depression associated with diabetes were similar in type 1 and type 2 diabetes. The effect of diabetes on depression remained after controlling for type of diabetes (Anderson et al., 2001).

Approximately 20% of all adults in the U.S. will suffer from major depressive disorder, dysthymia, minor depression, or other depressive symptoms at some point in their lives (Kessler et al., 2005). Depressive disorders are a subset of the mood disorders category of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR) (American Psychiatric Association [APA], 2005). Common symptoms exist among the depressive disorders, including depressed mood, weight loss or gain, insomnia or hypersomnia, psychomotor agitation or retardation, feelings of worthlessness, and diminished ability to concentrate (APA, 2005).

Clinical depression, depressed affect, and diabetes-related emotional distress are prevalent emotional states found among diabetes patients (Das-Munshi et al., 2007; De Groot et al., 2010; Katon et al., 2004). Das-Munshi and colleagues (2007) found that major depressive disorder is an important contributor to the burden of overall psychiatric comorbidity suffered by people with diabetes. Many diabetes patients also struggle with subclinical depression, or depressive symptoms, because of their illness beliefs, challenges with self-efficacy, and difficulty adjusting to and

living with a chronic illness (Campayo et al., 2010; De Groot et al., 2010; Snoek & Skinner, 2002).

**Diabetes and depression.** Common medical illnesses such as diabetes, heart disease, or chronic obstructive pulmonary disease have all demonstrated an increased prevalence of symptoms of depression (Huber, Drescher, & Asimakopoulou, 2009; Katon & Ciechanowski, 2002). Current research seeks to further understanding of biological and psychosocial mechanisms that influence this association and the environmental variables that influence its complicated relationship (Anderson, Clouse, Freedland, & Lustman, 2001; Katon et al., 2004; Katon et al., 2006; Katon et al., 2009; Katon, 2010; Lin et al., 2004; Lustman et al., 2000; Mezuk, Albrecht, Eaton, & Golden, 2008).

Diabetes patients are twice as likely as those without diabetes to suffer from depression or depressive symptoms (Anderson et al., 2001). This compares to 15 to 25% of patients with cancer and comorbid depression (National Cancer Institute, 2010) and 15% of patients with cardiovascular disease and depression (Jiang & Davidson, 2005). The relationship between these chronic conditions and the impact on patients who suffer from both deserves attention from treatment providers, researchers, and policy makers (Ciechanowski, Katon, & Russo, 2000; Egede & Ellis, 2010; Lin et al., 2010; Piette, Richardson, & Valenstein, 2004).

**Diabetes-related emotional distress.** Diabetes-related emotional distress is a unique form of psychological distress (Speight, Reaney, & Barnard, 2009). It differs from depression as it is influenced by fear of hypoglycemia, short- and long-term diabetic complications, and disordered eating (Polonsky et al., 1995). Diabetes-

related emotional distress is negatively associated with reported diabetes self-care behaviors (Polonsky et al., 1995).

Diabetes-related emotional distress also includes psychological constructs such as frustration, depressed mood, and worry; however, it is uniquely associated with diabetes-relevant outcomes (Delahanty et al., 2007). Diabetes-related emotional distress acts as an independent contributor to and/or result of poor adherence of diabetes self-care and subsequent difficulties with glycemia (Polonsky et al., 1995). While not all diabetes patients experience depressive symptoms, they may experience symptoms of diabetes-related emotional distress such as anxiety and worry about their diabetes (Speight, Reaney, & Barnard, 2009).

Diabetes-related emotional distress reflects patients' sense of worry and guilt about their diabetes as well as uncertain acceptance of diabetes diagnosis (Delahanty et al., 2007). Lack of understanding of treatment prescriptions such as dietary restrictions, self-monitoring of blood glucose, and taking insulin injections can also influence diabetes-related emotional distress (Rubin & Peyrot, 2001). Diabetes-related emotional distress can be influenced by feeling a lack of support from family and health care professionals as well as difficulty with disease management (Rubin & Peyrot, 2001). Measuring this construct will benefit this study as it will allow for greater understanding of associations among diabetes-related emotional distress, diabetes self-care, and social support.

### **Understanding Diabetes Self-Care**

Patients with diabetes must adhere to a range of self-care behaviors to reduce the risk of developing serious disease complications (DCCT, 1993; Lawson, Gerstein,

Tsui, & Zinman, 1999). Type 1 and 2 diabetes treatment involves complex interactions between biological, physiological, and behavioral facets of care (Cobden, Neissen, Barr, Rutten, & Redekop, 2010). Although self-care is recognized as an essential element of disease management, there is no clear consensus of how diabetes self-care is defined (Wilkinson & Whitehead, 2009).

Traditional self-care has been limited to routine behaviors and based on activities related to treatment adherence, including maintaining a recommended diet and exercise program, medication compliance, foot care, and regular blood glucose monitoring (Song, 2010). Non-routine self-care is also encouraged for patients with diabetes including making diabetes management decisions such as meal and medication planning (Lorig & Holman, 2003; Song, 2010). Establishing self-reliance and self-acceptance are also considered to be non-routine self-care behaviors in diabetes (Karlsson, Arman, & Wikblad, 2006).

**Diabetes self-care activities.** Diabetes self-care requires the individual to make many dietary and lifestyle changes simultaneously, placing the burden of responsibility largely upon the individual (Collins, Corcoran, & Perry, 2009). Diabetes self-care includes a range of activities which are directed by the patient's treatment team or diabetes physician. These activities include monitoring for disease symptoms, managing diet, exercising, checking blood glucose, medication adherence including insulin injections, assessing feet for early indications of compromised circulation, stopping smoking, and controlling alcohol consumption (Song, 2010).

The consumption of large amounts of complex carbohydrates, nutrient-poor foods with high sugar and saturated fat levels is of grave concerns for individuals in

developed and developing countries (WHO, 2003). It is recommended that patients with diabetes consume fruit and vegetables, nuts and whole grains in place of fatty, sugary foods that may worsen diabetes outcomes. Because of the increased risk of cardiovascular complications, patients with diabetes should also move from saturated animal-based fats to unsaturated vegetable-oil based fats and engage in daily moderate physical activity for at least 30 minutes (WHO, 2003).

Each individual must decide which diabetes self-care strategies to practice. Compliance with appropriate self-care actions will improve glycemic control, prevention of complications, and quality of life (Glasgow et al., 2001). However, patients with diabetes are influenced by psychosocial, demographic, and physiologic factors that may negatively impact diet and exercise choices, frequency of blood glucose monitoring, and medication regimen compliance (Collins et al., 2009).

### **Social Support and Diabetes**

**Defining social support.** Social support is defined as information that allows an individual to believe that he or she is cared for and loved, esteemed and valued. Social support also provides the feeling that an individual belongs to a network of communication and mutual obligation (Cobb, 1976). There is great diversity in social support concepts, but it has been commonly agreed that social support can be operationalized into categories of social embeddedness, perceived social support, and enacted support (Barrera, 1981; Barrera, Sandler, & Ramsey, 1981; Gottlieb, 1983; Heller & Swindle, 1983). Social concept, in this study, will be defined using Weiss's model (1974).

Weiss's model (1974) indicates that individuals wish to feel successful and skillful in their relationships. Assessment of skill level is made through self-fulfillment in relationships as well as a sense of fulfillment as judged by others. Weiss conceptualized six dimensions of social support reflecting the emotional aspects of important relationships. These dimensions include a sense of reliable alliance (feeling a sense of belonging, particularly with family), attachment (feeling a sense of intimacy), social integration (companionship, including shared interests), reassurance of worth (feedback that one's personal attributes are valued), provision of guidance (information or advice offered by others), and opportunity for nurturance (voluntary provision of help experienced as rewarding). Therefore, this model of social support incorporates the feedback from others in defining the success of a relationship as well as performance against cultural and normative standards about relationships.

The six dimensions of Weiss's conceptualization suggest the importance of social support during times of need and stability, and how relationships create a sense of membership to a community or network (Weiss, 1974). The need for emotional integration asserts that people seek a sounding board for their emotional responses to life experiences and that this feedback is an important addition to their own reactions. Weiss believed that individuals have a desire to expose elements of their experience and condition. This communication about self allows for individuals to relate with others in times of difficulty and stability. Weiss's conceptualization also assumes that individuals have the desire to evaluate themselves positively and be assured that they are positive and contributing members to their community, thereby enhancing

identity. This model also proposes that close relationships support the needs and values of the individual and validate the identity of the individual (Weiss, 1974).

For the purpose of this study, social support includes family (i.e., parents, spouses/partners, and children), community ties (i.e., churches, social groups), friends, peers with diabetes, and the medical care team. The medical care team is inclusive of primary care physicians, diabetes specialists, nurse practitioners, registered dietitians, psychologists/therapists, and diabetes educators. Social support influences health behavior outcomes for individuals suffering from chronic illness (Harris et al., 2008) and will be addressed as a variable that influences diabetes self-care and psychological well-being in individuals with diabetes.

**Social support and diabetes self-care.** Social support has been found to be a protective factor against stress and illness. Social support plays a role in the adherence, or lack thereof, to recommendations for health-related self-care behaviors (La Roche et al., 2009; Nicklett & Liang, 2010; Rosland et al., 2008). Social support, diabetes self-care, and depressive symptoms are likely to influence glycemic outcomes. Therefore, the interaction between social support, diabetes self-care, and depressive symptoms in patients with diabetes is critical to understanding how best to support the patient in treatment compliance to achieve good health outcomes.

### **Theoretical Overview**

**Self-determination theory.** Self-determination theory posits that people are inherently motivated to internalize the regulation of uninteresting though important activities (Deci & Ryan, 1985). There are two different processes through which internalization can occur, resulting in qualitatively different styles of self-regulation.

The two types of internalization are *introjection*, or taking in a value but not accepting it as one's own, and *integration*, when the value is assimilated with one's core sense of self. Introjection results in internally controlling values, whereas integration results in self-determination (Deci & Ryan, 1985). When the social context supports self-determination, integration tends to occur, whereas when the context does not support self-determination, introjection tends to occur (Deci, Eghrari, Patrick, & Leone, 1994).

Self-determination theory is a general theory of human motivation that proposes that humans have a need for autonomy and support (Williams, Freedman, & Deci, 1998). Self-determination theory also assumes humans have a need for competence, sharing similarities with self-efficacy in Bandura's social learning theory. Autonomous and competence motivations are correlated with improved glycemic control (Senecal, Nouwen, & White 2000; Williams et al., 1998), suggesting that perceptions of autonomy and competence may underlie effective diabetes self management and improve glycemic control.

Therefore, patients with diabetes who report reciprocal relationships and high levels of social support may be more motivated to adopt recommended health behaviors. It has been found that when an individual experiences autonomy and social support they become more motivated to adopt recommended health behaviors due to increased feelings of competence (Williams et al., 1998; Sheldon, Williams, & Joiner, 2003). Self-determination theorists might assume that patients with diabetes whose autonomy and social support needs are met would be more likely to practice appropriate diabetes self-care and subsequently improve glycemic control due to

increased feelings of competence. This could lead to a subsequent improvement in the emotional state as well as improved physiological outcomes.

**Autonomy and competence.** The concepts of autonomous versus controlled motivations and perceived competence versus incompetence are central to self-determination theory. People are autonomously motivated when they experience volition and choice while behaving; they are controlled when they experience pressure or coercion. Patients following a diabetes diet might feel autonomous if they freely chose to limit their calories because they believed it would help with glucose control and they were personally committed to improving their health. In contrast, patients would be controlled if they followed their diet because a doctor, nurse educator, dietician, or family member pressured them to do so (Williams, McGregor, Zeldman, Freedman, & Deci, 2004).

Adults perceive themselves to be competent when they feel capable of controlling important outcomes such as glucose levels, and they perceive themselves to be incompetent when they feel unable to control those outcomes. Studies have shown that as adults become more autonomously motivated, they feel more competent to attain relevant outcomes (Williams & Deci, 1996; Williams et al., 1998). These findings are consistent with self-determination theory because autonomy is associated with initiating behaviors and perceived competence is related to feelings about achieving a successful outcome.

Williams and colleagues (2004) suggested that patients who initiated diabetes self-care behaviors would also experience development of perceived competence for managing their diabetes. Self-determination theory predicted that people would be

most effective in long-term glycemic control when they are autonomous and feel competent with respect to critical self-care behaviors. According to this model, when practitioners are supportive of autonomy their patients would become more autonomous and begin to feel more competent (Williams et al., 2004).

**Autonomy support.** Autonomy support refers to the extent to which providers elicit and acknowledge patients' perspectives, support patients' initiatives, offer choice about treatment options, and provide relevant information while minimizing pressure and control (Williams et al., 2004). Studies have shown that autonomy support offered by health care practitioners influenced motivation and healthy behaviors in patients including smoking cessation (Williams, Cox, Kouides, & Deci, 1999), weight loss (Williams, Grow, Freedman, Ryan, & Deci, 1996), and medication adherence (Williams, Ryan, Rodin, Grolnick, & Deci, 1998).

Autonomy support was found to predict change in glycemic control over 12 months in a study of patients with diabetes (Williams et al., 1998). Williams and colleagues (2004) found that perceived autonomy support from treatment providers accounted for change in the experiences of autonomy and, to a lesser extent, competence, so autonomy support facilitated the internalization of autonomous motivation and perceived competence. This change in perceived competence also mediated the relationship between change in autonomous motivation and change in glycemic control as measured by glycosylated hemoglobin (HbA<sub>1c</sub>).

**Choice of self-determination theory.** The field of psychology is divided on issues of inherent tendencies towards psychological growth and autonomous behavior. Self-determination theory was selected for this research project because it

has been used in diabetes research in a successful manner in the past (Williams et al., 1998; Williams et al., 2004). Autonomous and competence motivations are correlated with improved glycemic control which suggests that perceptions of autonomy and competence may underlie effective diabetes self-care and improved glycemic control (Senecal, Nouwen, & White 2000; Williams et al., 1998).

Self-determination theory was developed in an attempt to incorporate the viewpoints of humanistic, psychoanalytic, developmental, behavioral, cognitive, and post-modern theories (Deci & Ryan, 1985). Self-determination theorists believe that human tendencies exist for active involvement and development and all individuals have a natural tendency to develop a unified sense of self and integrate autonomously with others (Deci & Ryan, 1985). This theory also acknowledges that social environments can either facilitate growth or disrupt and fragment individual development (Deci & Ryan, 1985).

Self-determination theory was selected over a behavioral approach as it is not adequate to suggest that diabetes behaviors are a function of the organization of their environment and are entirely influenced by past and current contingencies (Skinner, 1953). Although organization of the environment plays a role in the development of diabetes self-care behaviors, a behavioral approach would not adequately address the variables involved in diabetes self-care. Self-determination theory recognizes the influence of the environment on individual development, but it also incorporates internal motivators.

Self-determination theory was also chosen instead of social-cognitive theory. Social cognitive theory is a learning theory based on the concept that people learn by

observation and human thought processes are central to understanding personality (Bandura, 1989). While social cognition theorists agree that learned behavior influences development, they believe that the individual is capable of influencing their own development. Social cognition theory mirrors self-determination theory in its belief in the role of the individual in making choices (Deci & Ryan, 1985). However, the focus on desire for competence, relatedness, and autonomy in self-determination theory most closely follows the focus of this study in addressing the ways in which social support (relatedness) and diabetes self-care (autonomy and competence) interact with depressive symptoms and diabetes-related emotional support.

### **Statement of the Problem**

Clinical depression, depressive affect, and diabetes-related emotional distress are prevalent emotional states found among diabetes patients (Aarts et al., 2009; Ali, Stone, Peters, Davies, & Khunti, 2006; Anderson et al., 2001; Brown, Newman, Majumdar, & Johnson, 2005; Bryan et al., 2010; Carney, 2008; Das-Munshi et al., 2007; De Groot et al., 2010; Dirmaier et al., 2010; Jacobson, 1993; Jacobson & Weinger, 1998). Depressive symptom severity is associated with poorer diet and medication regimen adherence, functional impairment, and higher health care costs in primary care diabetic patients (Brenes, 2007; Ciechanowski et al., 2000; Egede & Ellis, 2010; Katon et al., 2004; Katon, 2010). Depressive symptoms have been negatively correlated with peer social support, family social support, self-esteem, and optimism (Anderson, Ho, Brackett, Finkelstein, & Laffel, 1997; Weber, Puskar, & Ren, 2010; Williams et al., 1998; Williams et al., 1999; Williams et al., 2004).

Developing a stronger understanding of the impact of social support on diabetes self-care behaviors aids physicians, psychologists, and nutritionists to develop interventions that provide appropriate levels of support. Patients with diabetes may benefit from treatment that incorporates family and friends when appropriate. Consideration of the influence of depressive symptoms on social support and self-care further supports the need for interventions that integrate psychosocial needs with diabetes care recommendations.

This study focused on understanding whether associations existed among 1) depressive symptoms, social support, and diabetes self-care, and 2) diabetes-related emotional distress, social support, and diabetes self-care. The study specifically focused on adult diabetes patients in poor glycemic control. The goal of this study was to further inform psychological approaches to helping patients with type 1 and type 2 diabetes.

### **Importance of the Study**

People with diabetes are twice as likely to suffer from depression compared with people without diabetes (Anderson et al., 2001). Depression is likely to decrease social support (Sacco & Yanover, 2006). Individuals with diabetes who do not receive adequate social support are less likely to practice appropriate diabetes self-care (Palmer et al., 2009; Vesco et al., 2010; Wysocki et al., 1996). Therefore, the present study assessed the relationships between social support, adherence to diabetes self-care behaviors, and depressive symptoms.

This study evaluated the relationship between social support and depressive symptoms for participants with type 1 and type 2 diabetes in poor glycemic control.

It also addressed whether a relationship exists between social support and diabetes self-care for these individuals. Associations among depressive symptoms and diabetes-related emotional distress and diabetes self-care were also analyzed.

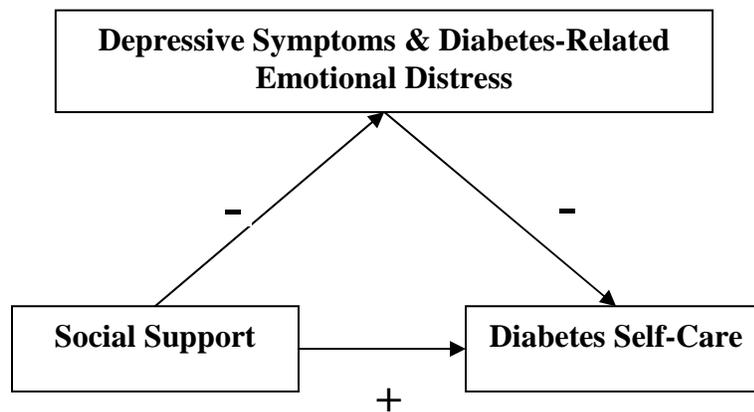
This study differs from prior research in its focus on the impact of social support, as defined by Weiss (1974), on diabetes self-care behaviors as well as depressive symptoms and diabetes-related emotional distress. Previous studies addressed these constructs independently (Palmer et al., 2009; Sacco & Yanover, 2006; Vesco et al., 2010; Wysocki et al., 1996) yet none have considered the relationship among all three. Diabetes research has long focused on understanding support provided within families and the impact of diabetes upon the family of children with type 1 diabetes (Anderson, Goebel-Fabbri, & Jacobson, 2005). Therefore, this study is unique in its specific focus on adults in poor glycemic control.

Consideration of participants in poor glycemic control is important as the presence of depressive symptoms is associated with poor adherence to diabetes control medication for these patients (Katon et al, 2009). Therefore, understanding the relationship between depressive symptoms, diabetes-related emotional distress, diabetes self-care, and social support is essential for this group of patients. This may allow for further insight into the needs of diabetes patients in poor glycemic control.

### **Conceptual Model**

The conceptual model below was used to explain the association between the constructs of this study.

Figure 1

*Conceptual Model***Study Design**

This descriptive study focused on the relationship between psychological distress (depressive symptoms and diabetes-related emotional distress), diabetes self-care, and social support. Lack of social support was expected to predict the presence of depressive symptoms and diabetes-related emotional distress as well as the frequency of diabetes self-care behaviors. The current study is a secondary analysis using baseline data from the Breaking Down Barriers Study conducted at the Joslin Diabetes Center between 2002 and 2006 under the oversight of the principal investigator, Katie Weinger, Ed.D.

The Breaking Down Barriers study evaluated the efficacy of an educator-led group behavioral/educational intervention intended to improve adherence to diabetes self-care behaviors. Participants in the Breaking Down Barriers program showed stronger glycemic improvement compared to controls after three months. Participants with type 2 diabetes experienced greater improvements over those with type 1 diabetes. Improved diabetes outcomes (HbA<sub>1c</sub> levels) one year after baseline were

associated with frequency of diabetes self-care, reduced frustration with self-care, and lower social integration scores at baseline. These findings indicated that structured educator-led diabetes education with cognitive behavioral strategies helped patients to improve their glycemic control.

### **Purpose of the Study**

The current study addressed whether lack of social support would predict depressive symptoms and diabetes-related emotional distress and whether the presence of social support would predict diabetes self-care in adult participants with type 1 and type 2 diabetes in poor glycemic control. The research focused on adults aged 20 to 65 years with a diagnosis of type 1 or type 2 diabetes who were diagnosed for a minimum of two years and whose hemoglobin A<sub>1c</sub> (HbA<sub>1c</sub>) levels were > 7.5% (higher than 2011 American Diabetes Association recommendations).

The combination of these variables was not previously analyzed using data from the Breaking Down Barriers study. The present study builds upon findings from the Breaking Down Barriers study through consideration of the impact of social support upon diabetes self-care for these participants at their baseline visit and supports the importance of social support through diabetes education for adult diabetes patients. The current study is also unique as social support and diabetes self-care constructs are not commonly considered together as influential factors in research on diabetes and depressive symptoms. Therefore, this novel combination provided greater understanding of ways to assist adult diabetes patients.

The investigation of the impact of social support on psychological distress and diabetes self-care is supported by social-determination theory as competence and

autonomy influences diabetes self-care and psychological well-being (Williams et al., 2004). Both of these variables are also likely to be influenced by social support. The central question of this study is: Do depressive symptoms and diabetes-related emotional distress mediate the relationship between social support and diabetes self-care?

### **Practical Application of the Study**

The results of this study may have implications for professionals in all aspects of diabetes care as well as for patients with type 1 and type 2 diabetes and their networks of social support. Comorbid diabetes and depressive symptoms increase the risk of diabetes complications and helping individuals with diabetes to access and better utilize social support may allow them to experience greater autonomy and competence in their self-care. Further understanding the associations between social support, diabetes self-care, and psychological distress helps treatment providers to support diabetes patients well as individuals within their support networks.

Greater understanding of the relationship between social support, diabetes self-care, depressive symptoms, and diabetes-related emotional distress assists in the development and modification of current diabetes treatment models in order to provide more successful options for patients with diabetes. Psychological interventions may be influenced by Weiss's (1974) conceptualization of social support, emphasizing the need for mutuality in relationships as well as sharing experiences with others. Enhancements to individual and group therapy interventions for diabetes patients may provide additional social support thereby enhancing

diabetes self-care and psychological well-being. Findings from this study also contribute to existing literature about adult diabetes patients and families.

### **Research Questions and Hypotheses**

This study measured the constructs of social support using the Social Provisions Scale, self-care through the Self-Care Inventory – Revised, depressive symptoms using the Brief Symptom Inventory-18, and diabetes-related emotional distress with the Problem Areas in Diabetes scale. It attempted to determine whether depressive symptoms and diabetes-related emotional distress mediate the relationship between social support and diabetes self-care for adults in poor glycemic control.

The following questions and hypotheses were addressed:

Question 1: Do differences exist between demographic data and scores of social support, diabetes self-care, depressive symptoms, and diabetes-related emotional distress among patients with type 1 and type 2 diabetes?

Hypothesis 1: No differences will exist between participants with type 1 and type 2 diabetes on demographic data and scores of social support, diabetes self-care, depressive symptoms, and diabetes-related emotional distress.

Question 2: Do depressive symptoms predict relationships between social support and diabetes self-care behaviors for patients in poor glycemic control?

Hypothesis 2: Depressive symptoms mediate the relationship between social support and diabetes self-care.

Question 3: Does diabetes-related emotional distress predict relationships between social support and diabetes self-care behaviors for patients in poor glycemic control?

Hypothesis 3: Diabetes-related emotional distress mediates the relationship between social support and diabetes self-care.

## **CHAPTER TWO**

### **Review of the Literature**

#### **Introduction**

Substantial attention has been paid to understanding the biological and psychosocial mechanisms that influence the association between diabetes and depression. However, the relationship between the two chronic illnesses remains difficult to establish and multiple variables influence the progression of both diseases. In this chapter, the most recent and influential research will be presented on comorbid depression and diabetes. The biological and psychosocial mechanisms influencing this relationship will be discussed in further detail.

Research on diabetes self-care will be presented and the impact of depressive symptoms on diabetes self-care will be discussed. Lastly, the role of social support is discussed as a variable that influences diabetes self-care as well as psychological well-being for patients with diabetes. The review of the literature supports the need for investigation of the role that social support and self-care variables play in the development of depressive symptoms in patients with diabetes.

#### **Impact of Diabetes Mellitus**

Diabetes mellitus affects 23.6 million people in the United States including 5.7 million people who are believed to have undiagnosed diabetes (CDC, 2010). Diabetes has been documented as the seventh leading cause of death in the U.S. and is likely to be underreported as the cause of death for many (CDC, 2010). The World Health Organization estimates that deaths caused by diabetes are likely to increase by more than 50% in the next 10 years unless steps are taken to control the increasing

number of cases (2009). Health care costs associated with diabetes are estimated at \$132 billion annually, making it among the most expensive diseases to manage in the United States (ADA, 2011).

### **Importance of Diabetes Self-Care**

Diabetes self-care involves a dynamic interaction among patients' past and present experiences, values, and culture as well as following treatment recommendations (Paterson, Russell, & Thorne, 2001; Song, 2010). Developing a personal understanding of physiological cues to warn the patient of hypoglycemic or hyperglycemic episodes is an important component of developing diabetes self-care behaviors (Thorne & Song, 2000). A variety of interventions have been found to be effective in helping patients to improve their diabetes self-care (Norris et al., 2001).

Von Korff and colleagues (1997) concluded that effective programs in chronic disease care include collaborative problem definition, targeting, goal setting, and planning. They also concluded that a continuum of self-management training and support services were most effective in addition to active and sustained follow-up. In addition to psychoeducational programming, responding to patients' individual needs, readiness to change and self-efficacy is critical in group and individual self-care interventions (Wagner, Austin, & Von Korff, 1996). The most beneficial components of educational interventions in chronic diseases, including diabetes, are individualization, relevance, feedback, reinforcement, and facilitation (Mullen, Green, & Persinger, 1985).

**Diabetes self-care education.** Diabetes education is essential in helping patients to develop appropriate self-care behaviors supporting compliance (Courtney

et al., 1997; Glasgow et al., 2001; Jacobson & Weinger, 1998). Diabetes education is a collaborative process in which diabetes educators help people with, or at risk for, diabetes to gain knowledge, problem-solving, and coping skills needed to manage the disease and its related conditions (CDC, 2010). Education and management differs between type 1 and type 2 diabetes depending upon the age and developmental stage of the patient at the time of diagnosis (Silverstein et al., 2005).

### **Comorbid Diabetes and Depressive Symptoms**

Patients with comorbid diabetes and symptoms of depression endorse poorer self-care behaviors than diabetes patients without depressive symptoms (Egede & Ellis, 2008). These behaviors include reduced frequency of checking blood glucose levels, less physical activity, a less healthy diet, and lower adherence to hypoglycemic, antihypertensive, and lipid-lowering medications (Lin et al., 2009). It is important to consider the role of depressive symptomology and its impact upon self-care and glycemic control in patients with diabetes.

Comorbid depression and depressive symptoms are highly prevalent in individuals with a chronic medical illness and the role of depression in the lives of diabetes patients has been a topic of great interest (Anderson & Funnell, 2005). Depression is associated with poor diabetes self-management (adherence to diet, exercise, checking blood glucose levels) and high HbA<sub>1c</sub> levels in patients with diabetes (De Groot et al., 2010; Katon et al., 2004; Katon et al., 2008; Katon, 2010; Lin et al., 2009). In addition to non-adherence to important aspects of diabetes self-care, patients with diabetes and depression reported a higher number of physical

symptoms, have less metabolic control, and experience a decrease quality of life (Lustman & Clouse, 2005; Brenes, 2007).

**Risk factors.** The role of psychosocial factors has been extensively analyzed in the study of individuals with diabetes and depression. These factors include being a younger age, female, unmarried, lower socioeconomic status, and ethnic and racial minority (Ciechanowski et al., 2000; De Groot, Anderson, Freedland, Clouse, & Lustman, 2001; Disdier-Flores, 2010; Egede, Zheng, & Simpson, 2002; Lustman et al., 2000). African Americans, Hispanic/Latino Americans, American Indians, and some Asian Americans and Native Hawaiians or Other Pacific Islanders are at particularly high risk for type 2 diabetes and its complications, including comorbid depression (CDC, 2010). Additional risk factors include poor perceived physical health, perceived lack of control, and lack of social support (Miyaoaka, Miyaoaka, Motomiya, Kitamura, & Asai, 1997; Talbot, Nouwen, Gingras, Bélanger, & Audet, 1999).

Obesity-promoting health behaviors such as physical inactivity and hypercaloric diet also place individuals with diabetes at greater risk for developing depression (Dirmaier et al., 2010). However, factors such as smoking, poor physical health, and duration of diabetes alone have not been found to be associated independently with depression (Lustman et al., 2000; Talbot et al., 1999). Poor self-management of diabetes intensifies the burden of this epidemic condition (Lin et al., 2004).

## **Mechanisms Involved in Diabetes and Depression**

Although numerous studies support the assertion that individuals with diabetes are at an increased risk for comorbid depression or depressive symptoms (Anderson et al., 2001; Aarts et al., 2009; Boutati & Raptis, 2009; Campayo et al., 2010; Ciechanowski et al., 2000; De Groot et al., 2010; Egede et al., 2002; Katon, 2010; Lustman et al., 2000; Lin et al., 2010), the temporal or causal relationship between diabetes and depression remains unclear. Depression and diabetes may result from a common biological vulnerability or from common environmental risk factors (van den Akker, Schuurman, Metsemakers, & Buntinx, 2004).

**Directionality of the relationship.** Recently, researchers have posited that a bidirectional link exists between depression and diabetes (Katon, 2010). Depression in early adulthood has been linked to an increased risk in the development of type 2 diabetes (Brown et al., 2005). Van den Akker and colleagues (2004) found that there was a 78% increase in the rate of type 2 diabetes among males with depression below age 50 when compared with non-depressed patients. Kawakami and colleagues (1999) reported on males aged 18 to 53 years and found an increased risk for the onset of type 2 diabetes among moderately and severely depressed as compared with participants with normal depression scores.

Further, Mezuk et al. (2008) concluded that depressed individuals have a 60% increased risk of developing type 2 diabetes when compared to non-depressed individuals based on a meta-analysis of 13 studies. Campayo and colleagues (2010) found that non-severe, persistent, and untreated depression, in addition to major depressive disorder, are associated with an increased risk of type 2 diabetes.

However, the use of self-report measures has caused some to question the validity of these findings.

**Biological mechanisms.** Depression might increase the risk for developing type 2 diabetes through dysregulation of the hypothalamic-pituitary-adrenal (HPA) axis, the final common pathway in the stress response (Boyle et al., 2007; Heckbert et al., 2010; Jacobson, 1993; Pouwer & Snoek, 2001). The HPA axis is a significant component of the neuro-endocrine system that controls reactions to stress and regulates many body processes, including the immune system, mood and emotions, energy storage, and expenditure (Engelman, Landgraf, & Wotjak, 2004). Dysregulation of the HPA axis impairs modulation of stress reactions (Engelman et al., 2004).

Depression and diabetes both activate the HPA axis (Cameron, Kronfol, Greden, & Carroll, 1984; Jacobson, 1993). This similarity makes it difficult to separate the neurobiology of diabetes versus depression in patients who struggle with both disorders. Increased mortality and higher risks associated with major complications in individuals with diabetes may also be associated with the biological effects of depression on platelet adhesion and inflammation (Heckbert et al., 2010).

Specifically for type 1 diabetes, clinical evidence suggests that insulin can act in the central nervous system to influence sympathetic nervous activity (Anderson et al., 1991). When the autonomic nervous system is activated during a hypoglycemic event, elevated insulin levels have been shown to inhibit, augment, or not significantly affect the sympathoadrenal response (Fisher et al., 2005).

Hypoglycemia and hypoglycemic unawareness are major problems in managing type

1 diabetes; the role of insulin action in the brain must also be addressed when considering the variables that influence comorbid diabetes and depression.

Depression is also associated with physiologic dysregulation of the sympathetic nervous system (Joynt, Whellan, & O'Connor, 2003; Carney et al., 2005) and inflammatory markers (Carney et al., 2007) which could have an adverse affect on diabetes outcomes.

**Psychosocial factors.** Increased complications with diabetes and depression may be caused by non-adherence to medication and treatment plans. These complications are likely to lead to worsened glycemic control and cardiovascular disease (Katon et al., 2005). Although the association between depression and diabetes has been established, neither the mechanism nor the direction of this relationship has been clearly established.

The prevalence of depression in individuals suffering from diabetes is similar to other chronic illnesses, suggesting that the burden of chronic disease contributes to the affective state (Carney, 1998). Meta-analyses have linked depression in diabetes to hyperglycemia and suboptimal medical management (Ryan, Anderson, Freedland, Clouse, & Lustman, 2001; Katon et al., 2004). Metabolic and hormonal factors may contribute to the course of both disorders; however, the burden of living with diabetes and its potential complications is likely to greatly contribute to affective symptoms (Carney, 1998).

Although the relationship between diabetes and depression may be bidirectional, it is possible that depression in individuals with diabetes results from the psychological burden of the disease (Talbot & Nouwen, 2000). This is likely to

be an important contributor to depression in adults with type 1 diabetes who may have longer disease duration. Depression is related to psychosocial hardships (i.e., deterioration of quality of life) associated with the illness (Jacobson, 1993; Lustman & Clouse, 2005). Understanding the impact of important biological and psychosocial variables and their sociodemographic moderators has direct implications for the design and effectiveness of treatment in this population (Kaholokula, Grandinetti, & Chang, 2003).

### **Diabetes Self-Care Behaviors and Depressive Symptoms**

Self-care is more impaired in individuals with diabetes who struggle with depression than for those without it (Katon et al., 2004; Lin et al., 2006). The clear association between diabetes, depression, inadequate self-care, and adverse outcomes has led to identification of the need for better diagnosis and treatment of depression and depressive symptoms among diabetic patients (Lin et al., 2006). Two recent studies found that depression worsened glucose dysregulation through decreased adherence to self-care but did not impact diabetes-related symptoms beyond self-care behaviors (McKellar, Humphreys, & Piette, 2004; Piette et al., 2004). A minority of patients with diabetes and depression receive adequate treatment for depression (Katon et al., 2006); therefore, the significant number of people with diabetes and comorbid depression may not practice appropriate self-care.

**Risk associated with impaired self-care.** Poor self-care that is associated with depression could lead to increased diabetes complications and an increase in medical costs (Katon et al., 2006). These individuals are also at an increased risk for developing more macrovascular and microvascular complications as well as increased

mortality (Katon et al., 2005). Therefore, considerable attention has been dedicated to understanding the mechanisms involved in diabetes and depression. Although the association between these conditions has been clearly established, the direction remains unclear.

Diabetes is considered to be one of the most psychologically demanding chronic illnesses (Irvine, Cox, & Gander-Frederick, 1992). Approximately 95% of diabetes care is managed by the patient including glucose monitoring, exercise, diet, and medication regimens which places a significant responsibility on the individual (Anderson, 1985). Psychological well-being and diabetes self-care are interrelated as the complex medical management required of individuals with diabetes serves as a constant reminder of the disease requirements (Cobden et al., 2010). Therefore, depression may be a response to the psychosocial stress caused by diabetes as opposed to a result of biochemical changes (Egede & Zheng, 2003).

### **Social Support and Diabetes**

As previously noted, psychosocial factors play a large role in managing diabetes and achieving improvement in diabetes symptoms (Barlow et al., 2005). Research has repeatedly shown that being in a supportive relationship buffers individuals from the physical and psychological effects of stressful life circumstances, including chronic illness (Franks et al., 2006; Iida et al., 2010; Miller & Brown, 2005). Sacco and Yanover (2006) linked the literature on depression and physical health to data indicating that depression evokes interpersonal rejection and launches a detrimental psychological process where depression resulting from poor physical health leads to a reduction in social support.

**Social support and the family.** Social support has a positive impact on health behaviors and status for individuals with chronic disease (Cohen, 2004); however, it can also become a destructive force when helping becomes misguided (Anderson & Coyne, 1991; Coyne & DeLongis, 1986). Family members are frequently involved in providing care for individuals with chronic disease, especially children. Caregiving can be perceived as over-involvement when the patient with diabetes feels that their autonomy has been compromised (Anderson & Coyne, 1991).

Good intentions of family members can result in interpersonal conflict as well as poorer health behaviors and outcomes for individuals with chronic illness (Harris et al., 2008). Individuals diagnosed with diabetes in childhood may negatively experience support from family members as an attempt to control diabetes management and care (Duke et al., 2008; Karlsson et al., 2006; Wysocki et al., 2008). However, a lack of social support by family and friends also has a negative impact on the self-care of patients with diabetes (Palmer et al., 2009; Vesco et al., 2010; Wysocki et al., 1996).

**Miscarried helping in families.** The concept of miscarried helping is derived from literature on social support, family systems, and health (Anderson & Coyne, 1991; Harris et al., 2008). Miscarried helping suggests that support from the caregiver becomes less focused on the needs of the patient and more focused on what the caregiver believes is best (Harris et al., 2008). If the patient's symptoms do not improve, as is often the case with chronic illness like diabetes, the caregiver may begin to feel like a failure and communicate these feelings to the patient. The patient

may then become resentful towards the caregiver and feel blamed for their illness (Harris et al., 2008).

Although social support can become miscarried helping, particularly with children and adolescents, it generally promotes increased optimism, reduced loneliness, and increased self-efficacy in the face of stress (Southwick, Vythilingam, & Charney, 2005). This response pattern can ward against depressive symptoms, particularly among patients with diabetes (Sacco & Beck, 1995). Therefore, the presence of social support may be linked to psychological well-being in diabetes patients.

**Deterioration of support.** Theory and research on the interactional nature of depression indicates that the interpersonal behaviors of depressed persons (e.g., negative self-statements, dependency) are experienced by others as aversive, leading to negative affective reactions and rejection of the depressed person (Sacco, 1999; Sacco & Vaughan, 2006). For instance, if a stressful situation is chronic and need for support persists social support may begin to deteriorate (Kaniasty & Norris, 1993; Norris & Kaniasty, 1996). This phenomenon has been found in partners of diabetes patients who experience high levels of depression (Fisher, Chesla, Skaff, Mullen, & Kanter, 2002).

### **Summary of the Literature**

In summary, patients with type 1 and type 2 diabetes commonly struggle with clinical depression, depressive symptoms, and diabetes-related emotional distress (Das-Munshi et al., 2007). Self-care is a critical component in managing diabetes and is further compromised by the presence of depression (Barlow et al., 2005). Support

for patients with diabetes appears to be protective for some components of self-care regimens (Nicklett & Liang, 2010). These findings support the importance of further investigation of the association between social support, self-care, depression, and diabetes-related emotional distress.

## **CHAPTER THREE**

### **Method**

This chapter describes the research design, measures, and data analysis procedures of the current study. As previously discussed, this study is a secondary data analysis using data from the Breaking Down Barriers study. Therefore, procedures from the original study will be briefly addressed. The current study evaluated whether depression and diabetes-related emotional distress mediate the relationship between social support and diabetes self-care for adults in poor glycemic control of their diabetes. The cross-sectional study design employed quantitative measures to assess the attitudes and behaviors of patients with type 1 and type 2 diabetes.

#### **Overview of Breaking Down Barriers Study Procedures**

Participants were recruited from the clinical practice of the Joslin Diabetes Center and advertisements and newsletters throughout New England. Minority participants were recruited from health facilities associated with the Joslin Clinic and its Community Outreach Program. Study staff conducted telephone screenings and charts were reviewed by a study physician. Participants with type 1 diabetes were required to be between 18 and 65 years of age. Participants with type 2 diabetes were required to be between 25 and 65 years of age. All participants were required to have disease duration between two and 25 years.

Exclusion criteria included inability to read and speak English, current or planned pregnancy, and a number of diabetes complications. Participants were excluded if they had participated in an education program within the prior six months.

Individuals with a history of major mental illness and recent drug or alcohol dependence were also excluded.

All assessments occurred at the Joslin Diabetes Center in Boston, Massachusetts. Participants who did not receive medical care at the Joslin Clinic were sent a non-Joslin medical information form to give to their doctor. Informed consent was obtained in writing at the first screening visit.

Data analyzed for the current study were collected during the baseline visit of the original study. Participants completed a demographic questionnaire and battery of brief questionnaires administered by trained research staff. All data were checked for consistency and to identify inaccurate or missing values.

### **Measures**

Four self-report measures were used in the current study. These measures provided information about social support, diabetes self-care behaviors, depression, and diabetes-related emotional distress. Data from the demographic questionnaire were also used in the current study.

The independent variables for this study were social support, depression, and diabetes-related emotional distress. Social support was measured using the global score of the Social Provisions Scale. Depression was assessed using scores from the depression subscale of the Brief Symptom Inventory – 18. Diabetes-related emotional distress was assessed using the global scores of the Problem Areas in Diabetes scale. Diabetes self-care was the dependent variable of the study. Diabetes self-care behaviors were measured by the global score of the Self-Care Inventory – Revised.

**Demographic questionnaire.** Participants identified their gender, age, disease duration, race, marital status, and years of education in a demographic questionnaire.

**Social support.** The Social Provisions Scale is a 24-item measure that was used to measure the independent variable of social support. The Social Provisions Scale was developed to assess the six dimensions of social support defined by Weiss (1974). The Social Provisions Scale assesses the value individuals place on different types of relationships.

The social provisions included in the six subscales of the measure reflect the requirements for relationships to provide support and for individuals to experience mutuality with others (Weiss, 1974). The six dimensions include guidance (advice or information), reliable alliance (assurance that others can be counted on in times of stress), reassurance of worth (recognition of one's competence), attachment (emotional closeness), social integration (a sense of belonging to a group of friends), and opportunity for nurturance (providing assistance to others) (Cutrona & Russell, 1987; Weiss, 1974).

Half of the items in the Social Provisions Scale describe the presence of a type of support and the others describe the absence of a type of support (Cutrona & Russell, 1987). Twelve of the twenty-four items are reverse coded across the six subscales. The response categories are: strongly disagree; disagree; agree; and strongly agree and each item is scored from one to four (from 1 = "strongly disagree" to 4 = "strongly agree"). High scores indicate a greater degree of perceived social support.

A global social support score is formed by summing the six individual provisions scores (Cutrona & Russell, 1987). The individual social provision subscales are highly correlated (Cutrona & Russell, 1987). Therefore, the global social support score is a valid approach to using the Social Provisions Scale and was used in this study. Reliability of the total Social Provisions Scale score is estimated to be .92 and intercorrelations among the six provisions range from .10 to .51, with a mean intercorrelation of .27 (Cutrona & Russell, 1987).

Individual provisions have been shown to correlate significantly and differentially with ratings of different relationship categories. For example, social integration correlated with relationship ratings most highly among college students and attachment correlated most highly with satisfying romantic or marital relations ( $r = .53$ , Russell, Cutrona, Rose, & Yurko, 1984). Scores on the on the Social Provisions scale were associated with scores on the social support measure developed by House (1981). No alpha reliability was reported for the Social Provisions Scale.

**Diabetes self-care.** The Self-Care Inventory – Revised is a 15-item measure that was used to measure the independent variable of diabetes self-care. The Self-Care Inventory was originally developed by La Greca and colleagues (1988) to assess participants' perceptions of the frequency with which they adhere to treatment recommendations for their diabetes self-care. The instrument has been subsequently revised and now consists of questions which are summarized to render a global scale of self-care behaviors. The Self-Care Inventory – Revised is used to assess the frequency of blood glucose testing and monitoring, insulin and food regulation, and exercise on a five-point Likert scale. Each item is scored from one to five (from 1 =

"never" to 5 = "always") (Weinger et al., 2005). High scores indicate high levels of diabetes self-care.

The Self Care Inventory – Revised was previously used at the Joslin Diabetes Center with type 1 and type 2 participants (Weinger & Jacobson, 2001). The Self-Care Inventory – Revised does not presume that all individuals have the same treatment prescription but evaluates individuals' perceptions of how frequently they adhere to their self-care behaviors (Weinger et al., 2005). The Self-Care Inventory – Revised is intended to be used in the context of an individual's prescription for diabetes care (Weinger et al., 2005).

Weinger and colleagues (2005) examined the psychometric properties of the Self-Care Inventory – Revised using three unique data sets of adult participants with type 1 and type 2 diabetes. The authors found support for the reliability and validity of the Self-Care Inventory – Revised for use with individuals with adults with type 1 and type 2 diabetes. The Self-Care Inventory – Revised correlated with diabetes-related emotional distress ( $r = -0.36$ ), self-esteem ( $r = 0.25$ ), self-efficacy ( $r = 0.47$ ), depression ( $r = -0.22$ ), anxiety ( $r = -0.24$ ), and HbA<sub>1c</sub> ( $r = -0.37$ ), supporting construct validity. The Self-Care Inventory – Revised was also found to have high internal reliability ( $\alpha = 0.87$ ) (Weinger et al., 2005). Weinger and colleagues (2005) concluded that the Self-Care Inventory – Revised is a psychometrically sound measure of perceptions of adherence to recommended diabetes self-care behaviors of adults with type 1 or type 2 diabetes.

Lewin and colleagues (2009) sought to demonstrate the validity and reliability of the Self-Care Inventory – Revised with adolescents and parents. The Self-Care

Inventory – Revised was chosen because of its ease of implementation and applicability to multiple diabetes regimens. The measure was found to have strong psychometric properties, including adequate internal consistency and test-retest agreement (Lewin et al., 2009). Associations between the Self-Care Inventory – Revised and a structured interview of diabetes adherence (the Diabetes Self-Management Profile) and HbA<sub>1c</sub> were strong and it was determined to be beneficial tool for clinicians and researchers.

**Depressive symptoms.** Depression was assessed using the 18-item Brief Symptom Inventory. The Brief Symptom Inventory – 18 is a shortened version of the Symptom Checklist-90-R (SCL-90-R) (Derogatis, 2000). The Brief Symptom Inventory – 18 gathers participant-reported data to measure psychological distress and psychiatric disorders in medical and community populations (Derogatis, 2000). The Brief Symptom Inventory – 18 was designed for application in primary care and specialized medical populations (Derogatis & Fitzpatrick, 2004), and is an assessment of symptoms experienced in a one-week period (Derogatis, 2000).

The Brief Symptom Inventory – 18 is composed of 18 items divided across three symptom dimensions. Six items are assigned to the dimensions of somatization, depression, and anxiety and they are combined to represent a Global Severity Index (Derogatis, 2000). Each item is scored on a five-point Likert-type scale ranging from “0 = no such problem” to “4 = severe problems.”

The depression subscale score was used for this study. This subscale measures a range of manifestations of clinical depression and depressive symptoms through six items. Symptoms of depression measured in this subscale include

dysphoric mood and affect, withdrawal from life interests, lack of motivation and energy, feelings of hopelessness, and thoughts of suicide (Derogatis & Fitzpatrick, 2004).

In studies of community populations, Brief Symptom Inventory – 18 scales were found to have good internal reliability (coefficient  $\alpha$  for global severity = .89 and depression = .84) (Derogatis, 2000). Further, Brief Symptom Inventory – 18 scales correlate highly with the SCL-90-R (Pearson correlation coefficient for global severity = .93 and depression = .93), which has demonstrated acceptable convergent validity with other measures of somatization, depression, and anxiety (Derogatis, 2000). The hypothesized structure of the depression subscale was replicated almost perfectly with using the community normative sample in this confirmatory factor analysis and sensitivity of the overall instrument was found to be .91 and specificity as .96 (Derogatis, 2000).

Weinger and colleagues (2005) employed the Brief Symptom Inventory – 18 to determine that depression was associated with frequently cancelled medical and education appointments in adults with diabetes. Phelps and colleagues (2009) also indicated the Brief Symptom Inventory – 18 as an appropriate measure to screen adult patients with type 2 diabetes for depression, somatization, and overall psychological distress when providing collaborative medical and psychological care. The Brief Symptom Inventory – 18 was found to be an appropriate measure to assess the depressive symptoms experienced by the participating patients with diabetes.

**Diabetes-related emotional distress.** The Problem Areas in Diabetes questionnaire was used to assess diabetes-related emotional distress. The Problem

Areas in Diabetes scale is a 20-item Likert scale that assesses a broad range of feelings related to living with diabetes and its treatment, including guilt, anger, frustration, worry, and fear. This measure is sensitive to barriers that restrict self-care behaviors and diabetes-related emotional distress (Weinger & Jacobson, 2001). This self-report questionnaire consists of items that cover a range of emotional problems frequently reported in type 1 and type 2 diabetes (Polonsky et al., 1995). Each item is scored from "0 = not a problem" to "4 = serious problem." The sum of the 20 items is multiplied by 1.25 to yield a final score 0 to 100. The Problem Areas in Diabetes scale was used to assess psychological distress in participants with diabetes who are in poor glycemic control.

Psychometric reports on the Problem Areas in Diabetes scale have shown that it has consistently high internal reliability ( $\alpha = .90$ ) (Polonsky et al., 1995). The Problem Areas in Diabetes scale correlates strongly with a wide range of theoretically related constructs such as general psychological distress, diabetes self-care behaviors, diabetes coping, and health beliefs (Polonsky et al., 1995). It was found to be a significant predictor of glycemic control in a study that tracked a managed care population for one year (Polonsky et al., 1995). In cross-sectional studies, the Problem Areas in Diabetes questionnaire was found to be unrelated to duration of diabetes, education, ethnicity, and gender when adjusted for age (Welch, Jacobson, & Polonsky, 1997; Polonsky et al. 1995).

Welch and colleagues (2003) examined the responsiveness of the Problem Areas in Diabetes scale using data from seven diabetes intervention studies. Mean Problem Areas in Diabetes scale scores improved from baseline to follow-up for all

seven studies,  $t$ -statistics ranged from  $t = 8.5$  ( $p < .001$ ) to  $t = 2.1$  ( $p < .06$ ). Effect size results ranged from .32 for a disease management intervention to .64 for an intensive medical/educational intervention (Welch, Weinger, Anderson, & Polonsky, 2003). The PAID has also been found to have high internal reliability ( $\alpha = 0.95$ ) (Polonsky et al., 1995; Welch et al., 1997).

## **Materials**

Data used in the present study were analyzed using SAS version 9.2 licensed by the Joslin Diabetes Center. A desktop computer belonging to the Joslin Diabetes Center was used for data analysis. A personal computer was also used by the researcher throughout the study.

## **Study Design**

This cross-sectional study sought to further the understanding of the relationships between social support, diabetes self-care, depression, and diabetes-related emotional distress for participants with type 1 and type 2 diabetes in poor glycemic control. The current study particularly focused on the impact of social support, defined by Weiss (1974), on diabetes self-care, depression, and diabetes-related emotional distress for participants with type 1 and type 2 diabetes in poor glycemic control (glycated hemoglobin [HbA<sub>1c</sub>] >7.5%).

## **Data Analytic Plan**

Descriptive statistics were used to present demographic data and data from the Social Provisions Scale, Self-Care Inventory – Revised, Brief Symptom Inventory – 18, and the Problem Areas in Diabetes scale. Statistical significance was set at a  $p$ -value of  $< .05$ . Measures of central tendency and dispersion are provided for all

measures and demographic data. Data were checked for unusual or extreme values at one or both ends of the distribution (Mertler & Vannatta, 2005). Frequency distributions were also analyzed to identify outliers and trends in the data and aid in interpretation of the data.

Data were checked for violations of normality and linearity in order to appropriately apply multivariate statistical analyses. The Shapiro-Wilks'  $W$  test was conducted to assess for normality in addition to the use of histograms to qualitatively assess the frequency distributions of the study variables. Outliers were investigated further to determine if they were due to errors missed during data checking.

The following data analysis procedures were conducted to address the research hypotheses:

Hypothesis 1: No differences will exist between-participants with type 1 and type 2 diabetes on demographic data and scores of social support, diabetes self-care, depression, and diabetes-related emotional distress.

A chi square ( $X^2$ ) statistical test was conducted to assess demographic differences for categorical variables among participants with type 1 and type 2 diabetes. These variables included marital status, race, and gender. Nonparametric  $t$ -tests were used to assess differences among participants with type 1 and type 2 diabetes for the remaining demographic variables which included age, disease duration, and years of education.

Nonparametric  $t$ -tests were also conducted to assess the differences in mean scores on measures of social support, diabetes self-care, depression, and diabetes-related emotional distress between participants with type 1 and type 2 diabetes

because of abnormal data distribution. This statistical test was used to evaluate differences between the Social Provisions Scale global scores, the Self-Care Inventory – Revised global scores, the Brief Symptom Inventory – 18 depression subscale score, and the Problem Areas in Diabetes scale global scores for participants with type 1 and type 2 diabetes (Mertler & Vannatta, 2005).

Hypothesis 2: Depression mediates the relationship between social support and diabetes self-care.

Scatterplots were examined for outliers that exceeded  $\pm 1.5$  standard deviations and could decrease the value of any correlations between the variables (Mertler & Vannatta, 2005). Scatterplots were also evaluated to assess the linearity of relationships between the variables of social support, diabetes self-care, and depression. Based on examination of variable distributions, a correlation matrix was used to examine the extent of relationships among social support, diabetes self-care, and depression. Cohen's standard was used as the standardized measure of correlation coefficient effect size. Effect size was classified as small ( $r = .1$ ); medium ( $r = .3$ ); or large ( $r = .5$ ) (Cohen, 1998).

If the correlation matrix was to reveal relationships consistent with mediation, mediation would be explored using the method outlined by Baron and Kenny (1986), based on three sequential regression analyses. In order to pursue the regression analyses, the correlation matrix must have revealed the following: 1) correlation between social support and diabetes self-care, 2) correlation between social support and depressive symptoms/diabetes-related emotional distress, 3) correlation between depressive symptoms/diabetes-related emotional distress and diabetes self-care

controlling for the effects of social support on psychological distress, and 4) the effect of social support on diabetes self-care controlling for psychological distress would be 0. Were these conditions met, the first equation would regress depression on social support. Self-care would then be regressed on social support. Finally, self-care would be regressed on social support and depression.

Perfect mediation would occur if social support was found to have no effect when depression was controlled for (Baron & Kenny, 1986). Depression would be considered a partial mediator if the predictive power of social support had decreased but remained significant. Regression coefficients, or *B* coefficients, would represent the independent contributions of each independent variable, social support and diabetes self-care, to the prediction of the dependent variable, depression. The coefficient of determination, or *R-Square*, would have been used to evaluate the fit of the model (Tabachnick & Fidell, 1996). Multiple regressions would have been used to control for age, disease duration, education, gender, and marital status.

Hypothesis 3: Diabetes-related emotional distress mediates the relationship between social support and diabetes self-care.

A correlation matrix was used to examine the significance of relations among social support, diabetes self-care, and diabetes-related emotional distress. Cohen's standard was used to assess the correlation coefficient (Cohen & Cohen, 1983). Scatterplots were examined for outliers that exceeded  $\pm 1.5$  standard deviations and could decrease the value of any correlations between the variables (Mertler & Vannatta, 2005). Scatterplots were also evaluated to assess the linearity of

relationships between the variables of social support, diabetes self-care, and diabetes-related emotional distress.

If the correlation matrix revealed relationships consistent with mediation, mediation was explored using the method outlined by Baron and Kenny (1986), based on three sequential regression analyses. Mediation would be revealed if 1) a correlation was found between social support and diabetes-related emotional distress, 2) a correlation was found between self-care and diabetes-related emotional distress, and 3) the correlation between social support and self-care should be greatly reduced after the variability caused by diabetes-related emotional distress is removed.

The first equation would regress diabetes-related emotional distress on social support. Self-care would then be regressed on social support. Finally, self-care would be regressed on social support and diabetes-related emotional distress.

Perfect mediation occurred if social support was found to have no effect when diabetes-related emotional distress was controlled for (Baron & Kenny, 1986). Diabetes-related emotional distress was considered as a partial mediator if the predictive power of social support decreased but remained significant. Regression coefficients, or *B* coefficients, represented the independent contributions of each independent variable, social support and diabetes self-care, to the prediction of the dependent variable, diabetes-related emotional distress. The coefficient of determination, or *R-Square*, was used to evaluate the fit of the model (Tabachnick & Fidell, 1996). Multiple regressions would also be used to control for age, disease duration, education, gender, and marital status.

## CHAPTER FOUR

### Results

In this chapter, the participants are first described in terms of their demographic characteristics. Demographic characteristics include age, disease duration, education, gender, race, and marital status for the total group of participants as well as by type of diabetes (type 1 and type 2). In total, data for 222 participants were analyzed for the present study. Detailed participant demographic characteristics are presented in Table 1.

Data from measures of social support (Social Provisions Scale), diabetes self-care (Self-Care Inventory – Revised), depression (Brief Symptoms Inventory – 18 depression subscale), and diabetes-related emotional distress (Problem Areas in Diabetes scale) are presented. The results of statistical analyses performed to test the unique hypotheses set forth in the current study are subsequently presented. The study hypotheses are: (1) No differences will exist among participants with type 1 and type 2 diabetes on demographic data and scores of social support, diabetes self-care, depression, and diabetes-related emotional distress; (2) Depression mediates the relationship between social support and diabetes self-care, and (3) Diabetes-related emotional distress mediates the relationship between social support and diabetes self-care.

#### Description of Demographics

**Participants with type 1 diabetes.** Of the total group of participants ( $N = 222$ ), 110 were diagnosed with type 1 diabetes (49.5%) (see Table 1). Approximately half of the participants with type 1 diabetes were women ( $n = 62, 56\%$ ) and most

identified their race as non-Hispanic White ( $n = 105$ , 96%). Seventy (64%) of the participants with type 1 diabetes reported being married at the time of the baseline visit. For participants with type 1 diabetes, the mean age was 47 years with a range of 22 to 74 years ( $SD = 12.1$ ). The mean disease duration for participants with type 1 diabetes was 24 years with a range of 2 to 66 years ( $SD = 12.8$ ). Participants with type 1 diabetes had a mean of 16 years of education with a range from 6 to 20 years ( $SD = 2.4$ ).

**Participants with type 2 diabetes.** Approximately half of the 222 participants were diagnosed with type 2 diabetes ( $n = 112$ , 50.5%) (see Table 1). Of this group, 50 participants were women (45%) and 80 participants with type 2 diabetes identified their race as non-Hispanic White (80%). For participants with type 2 diabetes, the mean age was 58 years with a range of 37 to 75 years ( $SD = 9.3$ ). The mean disease duration for participants with type 2 diabetes was 11 years with a range of 1.3 to 41 years ( $SD = 7.7$ ). The mean education for participants with type 2 diabetes was 15 years, with a range of 10 to 20 years ( $SD = 2.3$ ). Sixty-four (57%) of the participants with type 2 diabetes reported being married at the time of the baseline visit.

### **Assessment of Normality**

A Shapiro-Wilks'  $W$  test was conducted to assess for normality of the data (see Table 1). Histograms were also analyzed in order to qualitatively assess the frequency distributions of the study variables. The data were found to be roughly elliptically distributed with few prominent outliers. The null hypothesis that the distributions were normally distributed was rejected for education, disease duration,

depression (BSI-18 depression subscale), social support (SPS), and diabetes-related emotional distress. Therefore, in view of these findings, non-parametric statistics were selected for statistical analyses.

Table 1

*Characteristics of 222 Participants with Diabetes*

Characteristic	<i>M</i>	<i>SD</i>	<i>Mdn</i>	Range	%	Shapiro-Wilks' <i>p</i> -value
Age (years)	53.10	12.30	53.80	21.60-75.10		.005
Disease duration (years)	18.20	11.80	15.23	1.30-66.10		<.001
Education (years)	15.00	2.40	16.00	6.00-20.00		<.001
SPS	78.86	10.80	79.50	32.0-96.00		<.001
SCI – R	57.09	15.12	57.81	23.21-100		.324
BSI – 18	50.55	10.21	45.00	40.00-79.00		<.001
PAID	34.29	20.63	32.50	0.00-91.25		<.001
Type 1 diabetes					49.50	
Female					50.50	
Non-Hispanic White					87.00	
Married					60.00	

*Note.* SPS = Social Provisions Scale; SCI – R = Self-Care Inventory – Revised; BSI – 18 = Brief Symptom Inventory – 18 depression subscale t-score; PAID = Problem Areas in Diabetes questionnaire.

**Hypothesis One**

The first hypothesis was that no differences would exist among participants with type 1 and type 2 diabetes on demographic data and scores of social support, diabetes self-care, depression, and diabetes-related emotional distress.

Detailed data on the scores of social support, diabetes self-care, depression, and diabetes-related emotional distress are presented in Table 2. Data comparing the demographic data and scores between participants with type 1 and type 2 diabetes are also presented in Table 2.

Raw scores of the Social Provisions Scale range from 24 to 96. The means and standard deviations for global scores of the Social Provisions Scale for the separate participant groups are presented in Table 2. The total participants' mean score was 78.9 ( $SD = 10.8$ ) with a range from 32 to 96.

Raw scores on the Self-Care Inventory – Revised range from 15 to 100. The means and standard deviations for global scores of the Self-Care Inventory – Revised for the separate participant groups are presented in Table 2. The mean total participants' score was 57.1 ( $SD = 15.1$ ) with scores ranging from 23 to 100.

Depression was assessed using the depression subscale of the Brief Symptom Inventory – 18. Raw scores from the depression subscale were converted to T-scores for the purpose of this analysis. The means and standard deviations for the separate participants groups scores on the depression subscale of the Brief Symptom Inventory – 18 are presented in Table 2. The mean total participants' T-score was 50.6 ( $SD = 10.2$ ) with a range from 40 to 79.

The Problem Areas in Diabetes scale was used to measure diabetes-related emotional distress. Raw scores on the PAID range from 0 to 100. The means and standard deviations for the separate participant group scores on the Problem Areas in Diabetes scale are presented in Table 2. The mean total participants' score was 34.3 ( $SD = 20.6$ ) with a range of 0 to 91.3.

Wilcoxon rank-sum tests were used to determine whether differences existed among the age, education, and disease duration of participants with type 1 and type 2 diabetes. Results suggest that differences exist among participants with type 1 and type 2 diabetes in years of age ( $p < .001$ ), years of education ( $p = .034$ ), and years of disease duration ( $p < .001$ ).

Wilcoxon rank-sum tests were used to determine whether differences existed among participants with type 1 and type 2 diabetes on the Social Provisions Scale, Self-Care Inventory – Revised, depression subscale of the Brief Symptom Inventory – 18, and Problem Areas in Diabetes questionnaire. As shown in Table 2, no differences were found between the two groups on the mean scores of these measures. Therefore, the participants with type 1 and type 2 diabetes can be considered one group with regards to their scores on the study measures.

Chi square ( $X^2$ ) statistical tests were conducted to assess the proportions of participants according to gender, race, and marital status among participants with type 1 and type 2 diabetes. As presented in Table 2, more participants with type 1 diabetes identified themselves as non-Hispanic White (96%,  $p < .001$ ) than participants with type 2 diabetes (80%). No differences were found among the gender and marital status of the two groups of participants.

As predicted, no differences were found among participants with type 1 and type 2 diabetes on scores of social support, diabetes self-care, depressive symptoms, and diabetes-related emotional distress. Further, no differences were found in years of education, gender, or marital status between the two participant groups. This

finding provided greater understanding of diabetes patients' psychosocial experiences across both types of the disease.

Differences were found between the participants with type 1 and type 2 diabetes in mean age, disease duration, and percentage that identified as non-Hispanic White. The younger age of onset ( $M = 47.11$ ,  $SD = 12.11$ ) and longer disease duration of the participants with type 1 diabetes is consistent with known data about adults with this form of diabetes (ADA, 2011; CDC, 2010). Although the majority of participants with type 2 diabetes (80%) identified as non-Hispanic White, this was significantly different ( $p < .0001$ ) than those with type 1 diabetes (96%). It has been found that type 2 diabetes is more prevalent among racial and ethnic minorities than non-Hispanic Whites in the United States, suggesting that the population studied was very homogenous (ADA, 2011; CDC, 2010; Narayan et al., 2006).

Given that these participants were in poor glycemic control ( $HbA_{1c} > 7.5\%$ ), it is not surprising that they did not endorse high frequency in diabetes self-care behaviors. However, it is interesting to note that these participants did not endorse more severe depressive symptoms or diabetes-related emotional distress. Although individuals with major mental illness and major depression were excluded, on average, these participants did not endorse clinical levels of depression which might be expected given their poor glycemic control. However, these findings suggest that clinical levels of depressive symptoms and diabetes-related emotional distress may not be necessary to cause impairment in diabetes self-care.

Table 2

*Comparison of Participants with Type 1 and Type 2 Diabetes*

Characteristics and Measures	Combined <i>M (SD)</i>	Type 1 <i>M (SD)</i>	Type 2 <i>M (SD)</i>	<i>P</i> -value <sup>a</sup>
Age (years)	53.08 (12.26)	47.11 (12.11)	58.95 (9.25)	<.001
Education (years)	15.00 (2.36)	15.30 (2.35)	14.70 (2.34)	.034
Disease duration (years)	18.23 (11.82)	23.68 (12.78)	12.88 (7.72)	<.001
SPS	78.86 (10.80)	79.28 (10.34)	78.46 (11.27)	.824
SCI – R	57.09 (15.12)	56.32 (14.51)	57.85 (15.73)	.608
BSI – 18	50.55 (10.21)	50.98 (10.06)	50.12 (10.38)	.536
PAID	34.29 (20.63)	35.79 (22.46)	32.82 (18.64)	.475
Race (% non-Hispanic White)	87.00	96.00	80.00	<.001
Gender (% female)	50.50	56.00	45.00	.081
Marital status (% married)	60.00	64.00	57.00	.323

*Note.* SPS = Social Provisions Scale; SCI – R = Self-Care Inventory – Revised; BSI – 18 = Brief Symptom Inventory – 18 depression subscale t-score; PAID = Problem Areas in Diabetes questionnaire.

<sup>a</sup>*P*-values are associated with Wilcoxon rank-sum tests for continuous variables and chi square statistical tests for categorical variables.

## **Hypothesis Two**

The second study hypothesis purported that depression would mediate the relationship between social support and diabetes self-care as measured by the depression subscale of the Brief Symptom Inventory – 18, Social Provisions Scale, and Self-Care Inventory – Revised. The correlation matrix did not reveal relationships consistent with mediation using the method outlined by Baron and Kenny (1986), based on three sequential regression analyses. The correlation revealed that 1) a correlation was found between social support and depressive symptoms and 2) a correlation was found between diabetes self-care and depressive symptoms. However, there was no significant correlation between social support and diabetes self-care. Therefore, the conceptual model that predicted that depression would mediate the relationship between social support and diabetes self-care was not supported and further analyses were not pursued. These relationships are illustrated in Table 3.

Social support has previously been established as a contributing factor in the development and maintenance of symptoms of depression for participants with diabetes (Sacco, 1999; Sacco & Vaughan, 2006). The relationship between diabetes self-care and depression has also been well established in the literature (Anderson et al., 2001; Ciechanowski et al., 2000; Katon et al., 2009; Lin et al., 2004; Lustman & Clouse, 2005; McKellar et al., 2004). Depression is associated with an increased incidence of diabetes-related complications also which negatively impact diabetes self-care (Peyrot & Rubin, 1997). Therefore the associations found between 1) social

support and depressive symptoms and 2) diabetes self-care and depressive symptoms are consistent with previously discussed literature.

Table 3

*Spearman Correlation Coefficients among Social Support, Self-Care, and Depressive Symptoms*

Measure	1	2	3
1 SPS			
2 SCI – R	.093		
3 BSI – 18	-.347*	-.274*	

*Note.* SPS = Social Provisions Scale; SCI – R = Self-Care Inventory – Revised; BSI – 18 = Brief Symptom Inventory: Depression subscale *t*- score. Spearman correlation coefficients were used to assess the relationships among social support and self-care, social support and depressive symptoms, and self-care and depressive symptoms for all participants.

\* $p < .001$

### **Hypothesis Three**

The third study hypothesis purported that diabetes-related emotional distress would mediate the relationship between social support and diabetes self-care as measured by the Problem Areas in Diabetes questionnaire, Social Provisions Scale, and Self-Care Inventory – Revised. The correlation matrix did not reveal relationships consistent with mediation using the method outlined by Baron and Kenny (1986), based on three sequential regression analyses. The correlation revealed that 1) a correlation was found between social support and diabetes-related emotional distress and 2) a correlation was found between diabetes self-care and diabetes-related emotional distress. However, there was no significant correlation between social support and diabetes self-care.

Therefore, the conceptual model that predicted that diabetes-related emotional distress would mediate the relationship between social support and diabetes self-care was not supported and further analyses were not pursued. These relationships are illustrated in Table 4.

Diabetes-related emotional distress is common in participants with diabetes and is different from depression (Dalewitz, Kahn & Hershey, 2000). Diabetes-related emotional distress acts as an independent and major contributor to poor adherence of diabetes self-care and subsequent difficulties with glycemia (Polonsky et al., 1995). The association found among diabetes-related emotional distress and diabetes self-care in this study is reflective of previous research. The negative association among diabetes-related emotional distress and diabetes self-care is also indicative of the importance of addressing this relationship when working with diabetes patients in poor glycemic control.

Table 4

*Spearman Correlation Coefficients among Social Support, Self-Care, and Diabetes-Related Emotional Distress*

Measure	1	2	3
1 SPS			
2 SCI – R	.093		
3 PAID	-.222*	-.323*	

*Note.* SPS = Social Provisions Scale; SCI – R = Self-Care Inventory – Revised; PAID = Problem Areas in Diabetes questionnaire. Spearman correlation coefficients were used to assess the relationships among social support and self-care, social support and diabetes-related emotional distress, and self-care and diabetes-related emotional distress for all participants.

\* $p < .001$

## Summary

Findings indicated that participants with type 1 and type 2 diabetes differed age ( $p < .001$ ), years of education ( $p = .034$ ), years of disease duration ( $p < .001$ ), and the number who identified as non-Hispanic White ( $p < .001$ ). The participants did not differ significantly on scores of social support, diabetes self-care, depressive symptoms, and diabetes-related emotional distress. Significant correlations were not found between social support and diabetes self-care; therefore, further analyses were not pursued to determine whether depressive symptoms or diabetes-related emotional distress would mediate the relationship between social support and diabetes self-care.

The following chapter concentrates on the modest relationships among social support and depressive symptoms and diabetes self-care and depressive symptoms. The small to moderate relationships between social support and diabetes-related emotional distress and diabetes self-care and diabetes-related emotional distress are also addressed in the discussion.

## **Chapter 5**

### **Discussion**

The present study sought to examine the relationship between social support and diabetes self-care, and to examine whether depressive symptoms and diabetes-related emotional distress mediated that relationship. The results of the study are briefly reviewed in this chapter. The relationships among the variables are then discussed in the context of previous literature. The implications for practitioners, limitations of the study, and future directions for further research are also addressed.

#### **Overview of Results**

**Demographic data.** The sample for the present study is reflective of demographics across the Commonwealth of Massachusetts, where the Joslin Diabetes Center is located. Census data from 2011 described 85.9% of Massachusetts residents as “White” with 8.8% of this population identifying “Hispanic or Latino” as their ethnicity. Similarly, 87% of study participants identified as “non-Hispanic White.” The CDC (2011) reported that adults with diabetes in the United States (18 through 79 years) had a mean disease duration of 11.1 years and a mean age of 52.5 years for the age of diagnosis. Therefore, the current sample serves to represent a portion of the population within these defined parameters. However, the population of this sample is not representative of patients with type 2 diabetes in the United States.

Given the increased prevalence of type 2 diabetes among minority groups, including African Americans, Hispanic and Latino Americans, Native Americans, and Asians (CDC, 2011; Janovic & Harrison, 2004), clinicians must be aware of the

risks associated with diabetes and depressive symptoms and emotional distress and their potential complications. Education around diabetes and depression must be sensitive to the needs of diabetes patients whose cultures may carry particular stigmas against mental health care and should also incorporate family and community involvement as dictated by the particular community within which it provides treatment.

**Social support.** Higher scores on the Social Provisions Scale indicate a greater degree of perceived social support. The mean score of 48 suggests that participants are more satisfied than dissatisfied with the amount of social support they receive based on norms for this scale (Caron, Tempier, Mercier, & Leouffre, 1998). Therefore, participants endorsed the presence of a high degree of social support in their lives. That the study participants endorsed the presence of social support and subclinical depressive symptoms and diabetes-related emotional distress suggests that older diabetes patients with longer disease duration and some social support may be able to better manage distress or be less susceptible to it than younger patients with less experience with diabetes management.

**Diabetes self-care.** The mean score of 57.1 ( $SD = 15.1$ ) suggests that the study participants infrequently practiced diabetes self-care. This finding is not surprising given that participants were in poor glycemic control (glycated hemoglobin [ $HbA_{1c}$ ] > 7.5%) at the time data were collected. Glycemic control is highly influenced by diabetes self-care behaviors and less frequency of self-care has been shown to have a deleterious effect on diabetes management (Glasgow et al., 2001; Fisher et al., 2005; Song, 2010; WHO, 2003).

**Depressive symptoms.** Derogatis (2000) suggested that T-scores of 63 and above ( $\geq 90^{\text{th}}$  percentile) indicate clinically-significant depression based on community norms for the Brief Symptom Inventory – 18 depression subscale. Higher scores on the depression subscale indicate greater risk for clinical depression and higher endorsement of depressive symptoms. Therefore, the mean T-score of 50.6 ( $SD = 10.2$ ,  $50^{\text{th}}$  percentile) indicates that this participant group did not endorse depressive symptoms consistent with clinically-significant depression (Derogatis, 2000). However, this T-score suggests the presence of some sub-clinical depressive symptoms in the study population. This finding is consistent with previously discussed literature (Campayo et al., 2010; De Groot et al., 2010; Snoek & Skinner, 2002).

**Diabetes-related emotional distress.** Diabetes-related emotional distress was measured by the Problem Areas in Diabetes scale. The mean score on this measure was 34.3 ( $SD = 20.6$ ) indicating that, on average, these participants did not experience clinically-significant diabetes-related emotional distress. This is consistent with scores of depressive symptoms, suggesting that the combined participant group did not struggle with clinically-significant psychological distress at the time of data collection. These findings also suggest that diabetes patients may struggle with frustration, depressed mood, and worry and experience negative diabetes outcomes and that clinically-significant distress is not required for patients to experience depressive symptoms and distress (Delahanty et al., 2007; Polonsky et al., 1995; Speight, Reaney, & Barnard, 2009).

## Key Findings

**Hypothesis one.** No significant differences were found on scores of social support, diabetes self-care, depressive symptoms, or diabetes-related emotional distress among participants with type 1 and type 2 diabetes. Both groups practiced some diabetes self-care per scores on the Self-Care Inventory – Revised and endorsed the presence of social support in their lives, per scores on the Social Provisions Scale. Additionally, participants did not endorse clinical levels of depressive symptoms or diabetes-related emotional distress according to the Brief Symptom Inventory – 18 and Problem Areas in Diabetes scale. Further, demographic similarities existed in gender, marital status, and education. Participants in both groups endorsed being of non-minority and high socioeconomic status which may serve as a protective factors against psychological distress for adult diabetes patients in poor glycemic control.

High levels of education ( $M = 15$  years,  $SD = 2.36$  years) could allow for patients to obtain treatment for their diabetes, to understand the importance of practicing some self-care, and be able to afford costs associated with disease management. Further, the majority of this participant group was non-Hispanic White (type 1 = 96%, type 2 = 80%) suggesting that problems faced by many minority groups (language barriers, ethnically insensitive treatment, lack of insurance) may not be present for these participants.

Health care disparities are commonly acknowledged for minority diabetes patients (Burne, Nedelman, & Luke, 1994; Harris, 2001; Saydah, Eberhardt, & Narayan, 2007). The higher socioeconomic status of these participants likely influenced low endorsement of depressive symptoms and distress for these

participants despite their challenges with glycemic control. Factors such as poverty and racial discrimination would be more likely to confound the results of this study with a more diverse population due to their oppressive influences. Therefore, the demographic similarities (higher socioeconomic, non-minority status) served to protect these participants against psychological distress perhaps explaining the similarities between participants with type 1 and type 2 diabetes.

**Hypothesis two.** The association between social support and depressive symptoms in this study is consistent with existing literature. According to this finding, the presence of social support decreases the risk of depressive symptoms for diabetes patients. Therefore, the presence of friends, family, and community is likely to reduce risk for psychological distress. Participants in this study endorsed the presence of social support which could be attributed to the presence of established relationships that are supportive of diabetes management due to the disease duration ( $M = 18.23$  years,  $SD = 11.82$  years) or high rates of marriage for some (60%).

A correlation was also found between diabetes self-care and depressive symptoms. This relationship, when negative, may be especially strong for participants in poor glycemic control given their difficulties with diabetes management. Participants in this study endorsed daily practice of some, if not ideal, diabetes self-care. They also endorsed subclinical depressive symptoms which may be due to previously discussed factors such as the presence of social support and socioeconomic status. Therefore, the association between diabetes self-care and depressive symptoms was found to be positive in this study and suggests that practicing some self-care, even if not ideal, may protect against depressive symptoms.

Although hypothesized, social support was not found to be significantly correlated with diabetes self-care. The lack of association between these variables could be explained by the age of the participants ( $M = 53$  years,  $SD = 12.26$  years) and disease duration ( $M = 18.23$  years,  $SD = 11.82$  years). Given their age and the amount of time they have spent managing diabetes; social support may not have helped these participants to improve their self-care over time. Further, diabetes self-care decisions are autonomous and these participants may find social support to be protective against depressive symptoms but simultaneously unhelpful in enhancing self-care.

**Hypothesis three.** The third hypothesis of the study purported that diabetes-related emotional distress would mediate the relationship between social support and diabetes self-care. Associations were found between 1) diabetes-related emotional distress and social support and 2) diabetes-related emotional distress and self-care. Diabetes-related emotional distress is influenced by difficulty with disease management as well as frustrations associated with having a chronic disease (Polonsky et al., 1995; Rubin & Peyrot, 2001).

Diabetes-related emotional distress is common in participants with diabetes and is different from depression (Dalewitz, Kahn & Hershey, 2000). Diabetes-related emotional distress acts as an independent and major contributor to poor adherence of diabetes self-care and subsequent difficulties with glycemia (Polonsky et al., 1995). The association found among diabetes-related emotional distress and diabetes self-care in this study is reflective of previous research. The negative association among diabetes-related emotional distress and diabetes self-care is also indicative of the

importance of addressing this relationship when working with diabetes patients in poor glycemic control.

As previously discussed, social support was again not found to be significantly correlated with diabetes self-care. The social support experienced by these participants may be protective against diabetes-related emotional distress while at the same time not serving to improve diabetes self-care. Analyses for hypothesis two and three focused on different constructs, depressive symptoms and diabetes-related emotional distress. However, findings of both suggest that while social support may act as protective against psychological distress that it may not influence diabetes self-care for adults in poor glycemic control of their long-term diabetes.

### **Implications for Practitioners**

The associations between 1) social support and diabetes self-care, 2) depressive symptoms and diabetes self-care, and 3) diabetes-related emotional distress and diabetes self-care offer implications for practitioners working with adult diabetes patients in poor glycemic control. They suggest that social support may be a protective factor against psychological distress but not against practicing limited diabetes self-care. This finding suggests that physicians and mental health clinicians working with this population must be aware of other psychological factors such as fatigue with disease management, motivation, and life stressors. Awareness of these influencing factors will help clinicians to develop individualized and effective treatment approaches.

The findings from this study support the previously reported negative association between depressive symptoms and diabetes self-care. This finding

further the support for depression screening by clinicians focused on medical and psychological care of diabetes patients. Brief screening for depressive symptoms by diabetes clinicians could allow for early detection of the disease and improvement of diabetes outcomes. Therefore, it is critical for diabetes care providers to collaborate with patients to ensure support of mental health treatment when needed and to enrich an understanding of the patient's medical problems and history (Antai-Otong, 2007).

Screening for symptoms of depression in diabetes clinical management would allow for earlier detection and treatment of depressive symptoms (Katon et al., 2006). Depression is often undiagnosed in the medical setting despite its frequent presentation due to the overlap of physical symptoms of the two diseases (Katon et al., 2004; Osborn, Kozak, & Warner, 2010). Clinicians focused on treating physical symptoms may attribute changes in appetite, sleep patterns, and mood to blood glucose changes rather than depression or distress. Therefore, primary care physicians, endocrinologists, and other medical professionals would benefit from education related to detection of depressive symptoms in diabetes patients. This type of education could be provided by mental health providers within a medical setting such as hospitals, community outreach centers, and specialty clinics. Commitment to an integrated treatment approach would be required on the part of the medical and mental health treatment teams in order for patients to best benefit from this collaboration.

An integrated approach focused on treating psychological issues, diabetes management, and resultant issues would be most effective in improving the clinical outcome for diabetes and depression (Katon et al., 2004). This approach would help

clinicians working with patients with diabetes to improve upon screening, educating, and treatment of depressive symptoms. A holistic approach to diabetes treatment would allow clinicians to consider the implications of physical concerns on psychological well-being and for appropriate psychoeducation and treatment to be provided.

Physicians treating the medical complications and needs of diabetes patients should also collaborate with mental health practitioners. Diabetes patients may feel less stigma addressing psychological concerns, such as distress and depression, if such issues were explained and normalized through routine medical care. Multidisciplinary team treatment approaches offer comprehensive care of medical and psychological issues and have positive outcomes for diabetes management.

Appropriate referrals to mental health professionals may improve diabetes outcomes for patients (Osborn et al., 2010). Treatment of psychological distress related to diabetes should be tailored to fit the needs of each patient based on their specific burden of diabetes self-care. Traditional treatment approaches for depression have been found effective for patients with comorbid diabetes and depression (De Groot et al., 2010; Lustman et al., 1998). Interventions such as cognitive behavioral therapy (Lustman et al., 1998), diabetes education using cognitive behavioral techniques (Jacobson & Weinger, 1998), and pharmacology (Mac Gillivray et al., 2003; Sclar, Robinson, Skaer, & Galin, 1998) have all been found to be effective in the treatment of comorbid diabetes and depression.

Support groups for patients with diabetes could also offer support for individuals struggling with the burden of the disease and its associated psychosocial

challenges. Group treatment may be offered through the medical practice and co-led by physicians and mental health clinicians to provide support for both medical and psychological issues. The relapse of depressive symptoms is a challenge for patients and treatment providers and depressive symptoms are often persistent over time (De Groot et al., 2010). Therefore, this treatment option might help to provide ongoing professional and peer support in reducing depressive symptoms and improving diabetes outcomes.

In addition to providing psychological care for diabetes patients with depression and distress, patients should be referred for diabetes education. Education is one of the most important components of diabetes treatment (Jacobson & Weinger, 1998). Incorporating cognitive behavioral methods in the education of diabetic patients would benefit patients with symptoms of depression. The use of CBT in education would allow clinicians to address overgeneralization of diabetes outcomes and general negative thoughts about oneself and the ability to practice diabetes self-care. This approach would help diabetes patients to challenge thoughts that might impact their self-esteem, motivation, and ability to practice diabetes self-care. Jacobson and Weinger (1998) suggested that including components of CBT in diabetes education could also help patients who feel overwhelmed by the demands of diabetes care but who would not meet the diagnosis of clinical depression. CBT may be a useful addition to medical and educational approaches when depressive symptoms impede diabetes self-care behaviors.

Effective treatment of depression and distress in patients with diabetes may not only improve depression and quality of life, but also indirectly improve disease

outcomes and illness burden (Markowitz et al., 2011). Therefore, collaboration between medical and mental health care for diabetes patients should be specialized to the specific needs of the patient. Greater awareness among treatment providers of the complications caused by psychological distress in diabetes will encourage comprehensive and informed treatment resulting in improved outcomes for patients.

Healthcare providers across disciplines should prepare for the needs of patients as the number of individuals diagnosed with the disease continues to rapidly increase (CDC, 2011). Endocrinologists, primary care physicians, and other clinicians should continue to increase awareness of the psychological needs of their patients with diabetes and their increased risk for developing depression and diabetes-related emotional distress (Das-Munshi et al., 2007; De Groot et al., 2010; Katon et al., 2004).

### **Limitations**

There are a number of limitations associated with the current study. This first limitation is related to the data analysis plan. Any mediational analysis based purely on cross-sectional data must be conducted with some caution (Maxwell & Cole, 2007). However, the clear rationale provided justified the examination of possible mediating relationships in the data (Preacher & Hayes, 2004).

Additionally, education, disease duration, depressive symptoms (BSI-18 depression subscale), social support (SPS), and diabetes-related emotional distress data violated assumptions of normality and homogeneity of variance. Therefore, non-parametric analytic techniques were used. Non-parametric tests were used as they require few if any assumptions about the shapes of the underlying population

distributions and are subsequently considered weaker statistical tests (Siegel & Castellan, 1988). Although a larger sample may have prevented violations and allowed for the use of parametric statistics, the data may continue to be positively skewed because of the differences in disease duration for adults with type 1 and type 2 diabetes, the differences in years of education for these participants, and their varying experiences with social support and psychological distress.

It should also be noted that the constructs measured in the current study were measured by self-report data which may provide unreliable results. Additionally, all constructs were assessed using measures selected for the original Breaking Down Barriers study. For example, the construct of depressive symptoms was assessed using the depression subscale of the Brief Symptom Inventory – 18. Depression or depressive symptoms may have been better assessed in this population using an alternative measure focused completely on depression as opposed to psychological distress.

A measure focused directly on depressive symptoms rather than general psychological distress may have provided a clearer picture of whether these participants were suffering specifically from depression. For instance, use of the Quick Inventory of Depressive Symptomatology (QIDS) includes all nine DSM-IV depression criteria (Rush et al., 2003). An advantage to the QIDS is its inclusion of a clinician-rated version (QIDS-C) and a self-rated version (QIDS-SR) (Rush et al., 2003). Use of this type of measure would have allowed patients to identify their specific depressive symptoms without confusion about other symptoms of distress

and also allowed for a more objective sense of depressive symptoms through the clinician-rated version.

Furthermore, the construct of social support was assessed using the Social Provisions Scale which may not represent the unique needs and experiences of individuals with diabetes. The experience of caring for others, as measured by the opportunity for nurturance provision of the Social Provisions Scale, has previously been considered a positive social experience (Cutrona & Russell, 1987; Weiss, 1974). However, it is possible that patients with diabetes might find the need to care for another to be burdensome rather than supportive. While certain individuals may experience greater social support when offered the opportunity to provide assistance to others, it is unlikely to be the case for patients who already have the complicated responsibility of diabetes self-care (Irvine et al., 1992; Katon et al., 2006). Therefore, the global score of the Social Provisions Scale is not likely to best reflect social support for diabetes patients.

Finally, despite the efforts to recruit a diverse population for this study, the percentage of non-Hispanic White participants (87%) is very high. Further, the majority of participants with type 2 diabetes identified themselves as non-Hispanic White (80%). This was likely influenced by the location of the Joslin Diabetes Center as well as healthcare disparities among different socioeconomic and racial groups that prohibit minorities from receiving appropriate medical care.

According to the National Diabetes Statistics (National Diabetes Information Clearinghouse, 2011), Hispanics and Latinos have a 66% greater risk of developing type 2 diabetes in comparison to non-Hispanic White adults, non-Hispanic Blacks are

at a 77% increased risk, and Asian Americans have an 18% higher risk of developing type 2 diabetes. Therefore, the study participants differ racially and ethnically from the groups of adults who are at an increased risk of developing diabetes.

Additionally, the economic factors which may prohibit minority groups from receiving medical care would also be likely to prohibit them from participation in medical research.

The socioeconomic status of these non-Hispanic White participants also differs from national data on minority diabetes patients (CDC, 2011; WHO, 2003). The differences in socioeconomic status, race, and ethnicity are likely to have contributed to the results of this study. The participants in this study are of a higher socioeconomic class than many individuals diagnosed with diabetes (Held et al., 2010; Fortmann et al., 2011). Therefore, data on the participants, particularly with type 2 diabetes, could be reflective only of diabetes patients in the region where the study took place.

Overall, future studies should account for these limitations to fully convey the complex nature of diabetes self-care, social support for patients with diabetes, symptoms of depression, and diabetes-related emotional distress. Consideration of more specific measures and a more varied participant population could provide different results. The number of type 2 diabetes cases on the rise within the United States, especially within racial and ethnic minority groups (CDC, 2011). Therefore, it is critical for clinicians to develop an understanding of different outlets for social support so that they may best help their patients. To this end, future research must

address the limitations faced by the current study in order to help diabetes patients identify social support that may help them with overall diabetes outcomes.

### **Directions for Future Research**

As previously mentioned, results of this study may have differed greatly had social support been assessed using a measure more specific to the needs of diabetes patients. For example, Coffman (2008) used the Diabetes Tangible Support Scale to assess the impact of social support on diabetes self-care. The Diabetes Tangible Support Scale was developed on the basis of the Spanish version (Gleeson-Kreig, Bernal, & Woolley, 2002) of the Personal Resources Questionnaire (PRQ) (Weinert, 1988). The scale asks diabetes patients to endorse the level of help needed with activities such as accompaniment to doctor's appointments, help when sick, help understanding diabetes and taking medication and to identify who can provide this level of help. The Diabetes Tangible Support Scale, or a similar measure more specific to diabetes care, should be incorporated in a future study considering associations among social support, diabetes self-care, and depression/distress.

The dearth of psychometrically validated measures focused on social support needs of diabetes patients must also be addressed given the importance of this area of study. Measures like the Social Provisions Scale assess the presence of social support for individuals who would find the opportunity for nurturance to add to feeling supported by others. Therefore, development of additional measures of social support would add tremendous value to psychosocial research focused on diabetes.

Another important study would include assessment of the relationships among social support, diabetes self-care, and depression/distress for diabetes patients from

ethnic and racial minority groups. This is particularly important given the increased prevalence of type 2 diabetes among minority groups, including African Americans, Hispanic and Latino Americans, Native Americans, and Asians (CDC, 2011; Janovic & Harrison, 2004). Further, Fortmann and colleagues (2011) found that social support resources focused on disease management enhanced diabetes self-care, emotional well-being, and glycemic control.

Evaluation of these associations would allow for better outreach and support for individuals at high risk for developing diabetes and aid in the prevention of disease complications (Caballero & Tenzer, 2007; Marshall, 2005). Support specific to diabetes management has been found to have a considerable impact on overall diabetes self-care and the development of physical and psychological complications for minority diabetes patients (Coffman, 2008; Fortman et al., 2011).

A third study of interest would address the associations among social support, diabetes self-care, and depression/distress for diabetes patients in good glycemic control (glycated hemoglobin [ $\text{HbA}_{1c}$ ] > 7.5%). It would be beneficial to understand whether associations exist among social support and diabetes self-care for these patients so that clinicians involved in diabetes care could better understand how social support might be involved in the attainment of better glycemic control.

Understanding how patients in good glycemic control might utilize social support could help to inform treatment strategies for patients in poor glycemic control.

Further, all research focused on the impact of social support on diabetes self-care and depression/distress would benefit from the incorporation of qualitative research. It would be particularly beneficial to gain greater understanding of why

patients in poor glycemic control might not find the presence of social support to impact their diabetes self-care. Findings from qualitative research could inform both clinical practice as well as the development of measures to better assess the psychosocial impact of managing diabetes.

### **Conclusion**

Diabetes mellitus is a growing problem in the United States, with rates of type 2 diabetes increasing in children and adolescents, racial and ethnic minorities, and individuals over the age of 65 (CDC, 2011). Diabetes care practitioners are tasked with incorporating many complex components of the disease treatment (Eisenberg, 1992; Miranda & Munoz, 1993). These include depression and diabetes-related distress, diabetes self-care, and the incorporation of social support when needed. Given the prevalence of comorbid diabetes and depression (Anderson et al., 2001) and diabetes-related distress (Polonsky et al., 1995), the present secondary data analysis considers the important interaction between these variables, diabetes self-care, and social support.

These findings are likely to be indicative of this particular population and their difficulties with disease management. The results of this study underscore the importance of addressing psychological issues, such as depression and diabetes-related emotional distress, with clients who are struggling to manage their diabetes and achieve good glycemic control. Further, adherence to recommended diabetes self-care requires the ability to problem solve, self-monitor, and utilize working memory regardless of the age of the patient (McNally, Rohan, Pendley, Delamater, & Drotar, 2010).

This study represents one assessment of the relationships among social support, diabetes self-care, and depression and diabetes-related emotional distress. There is a need for further research in this area to determine ways in which clinical interventions may help the rising numbers of diabetes patients to cope with disease management, particularly among minority patients with limited access to health care and diabetes treatment. It will be critical for researchers and clinicians alike to continue to address the support and self-care needs of diabetes patients and to work towards the improvement of interventions in coping with psychosocial stressors.

## References

- Aarts, S., van den Akker, M., van Boxtel, M. P. J., Jolles, J., Winkens, B., & Mestemakers, J. F. M. (2009). Diabetes type II as a risk factor for depression: a lower than expected risk in a general practice setting. *European Journal of Epidemiology*, *24*, 641-648.
- Achat, H., Kawachi, I., Spiro, A., DeMolles, D. A., & Sparrow, D. (2000). Optimism and depression as predictors of physical and mental health functioning: The normative aging study. *Annals of Behavioral Medicine*, *22*, 127-130.
- Alberti, K. G. M., & Zimmet, P. Z. (1998). Definition, diagnosis and classification of diabetes mellitus and its complications. Part 1: Diagnosis and classification of diabetes mellitus. Provisional report of a WHO Consultation. *Diabetic Medicine*, *15*, 539-553.
- Ali, S., Stone, M. A., Peters, J. L., Davies, M. J., & Khunti, K. (2006). The prevalence of co-morbid depression in adults with type 2 diabetes: A systematic review and meta-analysis. *Diabetic Medicine*, *23*, 1165-1173.
- American College of Endocrinology (2002). American College of Endocrinology consensus statement on guidelines for glycemic control. *Endocrine Practice*, *8*, 5-11.
- American College of Sports Medicine (1995). *ACSM'S Guidelines for Exercise Testing and Prescription*. Baltimore, MD: Williams & Wilkins.
- American Diabetes Association. (2011). Standards of medical care in diabetes – 2011. *Diabetes Care*, *34*, 11-61.

- American Psychiatric Association. (2005). *Diagnostic and statistical manual of mental disorders* (4<sup>th</sup> ed., text revision). Washington, DC: American Psychiatric Association.
- Anderson, B. J., Clouse, R. E., Freedland, K. E., & Lustman, P. J. (2001). The prevalence of comorbid depression in adults with diabetes: A meta-analysis. *Diabetes Care*, *24*, 1069-1078.
- Anderson, B. J., & Coyne, J. C. (1991). "Miscarried helping" in families of children and adolescents with chronic diseases. In J. H. Johnson & S. B. Johnson (Eds.), *Advances in child health psychology*. Gainesville, FL: University of Florida Press.
- Anderson, B. J., Goebel-Fabbri, A. E., & Jacobson, A. M. (2005). Behavioral research and psychological issues in diabetes: Progress and prospects. In C. R. Kahn, G. C. Weir, G. L. King, A. M. Jacobson, A. C. Moses, & R. J. Smith (Eds.), *Joslin's Diabetes Mellitus* (14<sup>th</sup> ed.). Baltimore, MD: Lippincott, Williams, & Wilkins.
- Anderson, B.J., Ho, J., Brackett, J., Finkelstein, D., & Laffel, L. (1997). Parental involvement in diabetes management tasks: Relationships to blood glucose monitoring adherence and metabolic control in young adolescents with insulin dependent diabetes mellitus. *Journal of Pediatrics*, *130*, 257-265.
- Anderson, E. A., Hoffman, R. P., Balon, T. W., Sinkey, C. A., & Mark, A. L. (1991). Hyperinsulinemia produces both sympathetic neural activation and vasodilation in normal humans. *The Journal of Clinical Investigation*, *87*, 2246-2252.

- Anderson, R. M. (1985). Is the problem of compliance all in our heads? *Diabetes Educator, 11*, 31-34.
- Anderson, R. M. (1995). Patient empowerment and the traditional medical model. A case of irreconcilable differences? *Diabetes Care, 18*, 412-415.
- Anderson, R. M., & Funnell, M. M. (2005). Patient empowerment: Reflections on the challenge of fostering the adoption of a new paradigm. *Patient Education and Counseling, 57*, 153-157.
- Antai-Otong, D. (2007). Diabetes and depression: Pharmacologic considerations. *Perspectives in Psychiatric Care, 43*, 93-96.
- Aubert, R. E., Herman, W. H., Waters, J., Moore, W., Sutton, D., Peterson, B. L., Bailey, C. M., & Koplan, J. P. (1998). Nurse case management to improve glycemic control in diabetic patients in a health maintenance organization. *Annals of Internal Medicine, 129*, 605-612.
- Bandura, A. (1989). Human agency in social cognitive theory. *American Psychologist, 44*, 1175-1184.
- Barker, J. M. (2006). Type 1 diabetes-associated autoimmunity: Natural history, genetic associations, and screening. *The Journal of Clinical Endocrinology & Metabolism, 91*, 1210-1217.
- Barlow, J. H., Wright, C. C., Turner, A. P., & Bancroft, G. V. (2005). A 12-month follow-up study of self-management training for people with chronic disease: Are changes maintained over time? *British Journal of Health Psychology, 10*, 589-599.

- Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51*, 1173-1182.
- Barrera, M., Jr. (1980). A method for the assessment of social support in community survey research. *Connections, 3*, 8-13.
- Barrera, M., Jr., Sandler, I. N., & Ramsey, T. B. (1981). Preliminary development of a scale of social support: Studies on college students. *American Journal of Community Psychology, 9*, 435-447.
- Boutati, E. I., & Raptis, S. A. (2009). Self-monitoring of blood glucose as part of the integral care of type 2 diabetes. *Diabetes Care, 32*, 205-210.
- Boyle, S. H., Surwit, R. S., Georgiades, A., Brummett, B. H., Helms, M. J., Williams, R. B., & Barefoot, J. C. (2007). Depressive symptoms, race, and glucose concentrations: The role of cortisol as mediator. *Diabetes Care, 30*, 2484-2488.
- Brenes, C. (2007). Anxiety, depression, and quality of life in primary care patients. *Primary Care Companion to the Journal of Clinical Psychiatry, 9*, 437-443.
- Bronfenbrenner, U. (1979). *The ecology of human development: Experiments by design and nature*. Cambridge, MA: Harvard University Press.
- Brown, L. C., Newman, S. C., Majumdar, S. R., & Johnson, S. A. (2005). History of depression increases risk of type 2 diabetes in younger adults. *Diabetes Care, 28*, 1063-1067.
- Brownson, C. A., & Heisler, M. (2009). The role of peer support in diabetes care and self-management. *The Patient: Patient-Centered Outcomes Research, 2*, 5-17.

- Bryan, C., Songer, T., Brooks, M. M., Rush, A. J., Thase, M. E., Gaynes, B., Balasubramani, G. K., Trivedi, M. H., Fava, M., & Wisniewski, S. R. (2010). The impact of diabetes on depression treatment outcomes. *General Hospital Psychiatry, 32*, 33-41.
- Burant, C. (2008). *Medical management of type 2 diabetes* (6<sup>th</sup> ed.). Alexandria, VA: American Diabetes Association.
- Burne, C., Nedelman, J., & Luke, R. J. (1994). Race, socioeconomic status, and the development of end-stage renal disease. *American Journal of Kidney Diseases: the Official Journal of the National Kidney Foundation, 23*, 16-22.
- Caballero, A. E., & Tenzer, P. (2007). Building cultural competency for improved diabetes care: Latino Americans and diabetes. *The Journal of Family Practice, 56*, Supplement 9.
- Cameron, O. G., Kronfol, Z., Greden, J. F., & Carroll, B. J. (1984). Hypothalamic-pituitary-adrenocortical activity in patients with diabetes mellitus. *Archives of General Psychiatry, 41*, 1090-1095.
- Campayo, A., de Jonge, P., Roy, J. F., Saz, P., de la Camera, C., Quintanilla, M. A., Marcos, G., Santabarbara, J., & Lobo, A. (2010). Depressive disorder and incident diabetes mellitus: The effect of characteristics of depression. *American Journal of Psychiatry, 167*, 580-588.
- Carney, C. (1998). Diabetes mellitus and major depressive disorder: An overview of prevalence, complications, and treatment. *Depression and Anxiety, 7*, 149-157.

- Carney, R. M., Blumenthal, J. A., Freedland, K. E., Stein, P. K., Howells, W. B., Berkman, L. F., Watkins, L. L., Czajkowski, S. M., Hayano, J., Domitrovich, P. P., & Jaffe, A. S. (2005). Low heart rate variability and the effect of depression on post-myocardial infarction mortality. *Archives of Internal Medicine*, *165*, 1486-1491.
- Carney, R. M., Freedland, K. E., Stein, P. K., Miller, G. E., Steinmeyer, B., Rich, M. W., & Duntley, S. P. (2007). Heart rate variability and markers of inflammation and coagulation in depressed patients with coronary heart disease. *The Journal of Psychosomatic Research*, *62*, 463-467.
- Centers for Disease Control and Prevention (2010). Diabetes Data and Trends. National Center for Health Statistics, Division of Health Interview Statistics, data from the National Health Interview Survey. Retrieved from <http://www.cdc.gov/diabetes/statistics/duration/fig2.htm>
- Centers for Disease Control and Prevention (2011, January 26). *Number of Americans with diabetes rises to nearly 26 million*. Retrieved from [http://www.cdc.gov/media/releases/2011/p0126\\_diabetes.html](http://www.cdc.gov/media/releases/2011/p0126_diabetes.html)
- Ciechanowski, P. S., Katon, W. J., & Russo, J. E. (2000). Impact of depressive symptoms on adherence, function, and costs. *Archives of Internal Medicine*, *160*, 3278-3285.
- Cobb, S. (1976). Social support as a moderator of life stress. In A. M. Eward (Ed.), *Toward an integrated medicine: Classics from psychosomatic medicine, 1959-1979*. Washington, DC: American Psychiatric Press, Inc.

- Cobden, D. S., Niessen, L. W., Barr, C. E., Rutten, F. F., & Redekop, W. K. (2010). Relationships among self-management, patient perceptions of care, and health economic outcomes for decision-making and clinical practice in type 2 diabetes. *Value in Health, 13*, 138-147.
- Coffman, M. J. (2008). Effects of tangible social support and depression on diabetes self-efficacy. *Journal of Gerontological Nursing, 34*, 32-39.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2<sup>nd</sup> ed.). Hillsdale, NJ: Lawrence Erlbaum.
- Cohen, S. (2004). Social relationships and health. *American Psychologist, 59*, 676–684.
- Cohen S., & Wills T.A. (1985), Stress, social support and the buffering hypothesis. *Psychological Bulletin, 98*, 310–357.
- Collins, M. M., Corcoran, P., & Perry, I. J. (2009). Anxiety and depression symptoms in patients with diabetes. *Diabetic Medicine, 26*, 153-161.
- Cooke, D. W., & Plotnick, L. (2004). Management of type 1 diabetes. In O. H. Pescovitz & E. A. Eugster (Eds.), *Pediatric endocrinology: Mechanisms, manifestations and management*. Philadelphia, PA: Lippincott, Williams, & Wilkins.
- Courtney, L., Gordon, M., & Romer, L. (1997). A clinical path for adult diabetes. *Diabetes Educator, 23*, 664–671.
- Coyne, J. C., & DeLongis, A. (1986). Going beyond social support: The role of social relations in adaptation. *Journal of Consulting and Clinical Psychology, 54*, 454–460.

- Cryer, P. E. (2002). Hypoglycaemia: The limiting factor in the glycaemic management of type I and type II diabetes. *Diabetologia*, *45*, 937–948.
- Cryer, P. E., Davis, S. N., & Shamoon, H. (2003). Hypoglycemia in diabetes. *Diabetes Care*, *26*, 1902-1912.
- Cutrona, C. E., & Russell, D. W. (1987). The provisions of social relationships and adaptation to stress. In W. H. Jones & D. Perlman (Eds.), *Advances in personal relationships* (Vol. 1). Greenwich, CT: JAI Press.
- Dahlquist, G. (2001). Environmental factors and type 1 diabetes. *Diabetes Care*, *24*, 180-181.
- Dalewitz, J., Khan, N., & Hershey, C. O. (2000). Barriers to control of blood glucose in diabetes mellitus. *American Journal of Medical Quality*, *15*, 16-25.
- Daneman, D. (2006). Type 1 diabetes. *Lancet*, *367*, 847-858.
- Das-Munshi, J., Stewart, R., Ismail, K., Bebbington, P. E., Jenkins, R., & Prince, M. J. (2007). Diabetes, common mental disorders, and disability: Findings from the UK National Psychiatric Morbidity Survey. *Psychosomatic Medicine*, *69*, 543–550.
- De Fronzo, R. A. (1999). Pharmacologic therapy for type 2 diabetes mellitus. *Annals of Internal Medicine*, *131*, 281.
- De Groot, M., Anderson, R., Freedland, K. E., Clouse, R. E., & Lustman, P. J. (2001). Association of depression and diabetes complications: A meta-analysis. *Psychosomatic Medicine*, *63*, 619-630.

- De Groot, M., Kushnick, M., Doyle, T., Merrill, J., McGlynn, M., Shubrook, J., & Schwartz, F. (2010). Depression among adults with diabetes: Prevalence, impact, treatment options *Diabetes Spectrum*, *23*, 15-18.
- De Palma, M. T., Rollison, J., & Camporese, M. (2011). Psychosocial predictors of diabetes management. *American Journal of Health Behavior*, *35*, 209-218.
- Deci, E. L., Eghrari, H., Patrick, B. C., & Leone, D. R. (1994). Facilitating internalization: The self-determination theory perspective. *Journal of Personality*, *62*, 119-142.
- Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. New York, NY: Plenum Press.
- Delahanty, L. M., Grant, R. W., Wittenberg, E., Bosch, J. L., Wexler, D. J., Cagliero, E., & Meigs, J. B. (2007). Association of diabetes-related emotional distress with diabetes treatment in primary care patients with Type 2 diabetes. *Diabetic Medicine: A Journal of the British Diabetic Association*, *24*, 48-54.
- Derogatis, L. R. (2000). *BSI-18: Brief Symptom Inventory. Administration, scoring and procedures manual*. Minneapolis: National Computer Systems, Inc.
- Derogatis, L. R., & Fitzpatrick, M. (2004). The SCL-90-R, the Brief Symptom Inventory (BSI), and the BSI-18. In M. E. Manuish (Ed.), *The use of psychological testing for treatment planning and outcomes assessment*, (Vol. 3, 3<sup>rd</sup> ed.). Mahwah, NJ: Lawrence Erlbaum Associates, Inc.
- Desharnais, R., Godin, G., Jobin, J., Valois, P., & Ross, A. (1990). Optimism and health-relevant cognitions after a myocardial infarction. *Psychological Reports*, *67*, 1131-1135.

- The Diabetes Control and Complications Trial Research Group (1993). The effect of intensive treatment of diabetes on the development and progression of long-term complications in insulin-dependent diabetes mellitus. *New England Journal of Medicine*, *329*, 977-986.
- Dickinson, J., & O'Reilly, M. (2004). The lived experience of adolescent females with type 1 diabetes. *Diabetes Education*, *30*, 99-107.
- Dirmaier, J., Watzke, B., Koch, U., Schulz, H., Lehnert, H., Pieper, L., & Wittchen, H.-U. (2010). Diabetes in primary care: Prospective associations between depression, nonadherence and glycemic control. *Psychotherapy and Psychosomatics*, *79*, 172-178.
- Disdier-Flores, O. M. (2010). Association of major depression and diabetes in medically indigent Puerto Rican adults. *Puerto Rico Health Sciences Journal*, *29*, 30-35.
- Duke, D. C., Geffken, G. R., Lewin, A. B., Williams, L. B., Storch, E. A., & Silverstein, J. H. (2008). Glycemic control in youth with type 1 diabetes: Family predictors and mediators. *Journal of Pediatric Psychology*, *33*, 719-727.
- Egede, L. E., & Ellis, C. (2008). The effects of depression on diabetes knowledge, diabetes self-management, and perceived control in indigent patients with type 2 diabetes. *Diabetes Technology & Therapeutics*, *10*, 213-219.
- Egede, L. E., & Ellis, C. (2010). The effects of depression on metabolic control and quality of life in indigent patients with type 2 diabetes. *Diabetes Technology & Therapeutics* *12*, 257-262.

- Egede, L. E., & Zheng, D. (2003). Independent factors associated with major depressive disorder in a national sample of individuals with diabetes. *Diabetes Care*, 26, 104-111.
- Egede, L. E., Zheng, D., & Simpson, K. (2002). Comorbid depression is associated with increased health care use and expenditures in individuals with diabetes. *Diabetes Care*, 25, 464-470.
- Eisenbarth, G. S., Polonsky, K. S., & Buse, J. B. (2008). Type 1 diabetes mellitus. In H. M. Kronenberg, S. Melmed, K. S. Polonsky, & P. R. Larsen (Eds.). *Kronenberg: Williams Textbook of Endocrinology* (11<sup>th</sup> ed.) Philadelphia, Pa: Saunders Elsevier.
- Eisenberg, L. (1992). Treating depression and anxiety in primary care: closing the gap between knowledge and practice. *New England Journal of Medicine*, 326, 1080-1084.
- Engelman, M., Landgraf, R., & Wotjak, C. T. (2004). The hypothalamic–neurohypophysial system regulates the hypothalamic–pituitary–adrenal axis under stress: An old concept revisited. *Frontiers in Neuroendocrinology*, 25, 132-149.
- Fisher, E. B., Brownson, C. A., O’Toole, M. L., Shetty, G., Anwuri, V. V., & Glasgow, R. E. (2005). Ecological approaches to self-management: The case of diabetes. *American Journal of Public Health*, 95, 1523-1535.
- Fisher, L., Chesla, C. A., Skaff, M. M., Mullen, J. T., & Kanter, R. A. (2002). Depression and anxiety among partners of European-American and Latino patients with type 2 diabetes. *Diabetes Care*, 25, 1564-1570.

- Fisher, L., Glasgow, R. E., Mullan, J. T., Hessler, D., Arean, P., & Masharani, P. (2010). Diabetes distress but not clinical depression or depressive symptoms is associated with glycemic control in both cross-sectional and longitudinal analyses. *Diabetes Care, 33*, 23-28.
- Fisher, L., Gudmundsdottir, M., Gilliss, C., Skaff, M., Mullan, J., Kanter, R., & Chesla, C. (2000). Resolving disease management problems in European-American and Latino couples with type 2 diabetes: The effects of ethnicity and patient gender. *Family Process, 39*, 403-416.
- Fortmann, A. L., Gallo, L. C., & Philis-Tsimikas, A. (2011). Glycemic control among Latinos with type 2 diabetes: The role of social-environmental support resources. *Health Resources, 30*, 251-258.
- Fowler, M. J. (2008). Microvascular and macrovascular complications of diabetes. *Clinical Diabetes, 26*, 77-82.
- Franks, M. M., Stephens, M. A. P., Rook, K. S., Franklin, B. A., Keteyian, S. J., & Artinian, N. T. (2006). Spouses' provision of health-related support and control to patients participating in cardiac rehabilitation. *Journal of Family Psychology, 20*, 311-318.
- Glasgow, R. E., Hiss, R. G., Anderson, R. M., Friedman, N. M., Hayward, R. A., Marrero, D. G., Taylor, C. B., & Vinicor, F. (2001). Report of the health care delivery work group: Behavioral research related to the establishment of a chronic disease model for diabetes care. *Diabetes Care, 24*, 124-130.

- Gonder-Frederick, L. A., Cox, D. J., Ritterband, L. M. (2002). Diabetes and behavioral medicine: The second decade. *Journal of Consulting and Clinical Psychology, 70*, 611-625.
- Gottlieb, B. H. (1983). *Social support strategies: Guidelines for mental health practice*. Beverly Hills, CA: Sage.
- Harris, M. I. (2001). Racial and ethnic differences in health care access and health outcomes for adults with type 2 diabetes. *Diabetes Care, 24*, 454-459.
- Harris, M. A., Antal, H., Oelbaum, R., Buckloh, L. M., White, N. H., & Wysocki, T. (2008). Good intentions gone awry: Assessing parental “miscarried helping” in diabetes. *Families, Systems, & Health, 26*, 393-403.
- Heckbert, S. R., Rutter, C. M., Oliver, M., Williams, L. H., Ciechanowski, P., Lin, E. H. B., Katon, W. J., & Von Korff, M. (2010). Depression in relation to long-term control of glycemia, blood pressure, and lipids in patients with diabetes. *Journal of General Internal Medicine, 25*, 524-529.
- Heller, K., & Swindle, R. W. (1983). Social networks, perceived social support, and coping with stress. In R. D. Felner, L. A. Jason, J. N. Moritsugu, & S. S. Farber (Eds.) *Preventive psychology: Theory, research, and practice*. New York, NY: Pergamon Press.
- House, J. S. (1981). *Work stress and social support*. Reading, MA: Addison-Wesley.
- Huber, J., Drescher, U., & Asimakopoulou, K. (2009). Depression in people with type 2 diabetes. *Diabetes & Primary Care, 11*, 281-285.
- Hummel, M., Fuchtenbusch, M., Schenker, M., & Ziegler, A. G. (2001). No major association of breast-feeding, vaccinations, and childhood viral diseases with

early islet autoimmunity in the German BABYDIAB Study. *Diabetes Care*, 23, 969-974.

Iida, M., Parris Stephens, M. A., Rook, K. S., Franks, M. M., & Salem, J. K. (2010).

When the going gets tough, does support get going? Determinants of spousal support provision to type 2 diabetic patients. *Personality and Social Psychology Bulletin*, 36, 780-791.

Irvine, A. A., Cox, D., & Gander-Frederick, L. (1992). Fear of hypoglycemia:

Relationship to physical and psychological symptoms in patients with insulin-dependent diabetes mellitus. *Health Psychology*, 11, 135-138.

Jacobson, A. M. (1993). Depression and diabetes. *Diabetes Care*, 16, 1621-1623.

Jacobson, A. M., & Weinger, K. (1998). Treating depression in diabetic patients: Is there an alternative to medications? *Annals of Internal Medicine*, 129, 656-657.

James, P. T., Rigby, N., & Leach, R. (2004). The obesity epidemic, metabolic syndrome, and future prevention strategies. *European Journal of Preventive Cardiology*, 11, 3-8.

Janovic, L., & Harrison, R. W. (2004). Advances in diabetes for the millennium:

Diabetes in minorities. *Medscape General Medicine*, 6, Supplement 3.

Jiang, W., & Davidson, J. R. T. (2005). Antidepressant therapy in patients with ischemic heart disease. *American Heart Journal*, 150, 871-881.

Johnson, S. B. (1992). Methodological issues in diabetes research. Measuring adherence. *Diabetes Care*, 15, 1658-1667.

- Joynt, K. E., Whellan, D. J., & O'Connor, C. M. (2003). Depression and cardiovascular disease: Mechanisms of interaction. *Biological Psychiatry, 54*, 248-261.
- Judd, C. M., & Kenny, D. A. (1981). Process analysis: Estimating mediation in treatment evaluations. *Evaluation Review, 5*, 602-619.
- Juvenile Diabetes Research Foundation (2009). Type 1 diabetes information. Warning signs of type 1 diabetes. Retrieved September 13, 2010, from [http://www.jdrf.org/files/General\\_Files/Life\\_with\\_Diabetes/2008/WarningSigns.pdf](http://www.jdrf.org/files/General_Files/Life_with_Diabetes/2008/WarningSigns.pdf)
- Kaholokula, J. K., Haynes, S. N., Grandinetti, A., & Chang, H. K. (2003). Biological, psychosocial, and sociodemographic variables associated with depressive symptoms in persons with type 2 diabetes. *Journal of Behavioral Medicine, 26*, 435-458.
- Kaniasty, K., & Norris, F. H. (1993). A test of the social support deterioration model in the context of natural disaster. *Journal of Personality and Social Psychology, 64*, 395-408.
- Karlsson, A., Arman, M., & Wikblad, K. (2006). Teenagers with type 1 diabetes – A phenomenological study of the transition towards autonomy in self-management. *International Journal of Nursing Studies, 45*, 562-570.
- Katon, W. (2010). Depression and diabetes: Unhealthy bedfellows. *Depression and Anxiety, 27*, 323-326.

- Katon, W., Cantrell, C. R., Sokol, M. C., Chiao, E., & Gdovin, J. M. (2005). Impact of antidepressant drug adherence on comorbid medication use and resource utilization. *Archives of Internal Medicine, 165*, 2497-2503.
- Katon, W., & Ciechanowski, P. (2002). Impact of major depression on chronic medical illness. *Journal of Psychosomatic Research, 53*, 859– 863.
- Katon, W., Russo, J., Lin, E. H. B., Heckbert, S. R., Karter, A. J., Williams, L. H., Ciechanowski, P., Ludman, E., & Von Korff, M. (2009). Diabetes and poor disease control: Is comorbid depression associated with poor medication adherence or lack of treatment intensification? *Psychosomatic Medicine, 71*, 965-972.
- Katon, W., Schoenbaum, M., Unutzer, J., Lin, E. H. B., Fan, M.-Y., Hunkeler, E. M., Williams Jr., J. W. (2006). Cost-effectiveness and net benefit of enhanced treatment of depression for older adults with diabetes and depression. *Diabetes Care, 29*, 265-270.
- Katon, W., Von Korff, M., Lin, E. H. B., Simon, G., Ludman, E., Russo, J., Ciechanowski, P., Walker, P., & Bush, T. (2004). The Pathways Study: A randomized trial of collaborative care in patients with diabetes and depression. *Archives of General Psychiatry, 61*, 1042-1049.
- Kaufman, R. (2002). Type 2 diabetes in children and young adults: A “new epidemic.” *Clinical Diabetes, 20*, 217-218.
- Kawakami, N., Takatsuka, N., Shimizu, H., & Ishibashi, H. (1999). Depressive symptoms and occurrence of type 2 diabetes among Japanese men. *Diabetes Care, 23*, 1443-1444.

- Kessler, R. C., Berglund, P., Demler, O., Jin, R., Merikangas, K. R., Walters, E. E. (2005). Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication. *Archives of General Psychiatry*, *62*, 593-602.
- Koro, C. E., Bowlin, S. J., Bourgeois, N., & Fedder, D. O. (2004). Glycemic control from 1988 to 2000 among U.S. adults diagnosed with type 2 diabetes: A preliminary report. *Diabetes Care*, *27*, 17-20.
- La Greca, A. M. (1990). Social consequences of pediatric conditions: Fertile area for future investigation and intervention. *Journal of Pediatric Psychology*, *15*, 285-307.
- La Greca, A. M., Greco, P., Spetter, D., Fisher, E., & Santiago, J. (1995). I get by with a little help from my family and friends: Adolescents' support for diabetes care. *Journal of Pediatric Psychology*, *20*, 449-476.
- La Greca, A. M., Swales, T., Klemp, S., & Madigan, S. (1988). Self care behaviors among adolescents with diabetes. *Proceedings of the Ninth Annual Sessions of the Society of Behavioral Medicine*, Boston, A42.
- La Roche, H. H., Davis, M. M., Forman, J., Palmisano, G., Reisinger, H. S., Tannas, C., Spencer, M., & Heisler, M. (2009). Children's roles in parents' diabetes self-management. *American Journal of Preventive Medicine*, *37*, 251-261.
- Lawson, M. L., Gerstein, H. C., Tsui, E., & Zinman, B. (1999). Effect of intensive therapy on early macrovascular disease in young individuals with type 1 diabetes. A systematic review and meta-analysis. *Diabetes Care*, *22*, 35-39.

- Lewin, A. B., LaGreca, A. M., Geffken, G. R., Williams, L. B., Duke, D. C., Storch E. A., & Silverstein, J. H. (2009). Validity and reliability of an adolescent and parent rating scale of type 1 diabetes adherence behaviors: The Self-Care Inventory (SCI). *Journal of Pediatric Psychology, 34*, 999-1007.
- Lin, E. H. B., Heckbert, S. R., Rutter, C. M., Katon, W., Ciechanowski, P., Simon, G. E., Ludman, E. J., Oliver, M., Young, B., McCulloch, D. K., & Von Korff, M. (2009). Depression and increased mortality in diabetes: Unexpected causes of death. *Annals of Family Medicine, 7*, 414-421.
- Lin, E. H. B., Katon, W., Rutter, C., Simon, G. E., Ludman, E., Von Korff, M., Young, B., Oliver, M., Ciechanowski, P., Kinder, L., & Walker, E. (2006). Effects of enhanced depression treatment on diabetes self-care. *Annals of Family Medicine, 4*, 46-53.
- Lin, E. H. B., Katon, W., Von Korff, M., Rutter, C., Simon, G. E., Oliver, M., Ciechanowski, P., Ludman, E. J., Bush, T., & Young, B. (2004). Relationship of depression and diabetes self-care, medication adherence, and preventive care. *Diabetes Care, 27*, 2154-2160.
- Lin, E. H. B., Rutter, C. M., Katon, W., Heckbert, S. R., Ciechanowski, P., Oliver, M., Ludman, E. J., Young, B., Williams, L. H., McCulloch, D. K., & Von Korff, M. (2010). Depression and advanced complications of diabetes. *Diabetes Care, 33*, 264-269.
- Lorig, K. R., & Holman, H. (2003). Self-management education: History, definition, outcomes, and mechanisms. *Annals of Behavioral Medicine, 26*, 1-7.

- Lustman, P. J., & Clouse, R. E. (2005). Depression in diabetic patients: The relationship between mood and glycemic control. *Journal of Diabetes and its Complications, 19*, 113-122.
- Lustman, P. J., & Clouse, R. E. (2007). Depression in diabetes: The chicken or the egg? *Psychosomatic Medicine, 69*, 300-305.
- Lustman, P. J., Anderson, R. J., Freedland, K. E., De Groot, M., Carney, R. M. & Clouse, R. E. (2000). Depression and poor glycemic control: A meta-analytic review of the literature. *Diabetes Care, 23*, 934-942.
- Lustman, P. J., Freedland, K. E., Griffith, L. S., & Clouse, R. E. (1998). Predicting response to cognitive behavior therapy of depression in type 2 diabetes. *General Hospital Psychiatry, 20*, 302-306.
- Lustman, P. J., Griffith, L. S., Clouse, R. E., Freedland, K. E., Eisen, S. A., Rubin, E. H., Carney, R. M., & McGill, J. B. (1997). Effects of nortriptyline on depression and glycemic control in diabetes: results of a double-blind, placebo-controlled trial. *Psychosomatic Medicine, 59*, 241-250.
- MacGillivray, S., Arroll, B., Hatcher, S., Ogston, S., Reid, I., Sullivan, F., Williams, B. & Crombie, I. (2003). Efficacy and tolerability of selective serotonin reuptake inhibitors compared with tricyclic antidepressants in depression treated in primary care: Systematic review and meta-analysis. *BMJ, 326*, 1014–1020.
- Markowitz, S., Gonzalez, J. S., Wilkinson, J. L., & Safren, S. A. (2010). Treating depression in diabetes: Emerging findings. *Psychosomatics, 52*, 1-18.

- Marshall, M. C. (2005). Diabetes in African Americans. *Postgraduate Medical Journal*, 81, 734-740.
- McConnell, T. R. (1998). Cardiorespiratory Assessment of apparently healthy populations. In J. L. Roitman (Ed.), *ACSM's resource manual for guidelines for exercise testing and prescription* (pp. 347-353). Baltimore, MD: Lippincott, Williams, & Wilkins.
- McGowan, P. (2011). The efficacy of diabetes patient education and self-management education in type 2 diabetes. *Canadian Journal of Diabetes*, 35, 46-53.
- McKellar, J. D., Humphreys, K., & Piette, J. D. (2004). Depression increases diabetes symptoms by complicating patients' self-care adherence. *The Diabetes Educator*, 30, 485-492.
- McNally, K., Rohan, J., Pendley, J. S., Delamater, A., & Drotar, D. (2010). Executive functioning, treatment adherence, and glycemic control in children with type 1 diabetes. *Diabetes Care*, 33, 1159-1162.
- Meachen, S. J., Hanks, R. A., Millis, S. R., & Rapport, L. J. (2008). The reliability and validity of the brief symptom inventory-18 in persons with traumatic brain injury. *Archives of Physical Medicine and Rehabilitation*, 89, 958-965.
- Mensing, C., Boucher, J., Cypress, M., Weinger, K., Mulcahy, K., Barta, P., Hosey, G., Kopher, W., Lasichak, A., Lamb, B., Mangan, M., Norman, J., Tanja, J., Yauk, J., Wisdom, K., & Adams, C. (2002). National standards for diabetes self-management education. *Diabetes Care*, 25, 140-147.

- Mertler, C.A., & Vannatta, R. A. (2005). *Advanced and multivariate statistical methods* (3<sup>rd</sup> ed.). Glendale, CA: Pyrczak Publishing.
- Mezuk, B., Albrecht, S., Eaton, W. W., & Golden, S. H. (2008). Depression and type 2 diabetes over the lifespan: A meta-analysis. *Diabetes Care, 31*, 2383-2390.
- Miller, D., & Brown, J. L. (2005). Marital interactions in the process of dietary change for type 2 diabetes. *Journal of Nutrition Education and Behavior, 37*, 226-234.
- Miranda, J., & Munoz, R. (1993). Intervention for minor depression in primary care patients. *Psychosomatic Medicine, 56*, 136-141.
- Miyaoka, Y., Miyaoka, H., Motomiya, T., Kitamura, S., & Asai, M. (1997). Impact of sociodemographic and diabetes-related characteristics on depressive state among non-insulin-dependent diabetic patients. *Psychiatry and Clinical Neurosciences, 51*, 203-206.
- Mullen, P. D., Green, L. W., & Persinger, G. S. (1985). Clinical trials of patient education for chronic conditions: A comparative meta-analysis of intervention types. *Preventative Medicine, 14*, 753-781.
- Narayan, K. M., Boyle, J. P., Geiss, L. S., Saaddine, J. B., & Thompson, T. J. (2006). Impact of recent increase in incidence on future diabetes burden: U.S., 2005-2050. *Diabetes Care, 29*, 2114-2116.
- Narr-King, S., Podolski, C.-L., Frey, M. A., Templin, T. (2006). Social ecological model of illness management in high-risk youths with type 1 diabetes. *Journal of Counseling and Clinical Psychology, 74*, 785-789.

- National Cancer Institute. (2010). Depression (PDQ ®). Retrieved September 14, 2010, from <http://www.cancer.gov/cancertopics/pdq/supportivecare/depression/Patient/page2>
- National Diabetes Information Clearinghouse (2008). *Diagnosis of diabetes*. Bethesda, MD: National Institutes of Health, U.S. Department of Health and Human Services.
- National Diabetes Information Clearinghouse (2011). *National Diabetes Statistics*. Bethesda, MD: National Institutes of Health, U.S. Department of Health and Human Services.
- Nicklett, E. J., & Liang, J. (2010). Diabetes-related support, regimen adherence, and health decline among older adults. *Journal of Gerontology: Social Sciences*, 65, 390-399.
- Norris, F. H., & Kaniasty, K. (1996). Received and perceived social support in times of stress: A test of the social support deterioration deterrence model. *Journal of Personality and Social Psychology*, 71, 498-511.
- Norris, S. L., Engelgau, M. M., & Narayan, K. M. V. (2001). Effectiveness of self-management training in type 2 diabetes. A systematic review of randomized controlled trials. *Diabetes Care*, 24, 561-587.
- Norris, S. L., Lau, J., Smith, J., Shmid, C. H., & Engelgau, M. M. (2002). Self-management education for adults with type 2 diabetes. A meta-analysis of the effect on glycemic control. *Diabetes Care*, 25, 1159-1171.

- Osborn, C. Y., Kozak, C., & Wagner, J. (2010). Theory in practice: Helping providers address depression in diabetes care. *Journal of Continuing Education in the Health Professions, 30*, 172-179.
- Palmer, D. L., Berg, C. A., Butler, J., Fortenberry, K., Murray, M., Lindsay, R., Donaldson, D., Swinyard, M., Foster, C., & Wiebe, D. J. (2009). Mothers', fathers', and children's perceptions of parental diabetes responsibility in adolescence: Examining the roles of age, pubertal status, and efficacy. *Journal of Pediatric Psychology, 34*, 195-204.
- Paterson, B. L., Russell, C., & Thorne, S. (2001). Critical analysis of everyday self-care decision making in chronic illness. *Journal of Advanced Nursing, 35*, 335-341.
- Pearlin, L. I., & Schooler, C. T. (1978). The structure of coping. *Journal of Health and Social Behavior, 19*, 2-21.
- Peyrot, M., & Rubin, R. R. (1997). Levels and risks of depression and anxiety symptomatology among diabetic adults. *Diabetes Care, 20*, 585-590.
- Phelps, K. W., Howell, C. D., Hill, S. G., Seemann, T. S., Lamson, A. L., Hogson, J. L., & Smith, D. A. (2009). A collaborative care model for patients with type 2 diabetes. *Families, Systems, & Health, 2*, 131-140.
- Piette, J. D., Richardson, C., & Valenstein, M. (2004). Addressing the needs of patients with multiple chronic illnesses: The case of diabetes and depression. *The American Journal of Managed Care, 10*, 152-162.

- Polonsky, W. H., Anderson, B. J., Lohrer, P. A., Welch, G., Jacobson, A. M., Aponte, J. E., & Schwartz, C. E. (1995). Assessment of diabetes-related distress. *Diabetes Care, 18*, 754–760.
- Pouwer, F., & Snoek, F. J. (2001). Association between symptoms of depression and glycaemic control may be unstable across gender. *Diabetic Medicine: A Journal of the British Diabetic Association, 18*, 595-598.
- Preacher, K. J. & Hayes, A. F. (2004). SPSS and SAS procedures for estimating indirect effects in simple mediation models. *Behavior Research Methods, Instruments, and Computers, 36*, 717-731.
- Reifsnider, E., Gallagher, M., & Forgione, B. (2005). Using ecological models in research on health disparities. *Journal of Professional Nursing, 21*, 216-222.
- Recklitis, C. J., Parsons, S. K., Shih, M.-C., Mertens, A., Robison, L. L., & Zeltzer, L. (2006). Factor structure of the Brief Symptom Inventory-18 in adult survivors of childhood cancer: Results from the Childhood Cancer Survivor Study. *Psychological Assessment, 18*, 22-32.
- Rosland, A.-M., Kieffer, E., Israel, B., Cofield, M., Palmisano, G., Sinco, B., Spencer, M., & Heisler, M. (2008). When is social support important? The association of family support and professional support with specific diabetes self-management behaviors. *Journal of General Internal Medicine, 23*, 1992-1999.
- Rubin, R. R., & Peyrot, M. (2001). Psychological issues and treatments for people with diabetes. *Journal of Clinical Psychology, 57*, 457-478.

- Rush, A. J., Trivedi, M. H., Ibrahim, H. M., Carmody, T. J., Arnow, B., Klein, D. N., Markowitz, J. C., Ninan, P. T., Kornstein, S., Manber, R., Thase, M. E., Kocsis, J. H., & Keller, M. B. (2003). The 16-Item Quick Inventory of Depressive Symptomatology (QIDS), clinician rating (QIDS-C), and self-report (QIDS-SR): a psychometric evaluation in patients with chronic major depression. *Biological Psychiatry*, *54*, 573-583.
- Russell, D., Cutrona, C. E., Rose, J., & Yurko, K.. (1984). Social and emotional loneliness: An examination of Weiss's typology of loneliness. *Journal of Personality and Social Psychology*, *46*, 1313-1321.
- Ryan, J., Anderson, B. A., Freedland, K., Clouse, R., & Lustman, P. (2001). The prevalence of comorbid depression in adults with diabetes. *Diabetes Care*, *24*, 1069-1078.
- Sacco, W. P. (1999). A social-cognitive model of interpersonal processes in depression. In T. E. Joiner & J. C. Coyne (Eds.), *The Interactional Nature of Depression: Advances in Interpersonal Approaches*. Washington, DC: American Psychological Association.
- Sacco, W. P., & Beck, A. T. . (1995). Cognitive theory and therapy. In E. E. Beckham & R. L. William (Eds.), *Handbook of depression: Treatment, assessment and research* (2<sup>nd</sup> ed.). New York, NY: Guilford Press.
- Sacco, W. P., & Vaughan, C. A. (2006). Depression and the response of others: A social-cognitive interpersonal process model. In T. E. Joiner, J. S. Brown, & J. Kistner (Eds.), *The interpersonal, cognitive, and social nature of depression*. Mahway, NJ: Lawrence Erlbaum Associates.

- Sacco, W. P., & Yanover, T. (2006). Diabetes and depression: The role of social support and medical symptoms *Journal of Behavioral Medicine, 29*, 523-531.
- Saydah, S. H., Fradkin, J., & Cowie, C. C. (2004). Poor control of risk factors for vascular disease among adults with previously diagnosed diabetes. *The Journal of the American Medical Association, 291*, 335-342.
- Saydah, S. H., Eberhardt, M. S., & Narayan, K. M. (2007). Race and ethnic differences in glycemic control among adults with diagnosed diabetes in the United States. *Ethnicity & Disease, 17*, 529-535.
- Schlenger, W. E., Caddell, J. M., Ebert, L., Jordan, B. K., Rourke, K. M., Wilson, D., Thalji, L., Dennis, J. M., Fairbank, J. A., & Kulka, R. A. (2002). Psychological reactions to terrorist attacks: Findings from the national study of Americans' reactions to September 11. *The Journal of the American Medical Association, 288*, 581-588.
- Schneider, S., Iannotti, R. J., Nansel, T. R., Haynie, D. L., Sobel, D. O., & Simons-Morton, B. (2009). Assessment of an illness-specific dimension of self esteem in youths with type 1 diabetes. *Journal of Pediatric Psychology, 34*, 283-293.
- Sclar, D. A., Robinson, L. M., Skaer, T. L., & Galin, R. S. (1998). Trends in the prescribing of antidepressant pharmacotherapy: Office-based visits, 1990-1995. *Clinical Therapeutics, 20*, 871-884.
- Senecal, C., Nouwen, A., & White, D. (2000). Motivation and dietary self-care in adults with diabetes: Are self-efficacy and autonomous self-regulation complementary or competing constructs? *Health Psychology, 19*, 452-457.

- Sheldon, K., Williams, G., & Joiner, T. (2003). *Motivating physical and mental health: Applying self-determination theory in the clinic*. New Haven, CT: Yale University Press.
- Siegel, S., & Castellan, N.J. (1988). *Nonparametric statistics for the behavioral sciences* (2<sup>nd</sup> Ed.). New York, NY: McGraw-Hill.
- Silverstein, J., Klingensmith, G., Copeland, K., Plotnick, L., Kaufman, F., Laffel, L., Deeb, L., Grey, M., Anderson, B., Holzmeister, L. A., & Clark, N. (2005). Care of children and adolescents with type 1 diabetes: A statement of the American Diabetes Association. *Diabetes Care*, 28, 186-212.
- Skinner, B. F. (1953). *Science and human behavior*. New York, NY: Macmillan.
- Skinner, T. C., John, M., & Hampson, S. E. (2000). Social support and personal models of diabetes as predictors of self-care and well-being: A longitudinal study of adolescents with diabetes. *Journal of Pediatric Psychology*, 25, 257-267.
- Snoek, F. J., & Skinner, T. C. (2001). Psychological counselling in problematic diabetes: does it help? *Diabetic Medicine*, 19, 265-273.
- Song, M. (2010). Diabetes mellitus and the importance of self-care. *Journal of Cardiovascular Nursing*, 25, 93-98.
- Song, S. H. (2008). Early-onset type 2 diabetes mellitus: A condition with elevated cardiovascular risk? *British Journal of Diabetes and Vascular Disease*, 8, 61-65.

- Sousa, V. D., Zauszniewski, J. A., Musil, C. M., Price, L. P. J., & Davis, S. A. . (2005). Relationships among self-care agency, self-efficacy, selfcare, and glycemic control. *Research and Theory for Nursing Practice, 19*, 217-230.
- Southwick, S. M., Vythilingam, M., & Charney, D. S. (2005). The psychobiology of depression and resilience to stress: Implications for prevention and treatment. *Annual Review of Clinical Psychology, 1*, 255-291.
- Speight, J., Reaney, M. D., & Barnard, K. D. 2009. Not all roads lead to Rome—A review of quality of life measurement in adults with diabetes. *Diabetic Medicine, 26*, 315-327.
- Stevens, J. (1992). *Applied multivariate statistics for the social sciences* (2<sup>nd</sup> ed.). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Stice, E., Ragan, J., & Randall, P. (2004). Prospective relations between social support and depression: Differential direction of effects for parent and peer support? *Journal of Abnormal Psychology, 113*, 155-159.
- Talbot, F., & Nouwen, A. (2000). A review of the relationship between depression and diabetes in adults: Is there a link? *Diabetes Care, 23*, 1556–1562.
- Talbot, F., Nouwen, A., Gingras, J., Bélanger, A., & Audet, J. (1999). Relations of diabetes intrusiveness and personal control to symptoms of depression among adults with diabetes. *Health Psychology, 18*, 537-542.
- Tennen, H., Affleck, G., Allen, D. A., McGrade, B. J., & Ratzan, S. (1984). Causal attributions and coping with insulin-dependent diabetes. *Basic and Applied Social Psychology, 5*, 131-142.

- The United Kingdom Prospective Diabetes Study Research Group (1998). Effect of intensive blood-glucose control with metformin on complications in overweight patients with type 2 diabetes. *Lancet*, *352*, 854-865.
- U.S. Census Bureau (2011). Massachusetts QuickFacts from the U.S. Census Bureau Retrieved March 4, 2011, from <http://quickfacts.census.gov/qfd/states/25000.html>
- Van den Akker, M., Schuurman, A., Metsemakers, J., & Buntinx, F. (2004). Is depression related to subsequent diabetes mellitus? *Acta Psychiatrica Scandinavica*, *110*, 178-183.
- Von Korff, M., Gruman, J., Schaefer, J., Curry, S., & Wagner, E. (1997). Collaborative management of chronic illness. *Annals of Internal Medicine*, *127*, 1097-1102.
- Vesco, A. T., Anderson, B. J., Laffel, L., Dolan, L. M., Ingerski, L. M., & Hood, K. K. (2010). Responsibility sharing between adolescents with type 1 diabetes and their caregivers: Importance of adolescent perceptions on diabetes management and control. *Journal of Pediatric Psychology*, Advance Access published online May 5, 2010 doi: 10.1093/jpepsy/jsq038.
- Wagner, E. H., Austin, B. T., & Von Korff, M. (1996). Organizing care for patients with chronic illness. *The Millbank Quarterly*, *74*, 511-544.
- Weber, S., Puskar, K. R., & Ren, D. (2010). Relationships between depressive symptoms and perceived social support, self-esteem, & optimism in a sample of rural adolescents. *Issues in Mental Health Nursing*, *31*, 584-588.

- Weinger, K., & Jacobson, A. M. (2001). Psychosocial and quality of life correlates of glycemic control during intensive treatment of type 1 diabetes. *Patient Education and Counseling, 42*, 123-131.
- Weinger, K., Beverley, E. A., Lee, Y., Sitnikov, L., Ganda, O. P., & Caballero, A. E. (2011). The effect of a structured behavioral intervention on poorly controlled diabetes: A randomized controlled trial. *Archives of Internal Medicine, in press*. Retrieved from doi:10.1001/archinternmed.2011.502
- Weinger, K., Butler, H. A., Welch, G. W., & La Greca, A. M. (2005). Measuring diabetes self-care: A psychometric analysis of the Self-Care Inventory-Revised with adults. *Diabetes Care, 28*, 1346–1352.
- Weinger, K., McMurrich, S. J., Yi, J. P., Lin, S., & Rodriguez, M. (2005). Psychological characteristics of frequent short-notice cancellers of diabetes medical and education appointments. *Diabetes Care, 28*, 1791-1793.
- Weiss, R. S. (1974). The provisions of social relationships. In Z. Rubin (Ed.), *Doing unto others*. Englewood Cliffs, N.J.: Prentice-Hall.
- Welch, G. W., Jacobson, A. M., & Polonsky, W. H. (1997). The Problem Areas in Diabetes Scale: An evaluation of its clinical utility. *Diabetes Care, 20*, 760 – 766.
- Welch, G., Weinger, K., Anderson, B., & Polonsky, W. H. (2003). Responsiveness of the Problem Areas In Diabetes (PAID) questionnaire. *Diabetic Medicine, 20*, 69-72.

- Wilkinson, A., & Whitehead, L. (2009). Evolution of the concept of self-care and implications for nurses: A literature review. *International Journal of Nursing Studies, 46*, 1143-1147.
- Williams, G. C., Cox, E. M., Kouides, R., & Deci, E. L. (1999). Presenting the facts about smoking to adolescents: The effects of an autonomy supportive style. *Archives of Pediatrics & Adolescent Medicine, 153*, 959-964.
- Williams, G. C., & Deci, E. L. (1996). Internalization of biopsychosocial values by medical students: A test of self-determination theory. *Journal of Personality and Social Psychology, 70*, 767-779.
- Williams, G. C., Freedman, Z. R., & Deci, E. L. (1998). Supporting autonomy to motivate glucose control in patients with diabetes. *Diabetes Care, 21*, 1644-1651.
- Williams, G. C., Grow, V. M., Freedman, Z., Ryan, R. M., & Deci, E. L. (1996). Motivational predictors of weight loss and weight-loss maintenance. *Journal of Personality and Social Psychology, 70*, 115-126.
- Williams, G. C., McGregor, H. A., Zeldman, A., Freedman, Z. R., & Deci, E. L. (2004). Testing a self-determination theory process model for promoting glycemic control through diabetes self-management. *Health Psychology, 23*, 58-66.
- Williams, G. C., Ryan, R. M., Rodin, G. C., Grolnick, W. S., & Deci, E. L. (1998). Autonomous regulation and long-term medication adherence in adult outpatients. *Health Psychology, 17*, 269-276.

- World Health Organization (2003). *Obesity and overweight. Global strategy on diet, physical activity, and health*. Retrieved from [http://www.who.int/dietphysicalactivity/media/en/gsfes\\_obesity.pdf](http://www.who.int/dietphysicalactivity/media/en/gsfes_obesity.pdf)
- World Health Organization (2009). *Preventing chronic diseases: A vital investment. Diabetes programme*. Retrieved from <http://www.who.int/diabetes/en/>
- Wysocki, T., Iannotti, R., Weissberg-Benchell, J., Laffel, L., Hood, K., Anderson, B., & Chen, R. (2008). Diabetes problem solving by youths with type 1 diabetes and their caregivers: Measurement, validation, and longitudinal associations with glycemic control. *Journal of Pediatric Psychology, 33*, 875-884.
- Wysocki, T., Taylor, A., Hough, B. S., Linscheid, T. S., Yeates, K. O., & Naglieri, J. A. (1996). Deviation from developmentally appropriate self-care autonomy. Association with diabetes outcomes. *Diabetes Care, 19*, 119-125.
- Yang, X.-J., Kow, L.-M., Pfaff, D. W., & Mobbs, C. V. (2004). Metabolic pathways that mediate inhibition of hypothalamic neurons by glucose. *Diabetes, 53*, 67-73.
- Yi, J. P., Vitaliano, P. P., Smith, R. E., Yi, J. C., & Weinger, K. (2008). The role of resilience on psychological adjustment and physical health in patients with diabetes. *British Journal of Health Psychology, 13*, 311-325.
- Zabora, J., Jacobson, P., Piantadosi, S., & Owens, A. (2001). A new psychosocial screening instrument for use with cancer patients. *Psychosomatics, 42*, 241-246.

## APPENDIX A

## Demographic Questionnaire

1. **Marital Status?** single married separated divorced widowed  
 1 2 3 4 5

**Gender:** M F

2. **Occupation:** \_\_\_\_\_

3. **Circle the last year of school completed:**

Grade School	High School	College
Graduate/Professional		
1 2 3 4 5 6 7 8	9 10 11 12	1 2 3 4

4. **How many people do you live with *not including you*?** \_\_\_\_\_

*If 1 or more, who?* \_\_\_\_\_

5. **In the past 2 weeks, how many times *per day* have you been checking your blood sugar?** \_\_\_\_\_

6. **How many times in the past year did you see a(n):**

- a. **primary care doctor** \_\_\_\_\_
- b. **diabetes doctor** (*if different from a.*) \_\_\_\_\_
- c. **eye doctor** \_\_\_\_\_
- d. **dietician** \_\_\_\_\_
- e. **diabetes educator** \_\_\_\_\_
- f. **other** \_\_\_\_\_

7. **Have you ever been diagnosed with any complications of diabetes?**

- no       yes

*If yes, what have you been diagnosed with?* \_\_\_\_\_

8. **What diabetes medications/type of insulin do you take?** \_\_\_\_\_

9. **Are you taking any non-diabetes medications?**  no  yes

*If yes, what?* \_\_\_\_\_

*Are any of these for cholesterol?*  yes

*For blood pressure?*  yes

10. **How many times in the past year have you been:**

- a. **Hospitalized** \_\_\_\_\_
- b. **To the emergency room** \_\_\_\_\_

***If hospitalized or been to the emergency room, what were the surrounding circumstances?*** \_\_\_\_\_

**11. Do you have an exercise program, belong to a gym, or participate in a weight loss program?**

no                       yes

***If yes, specify:*** \_\_\_\_\_

**12. Is coping with diabetes a problem for you?**                       no                       yes

**13. Are you an organized person?**     no                       yes

**14. Are your closets neat and organized?**                                       no                       yes

**15. Do you do a good job managing your time?**                                       no                       yes

**16. Do you *fully* understand your treatment plan recommendations for:**

no    yes

—    —

**glucose monitoring**

—    —

**exercise**

—    —

**medication**

—    —

**meal plan**

—    —

**medical appointments**

**treating lows**

The following questions are not about what you actually do, but what your treatment plan recommends you do.

**17. How many times per day does your treatment plan recommend checking your blood sugar?**

\_\_\_\_\_  I don't know                       no recommendation given

**18. How many times a week does your treatment plan recommend you exercise?**

\_\_\_\_\_  I don't know                       no recommendation given

**19. What type of exercise does your treatment plan recommend?**

\_\_\_\_\_  I don't know                       no recommendation given

**20. How long does your treatment plan recommend you exercise at each session?**

\_\_\_\_\_  I don't know                       no recommendation given

21. **How often does your treatment plan recommend you check your feet?**

\_\_\_\_\_  I don't know       no recommendation given

22. **At what blood sugar level does your treatment plan recommend you treat a low blood sugar?**

\_\_\_\_\_  I don't know       no recommendation given

23. **How many times per year were you advised to attend medical appointments with a doctor or nurse practitioner?**

\_\_\_\_\_  I don't know       no recommendation given

24. **How many times per year were you advised to attend medical appointments with a diabetes nurse educator?**

\_\_\_\_\_  I don't know       no recommendation given

25. **How many times per year were you advised to attend medical appointments with a dietician?**

\_\_\_\_\_  I don't know       no recommendation given

26. **How many times per year were you advised to attend medical appointments with an eye doctor?**

\_\_\_\_\_  I don't know       no recommendation given

## APPENDIX B

### Social Provisions Scale

**INSTRUCTIONS:** In answering the following questions, think about your current relationships with friends, family members, co-workers, community members, and so on. Please indicate to what extent each statement describes your current relationships with other people. Use the following scale to indicate your opinion. So, for example if you feel a statement is very true of your current relationships, you would respond with a 4 (strongly agree). If you feel a statement clearly does not describe your relationships, you would respond with a 1 (strongly disagree).

	Strongly Disagree	Disagree	Agree	Strongly Agree
1. There are people I can depend on to help me if I really need it.	1	2	3	4
2. I feel that I do not have close personal relationships with other people.	1	2	3	4
3. There is no one I can turn to for guidance in times of stress.	1	2	3	4
4. There are people who depend on me for help.	1	2	3	4
5. There are people who enjoy the same social activities I do.	1	2	3	4
6. Other people do not view me as competent.	1	2	3	4
7. I feel personally responsible for the well-being of another person.	1	2	3	4
8. I feel part of a group of people who share my attitudes and beliefs.	1	2	3	4
9. I do not think other people respect my skills and abilities.	1	2	3	4
10. If something went wrong, no one would come to my assistance.	1	2	3	4
11. I have close relationships that provide me with a sense of emotional security and well-being.	1	2	3	4
12. There is someone I could talk to about important decisions in my life.	1	2	3	4

<b>13. I have relationships where my competence and skill are recognized.</b>	1	2	3	4
<b>14. There is no one who shares my interests and concerns.</b>	1	2	3	4
<b>15. There is no one who really relies on me for their well-being.</b>	1	2	3	4
<b>16. There is a trustworthy person I could turn to for advice if I were having problems.</b>	1	2	3	4
<b>17. I feel a strong emotional bond with at least one other person.</b>	1	2	3	4
<b>18. There is no one I can depend on for aid if I really need it.</b>	1	2	3	4
<b>19. There is no one I feel comfortable talking about problems with.</b>	1	2	3	4
<b>20. There are people who admire my talents and abilities.</b>	1	2	3	4
<b>21. I lack a feeling of intimacy with another person.</b>	1	2	3	4
<b>22. There is no one who likes to do the things I do.</b>	1	2	3	4
<b>23. There are people who I can count on in an emergency.</b>	1	2	3	4
<b>24. No one needs me to care for them.</b>	1	2	3	4

## APPENDIX C

## Self-Care Inventory – Revised

**INSTRUCTIONS:** This survey measures what you *actually do*, not what you are advised to do. How have you followed your diabetes treatment plan in the past 1-2 months?

	Never	Rarely	Sometimes	Usually	Always	
1. Check blood glucose with meter	1	2	3	4	5	
2. Look at blood glucose patterns	1	2	3	4	5	
3. Check blood glucose more often when sick	1	2	3	4	5	
4. If type 1: Check ketones when glucose level is high	1	2	3	4	5	Have T2DM
5. Take the correct dose of diabetes pills or insulin	1	2	3	4	5	
6. Take diabetes pills or insulin at the right time	1	2	3	4	5	
7. If on insulin: Adjust dosage based on blood glucose results, food and activity	1	2	3	4	5	Not on insulin
8. Follow meal plan	1	2	3	4	5	
9. Eat the correct serving sizes	1	2	3	4	5	
10. Eat heart healthy foods	1	2	3	4	5	
11. Read food labels	1	2	3	4	5	
12. Take brisk walks daily	1	2	3	4	5	

<b>13. Check feet daily</b>	1	2	3	4	5	
<b>14. Treat low blood glucose with just the recommended amount of carbohydrate</b>	1	2	3	4	5	<b>Never had low blood glucose</b>
<b>15. Carry quick acting sugar to treat low blood glucose</b>	1	2	3	4	5	
<b>16. Exercise regularly</b>	1	2	3	4	5	
<b>17. Wear a Medic Alert ID</b>	1	2	3	4	5	
<b>18. Come in for clinic appointments</b>	1	2	3	4	5	
<b>19. Know my blood pressure, A1C and lipid (HDL, LDL) lab results</b>	1	2	3	4	5	

## APPENDIX D

### Brief Symptom Inventory – 18

**INSTRUCTIONS:** Below is a list of problems that people sometimes have. Read each one carefully and circle the one that best describes HOW MUCH THAT PROBLEM HAS DISTRESSED OR BOTHERED YOU DURING THE PAST 7 DAYS INCLUDING TODAY.

HOW MUCH WERE YOU DISTRESSED BY:	Not at all	A little bit	Moderately	Quite a bit	Extremely
1. Faintness or dizziness	0	1	2	3	4
2. Feeling no interest in things	0	1	2	3	4
3. Nervousness or shakiness inside	0	1	2	3	4
4. Pains in heart or chest	0	1	2	3	4
5. Feeling lonely	0	1	2	3	4
6. Feeling tense or keyed up	0	1	2	3	4
7. Nausea or upset stomach	0	1	2	3	4
8. Feeling blue	0	1	2	3	4
9. Suddenly scared for no reason	0	1	2	3	4
10. Trouble getting your breath	0	1	2	3	4
11. Feelings of worthlessness	0	1	2	3	4
12. Spells of terror or panic	0	1	2	3	4
13. Numbness or tingling in parts of your body	0	1	2	3	4
14. Feeling hopeless about the future	0	1	2	3	4
15. Feeling so restless you couldn't sit still	0	1	2	3	4
16. Feeling weak in parts of your body	0	1	2	3	4

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<b>17. Thoughts of ending your life</b>	0	1	2	3	4
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<b>18. Feeling fearful</b>	0	1	2	3	4
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## APPENDIX E

### Problem Areas in Diabetes

**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.

	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 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

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<b>16. Feeling that diabetes is taking up too much of your mental and physical energy every day?</b>	0	1	2	3	4
<b>17. Feeling alone with your diabetes?</b>	0	1	2	3	4
<b>18. Feeling that your friends and family are not supportive of your diabetes management efforts?</b>	0	1	2	3	4
<b>19. Coping with complications of diabetes?</b>	0	1	2	3	4
<b>20. Feeling “burned out” by the constant effort needed to manage diabetes?</b>	0	1	2	3	4

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