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The Impact of Illness Perception, Diabetes Management Self-Efficacy, and Emotional Distress on Type 2 Diabetes Self-Management among Americans with Chinese Backgrounds

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The Impact of Illness Perception, Diabetes Management Self-Efficacy, and Emotional Distress on Type 2 Diabetes Self-Management among Americans with Chinese Backgrounds

by

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Dedication

In dedication to my family for their love, understanding, and unlimited support, to my teachers, mentors, and friends for their helps and encouragements, as well as to all patients with diabetes who could benefit from improved self-management.

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Abstract

The Impact of Illness Perception, Diabetes Management Self-Efficacy, and Emotional Distress on Type 2 Diabetes Self-Management among Americans with Chinese Backgrounds

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This descriptive correlational study explored the relationships of diabetes illness perception (consequences, personal control, treatment control, and cause), emotional distress (diabetes distress and depressive symptoms), and diabetes management self-efficacy with diabetes self-management activities; the mediator effects of diabetes management self-efficacy on the relationship between diabetes illness perception (consequences, personal control, treatment control, and cause) and self-management activities; and the moderator effects of emotional distress (diabetes distress and depressive symptoms) on the relationship between diabetes illness perception and self-management activities among Americans with Chinese backgrounds.

The conceptual framework was based on an adaptation of Leventhal's Common-Sense Model of self-regulation. A hundred and fifty-three survey participants with Type 2 diabetes were recruited from Chinese speaking communities in three major metropolitan areas in Texas. Participants average age was 69.1 years old, female (52.3%), and had at

least a high school education. Their average acculturation score was 14.82 ± 7.66 (relatively low). The average number of comorbidities was 1.30 ± 1.27; participants were diagnosed with T2DM for an average of 13.43 ± 10.20 years; 14.4% were prescribed insulin. A mean item score for diabetes self-management self-efficacy was 7.4 out of 10. Diabetes distress mean score was 2.36, indicating a moderate level of distress. The average score of depressive symptoms was 11.25, and 24.8% of the participants met the clinical definition of depression. Participants performed diabetes management activities about 4.3 days out of the preceding 7 days.

The significant bivariate correlations among variables included older age, longer years of diabetes, insulin usage, lower acculturation level; and participants with higher self-efficacy were more likely to report having better self-management activities. Neither illness perceptions nor emotional distress were found to be significant predictors of diabetes self-management in hierarchical multiple models. However, age, duration of diabetes, and self-efficacy were shown to significantly predict self-management. Self-efficacy also significantly mediated the relationship between illness perceptions and self-management activities; and the relationship between emotional distress and self-management activities. These findings contribute to our understanding of the factors that facilitate patients of Chinese American backgrounds to perform self-management activities on a daily basis.

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CHAPTER ONE: INTRODUCTION

In the United States, diabetes has become one of the most common chronic diseases, affecting about 30.3 million Americans (American Diabetes Association [ADA], 2018a). It is the seventh-leading cause of death, accounting for an estimated 252,806 deaths in 2016 (Centers for Diabetes Control and Prevention [CDC], 2018). There is growing global attention focused on diabetes prevalence, the complications that result from diabetes, and diabetes-related costs to individuals and societies. The rapidly-increasing incidence rate indicates the dire need to help patients manage their disease (World Health Organization [WHO], 2016).

The prevalence of diabetes in Asian Americans from 2000 to 2014 steadily increased by approximately 67% (from 3.4% to 5.7%) compared to 41% for Whites and 29% for Blacks (CDC, 2015). The age-adjusted prevalence of diagnosed diabetes in Asian Americans is 8.1%, which is about 1.1 times higher than for non-Hispanic Whites (National Diabetes Statistics Report, 2017).

Asian Americans are a minority group of particular significance because in the past decade the number of Asian Americans grew by 43.3%, greatly outpacing the national growth rate of 9.7% (United States Bureau of the Census, 2012a). The Asian American demographic group is comprised of several exceedingly heterogeneous and diverse racial, ethnic, and national populations. Chinese Americans make up the largest and fastest-growing Asian immigrant group with around 2.2 million foreign-born Chinese in the U.S. (United States Bureau of the Census, 2012b). For the purposes of this study, we define "Chinese Americans" as individuals with Chinese backgrounds who hail from different originating countries.

Chinese Americans exhibit fundamental differences in their values from other Asian American groups. For instance, three central ancient philosophies, Buddhism,

Confucianism, and Holism, profoundly influence Chinese Americans' norms of daily life, social relationships, and health care beliefs (Tseng, Halperin, Ritholz, & Hsu, 2013). Chinese Americans are a fairly diverse subgroup having immigrated to the U.S. from mainland China, Hong Kong, Macau, Singapore, Malaysia, Taiwan, and other places where large populations of the Chinese diaspora live (e.g., Vietnamese Chinese). These groups of people inherited the central philosophies and culture of Chinese society that differentiate them from other Asian American subgroups, but they speak different dialects and write various forms of Chinese characters, and they could have disparate health care beliefs and experiences.

Chinese typically value harmony, respect, self-control, Yin-Yang and cold-hot balance, interdependency, collectivism, and community, all of which are integrated into their daily lives as norms. They attempt to balance individual and group aspirations and health-seeking behaviors (Tseng et al., 2013). For example, symptoms of diabetes (e.g., thirst, hunger, and excessive urination) can be associated with a deficiency in Yin, or "coldness." Because of this, traditional Chinese treatments for diabetes (e.g., herbal medicine, diet therapy, acupuncture, Chi-gong, or Chinese massages) focus on balancing or correcting the Yin deficiency by prescribing "cold" therapies such as eating watermelon, a Yin food (Covington, 2001). Because Chinese Americans are motivated by different philosophies, possess diverse backgrounds, and practice different health behaviors compared to other Asian Americans, it is necessary to explore their perceptions and practices that could impact their diabetes self-management outcomes.

Patients with diabetes are encouraged and empowered to perform daily self-management activities to attain healthy glucose levels and to minimize or delay the onset of diabetes-related complications and co-morbidities (ADA, 2018b; Funnell & Robert, 2004; Haas et al., 2012). To engage in self-management, individuals work with their

families within their communities, and with healthcare professionals "to manage [their] symptoms, treatments, lifestyle changes, and psychosocial, cultural, and spiritual consequences of health conditions" (Richard & Shea, 2011, p. 261). Cultural beliefs, family dynamics, acculturation experiences, and socioeconomic status shape self-management behaviors and attitudes (Flores, 2006; Tseng et al., 2013). Thus, the immigrant population's disease management attitudes are likely to differ from attitudes held by most people in the mainstream American public.

Self-efficacy, "a person's beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments" (Bandura, 1997 p. 3), has been shown to be a strong predictor of patients' self-management activities (Walker, Smalls, Hernanade-Tejada, Campbell, & Egede, 2014). Higher self-efficacy, or stronger beliefs about one's own abilities to manage diabetes, is associated with more effective self-management behaviors (King, Glasgow, & Toobert, 2010; Sharoni & Wu, 2012), better medication adherence, and better glycemic control (Gonzalez, Shreck, Psaros, & Safren, 2015).

In addition, the quality of self-management activities is also strongly associated with one's internal sense of disease, referred to as an illness perception by the Common-Sense Model of Self-Regulation ([CSM]; Leventhal, Brissette, & Leventhal, 2003). Illness perceptions explain behaviors associated with many chronic conditions, including diabetes (Anagnostopoulos, & Spanea, 2005; Chen, Tsai, & Lee, 2008; Kim, & Evangelista, 2010; McSharry, Moss-Morris, & Kendrick, 2011; O'Donovan, Painter, Lowe, Robinson, & Broadbent, 2016). Particularly, perceptions about disease consequences, personal control, control of treatment, and disease causes have been found to be predictive of self-management in different ethnic groups including Caucasians, Hispanics, and Asians (Abubakari et al, 2011; Paschalides, Wearden, Dunkerley, & Bundy, 2004; Pereira, Pedras,

Machado, & Ferreira, 2016). Since Chinese cultures differ from those of mainstream Western culture, Chinese immigrants might hold different illness perceptions and those perceptions might have a different impact on their diabetes self-management outcomes.

Diabetes distress refers to a common, non-pathological negative emotional reaction (such as feeling overwhelmed, hopeless, and helpless) and perceived burden related to diabetes. Diabetes distress is another strong factor associated with psychological, behavioral, and social outcomes (Fisher, Glasgow, & Strycker, 2010). High diabetes distress is associated with impaired capacity for glycemic control (van Bastelaar KM, Pouwer F, & Geelhoed-Duijvestijn, 2010), worse quality of life (Schram, Baan, & Pouwer, 2009) for people with either type 1 diabetes (T1DM) or T2DM, and reduced medication adherence in a longitudinal study (Aikens, 2012).

Depressive symptoms are also related to worse diabetes outcomes and self-management activities among patients with diabetes. Individuals with T2DM have about a two-fold higher risk of developing depression than the general population (Egede, Zheng, & Simpson; 2002; Rotella & Mannucci, 2013). Depressive symptoms adversely affect self-management behaviors such as physical activity, diet control, and medication adherence (Katon & Ciechanowski, 2002), each of which results in worsening diabetes-related complications and quality of life (Carnethon et al, 2007).

Although depression disorders and diabetes distress are negative emotional states, depressive symptoms are different from diabetes distress in that depressive symptoms fall along a continuum of severity in which depression is a medical diagnosis at the extreme end. Depressive symptoms may be influenced by diabetes and diabetes distress. Recent studies in diabetes distress and depression suggest that neither construct cannot be replaced by the other, and diabetes distress and depression are different and independent factors that

are related to diabetes self-care (Schmitt, Reimer, Kulzer, Haak, Gahr, & Hermanns, 2014; Snoek, Bremmer, & Hermanns, 2015)

Mental health problems such as depression and distress are commonly stigmatized by the general population, and even more so within the Chinese American community. This population regards negative emotional conditions as degrading for both the patient and the patient's entire family (Zeng, Sun, Gary, Li, & Liu, 2014). As a result, Chinese Americans with diabetes are likely to have depressive symptoms and distress that go undetected and untreated, which could adversely limit their abilities to perform effective self-management skills.

Diabetes illness perceptions, diabetes management self-efficacy, diabetes distress, and depressive symptoms might be keys to understanding how to manage diabetes and improve diabetes self-management among Chinese Americans. This study investigated the impact of diabetes illness perceptions, self-efficacy, diabetes distress, and depressive symptoms on diabetes self-management activities among Chinese Americans with T2DM.

Statement of the Problem

Diabetes and its complications are costly and affect a significant proportion of Chinese Americans. Thus, it is important to improve Chinese American patients' self-management quality, delay the onset of diabetes-related complications, and reduce the costs to the individual and health care systems. Patients' diabetes self-management behaviors depend on some degree on their illness perceptions, and the degree of diabetes distress and depressive symptoms (Katon & Ciechanowski, 2002; Leventhal et al., 2003). The extent of the relationships among patients' illness perceptions, diabetes management self-efficacy, diabetes distress, and depressive symptoms with their diabetes self-

management activities has not been explored in Chinese Americans who bring their unique culture and health beliefs to the U.S.

Purpose

Asian Americans are known to be at an increased risk of T2DM, even though they have a lower prevalence of obesity, an important precursor to T2DM, as compared to non-Hispanic Whites (Lee, Brancati, & Yeh, 2011; McNeely & Boyko, 2004). Socio-economic status, language barriers, acculturation level, cultural health beliefs, attitudes about Western healthcare, emotional status, and beliefs about their illnesses motivate self-management behaviors among Chinese American patients with diabetes. However, studies specifically assessing the impact of illness perception, diabetes management self-efficacy, diabetes distress, and depressive symptoms on T2DM self-management among Chinese immigrants in the U.S. are scant; and do not explore the combination of illness perception, diabetes management self-efficacy, diabetes distress, and depressive symptoms on T2DM self-management activities (Glanz, Rimer, & Viswanath, 2008; Sun, Tsoh, Saw, Chan, & Cheng, 2012; Tseng, et al., 2013; Wang, Chuang, & Bateman, 2012; Zeng et al., 2014). Hence, this study targets Chinese immigrants with T2DM in the U.S. to: (1) examine the relationships among diabetes illness perception, diabetes management self-efficacy, and diabetes distress, depressive symptoms with diabetes self-management activities; (2) assess the impact of diabetes illness perception factors, depressive symptoms, and diabetes distress on diabetes self-management activities beyond diabetes management self-efficacy and background factors; (3) explore the mediator effects of diabetes management self-efficacy on the relationship between diabetes illness perception and self-management activities; and 4) explore the mediator effect of diabetes management self-efficacy on the relationship between emotional distress and self-management behaviors.

This study addresses one of the goals of the Healthy People 2020 initiative, which strives to decrease the effect of diabetes and render increasing attention to disparities in health care regarding race and ethnicity (Office of Disease Prevention and Health Promotion, 2018). The findings of this study provide understanding of the relationship of illness perceptions, self-efficacy, diabetes distress, and depressive symptoms with diabetes self-management. This informs future studies and suggests culturally-tailored interventions that could be tested, all of which contribute to the improvement of health care strategies for Chinese Americans.

Research Questions

Specific research questions that were examined for this dissertation are:

1. What are the relationships among the independent variables of illness perceptions factors (consequences, personal control, treatment control, and cause), diabetes management self-efficacy, and emotional distress (diabetes distress and depressive symptoms) with the dependent variable of diabetes self-management activities among Chinese Americans with T2DM?
2. How do illness perception factors (consequences, personal control, treatment control, and cause), and emotional distress (diabetes distress and depressive symptoms) predict diabetes self-management activities after controlling for diabetes self-management efficacy and background factors?
3. Whether diabetes management self-efficacy mediate the effect of illness perception on self-management behaviors?
4. Whether diabetes management self-efficacy mediate the relationship between emotional distress and diabetes self-management behaviors?

Theoretical Framework

The study is guided by the Psychosocial Influences on Chinese Americans Diabetes Self-Management Activities framework that was inspired by the Common Sense Model (CSM) of Self-Regulation (Figure 1.1). According to Leventhal et al.'s CSM, people develop a view of their illness, called an illness perception, based on key factors such as the natural history of the disease and the individual's attitudes and beliefs about the disease's threat to their health (Leventhal & Cameron, 1987). Self-regulation is the systematic process individuals use to achieve physical and mental health within a changing environment. Self-regulation includes their conscious efforts to manage thoughts, emotions, and behaviors using information from their past experiences and new information to make decisions and take actions in response to threat of disease (Zeidenr, Boekaerts, & Pintrich, 2000). The CSM regards individuals as independent problem solvers who actively process and cope with their symptom experiences. Individuals try to make sense of potential or existing changes in somatic events and take actions to control those perceived changes (Cameron & Leventhal, 2003; Leventhal, Leventhal, & Cameron, 2001).

According to the CSM, a person creates both cognitive and emotional representations of their disease. In Leventhal et al.'s original model the parallel cognitive and emotional views of health threats have five dimensions: 1) symptoms and names (identity); 2) expected age of onset and duration of the disease, and whether it is an acute, chronic, or cyclical disease (timeline); 3) severity of symptoms and their impact on one's life (consequences); 4) beliefs about whether the disease causes a health threat (cause); and 5) determination of whether the disease is preventable, curable, or controllable (control). These dimensions influence patients' conscious and unconscious decisions to seek health care, adhere to treatment, and practice daily self-management skills (Leventhal et al., 2003). For example, not having symptoms or complications can lead to a perception that treatment

is not necessary, whereas having symptoms can lead to perceptions that the treatment is not working properly (Leventhal et al., 1987).

The framework for this study is based on the dimensions of illness perceptions and adds diabetes management self-efficacy, diabetes distress, and depressive symptoms because they have been demonstrated to be strong predictors of diabetes self-management activities (Katon & Ciechanowski, 2002; Walker, et al., 2014). Patients with T2DM have a chronic condition and could interpret diabetes differently because of their disease status (e.g., how well controlled, symptoms experienced), cultural background, and knowledge of diabetes. The Psychosocial Influences on Chinese Americans Diabetes Self-Management Activities framework, developed for this study, provides a guide to understanding Chinese immigrants' cognitive and emotional illness perceptions, diabetes management self-efficacy, emotional distress, and subsequent self-care activities.

Figure 1.1. Psychosocial Influences on Chinese Americans Diabetes Self-Management Activities

Background factors were controlled for (demographic information: age, gender, education, marital status**,** and income; Disease characteristics: length of diabetes, type of treatment, and chronic health condition), and acculturation

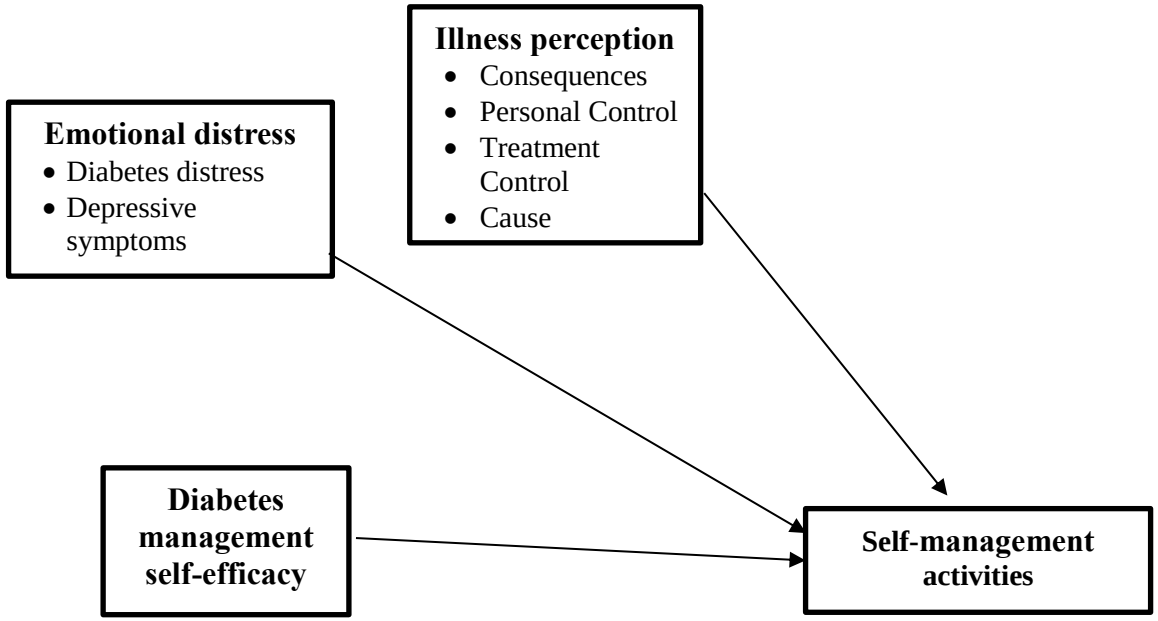
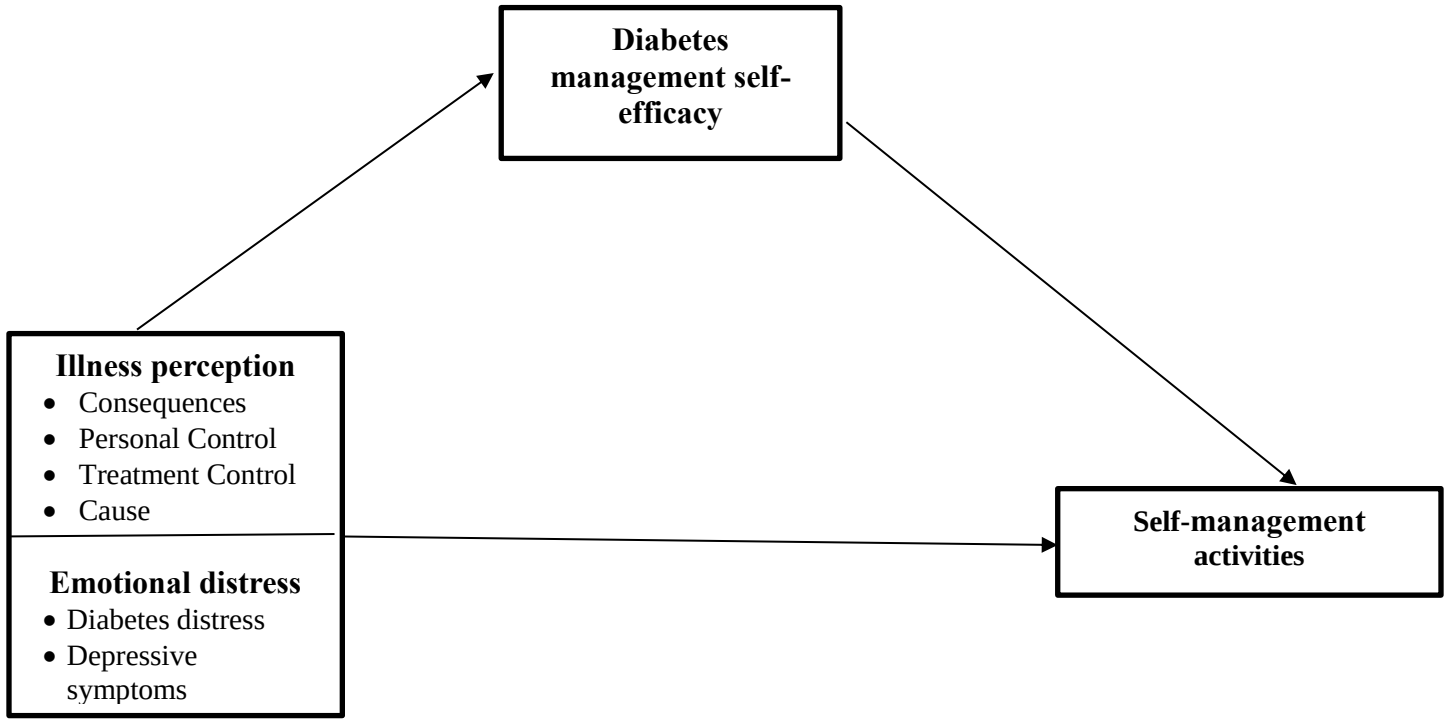


Figure 1.2. Mediation Mode of Diabetes Management Self-efficacy on the Relationships Between Illness Perception and Emotional Distress with Chinese Americans' Diabetes Self-Management Activities



The Psychosocial Influences on Chinese American' Diabetes Self-Management Activities framework in Figure 1.1 depicts the relationships among illness perception (consequences, personal control, treatment control, cause), diabetes management self-efficacy, emotional distress (diabetes distress and depressive symptoms), and diabetes self-management activities. The relationships among the concepts are explained below.

Illness Perceptions and Self-Management Activities

Figure 1.1 shows an arrow to represent the effect of illness perceptions as represented by the dimensions of Consequences, Personal Control, Treatment Control, and Causes (composed of four causal factors examined individually: Psychological, Balance, Risk Factors, and Behavior) on self-management activities. The correlations between these dimensions of illness perceptions and diabetes self-management activities are expected to be significant among Chinese Americans. For example, people who believe diabetes consequences will worsen are expected to have high scores on self-management behaviors because self-management behaviors would reduce long-term consequences. Relationships of personal control and treatment control with diabetes self-management behavior among Chinese Americans have not yet been explored in previous studies and were explored bi-directionally in this study. Figure 1.1 depicts that patients' diabetes self-management activities were expected to be influenced by illness perceptions.

Emotional Distress and Self-Management Activities

Emotional distress includes diabetes distress and depressive symptoms. Figure 1.1 shows an arrow to represent the effect of emotional distress on diabetes self-management activities. Those with higher emotional distress (either diabetes distress or depressive symptoms or both) are more likely to practice fewer diabetes self-management activities.

Diabetes Management Self-Efficacy and Self-Management Activities

Figure 1.1 shows an arrow to represent the effect of diabetes management self-efficacy on diabetes self-management activities. Those with higher level of self-efficacy are more likely to practice diabetes self-management activities.

Illness Perception and Diabetes Management Self-Efficacy

Figure 1.2 shows an arrow to represent the expected relationship between illness perception dimensions of Consequences, Personal Control, Treatment Control, and Causes (composed of four causal factors examined individually: Psychological, Balance, Risk Factors, and Behavior) and diabetes management self-efficacy. Participants' beliefs in severe diabetes consequence was expected to correlate with lower diabetes management self-efficacy; positive beliefs about personal control and treatment control were expected to correlate with higher diabetes management self-efficacy. The relationship of the four causal factors and the level of self-efficacy have not been explored in previous studies and were explored bi-directionally in this study.

Emotional Distress and Diabetes Management Self-Efficacy

Figure 1.2 shows an arrow to represent the relationship between emotional distress (diabetes distress and depressive symptoms) and diabetes management self-efficacy. Worse emotional distress was expected to correlate with lower diabetes management self-efficacy.

Diabetes Self-Efficacy on the Relationship between Illness Perception and Self-Management Activities

Figure 1.2 shows an arrow to represent the mediator effects of diabetes management self-efficacy on the relationship between each type of illness perception and frequency of self-management activities. Diabetes management self-efficacy was expected to reduce the

strength of the relationships between negative illness perceptions and diabetes self-management activities.

Diabetes Self-Efficacy on the Relationship between Emotional Distress and Self-Management Activities

Figure 1.2 shows an arrow to represent the mediator effect of diabetes management self-efficacy on the relationship between emotional distress and diabetes self-management activities. Diabetes management self-efficacy was expected to reduce the strength of the relationships between emotional distress and self-management activities.

Definitions

For the purposes of this study, the following definitions are used:

Chinese Americans

Conceptual definition: Chinese Americans include individuals whose original family can be traced back to Chinese-speaking countries (including Mandarin and other spoken languages such as Taiwanese, Cantonese, Taishanese, and Hakka), or any person who self-identifies as being of Chinese ancestry living in the United States.

Operational definition: Chinese American status was measured by the participants' self-report.

Background Factors

Background factors relating to participants' demographic data (age, gender, education, socioeconomic status, and marital status), disease characteristics (years of diabetes and type of treatment, other chronic health conditions), and immigrant information (length of stay in the U.S. and acculturation level).

Age

Conceptual definition: Age is the number of years since birth.

Operational definition: Participants were asked to self-report their date of birth, which was used to calculate age at data collection.

Gender

Conceptual definition: Gender is the male or female sex role.

Operational definition: Participants self-reported their gender.

Education

Conceptual definition: Education is the level of formal study completed.

Operational definition: Participants were asked how many years of formal education they completed or the highest degree attained.

Marital Status

Conceptual definition: A person's state of being single (never married), married, separated, divorced, widowed, or living with a significant other.

Operational definition: Participants self-reported their marital status.

Income

Conceptual definition: Income is the economic ability of the participants.

Operational definition: Participants were asked to categorize their family's pre-tax income and whether the income met their family's needs.

Year of Diabetes

Conceptual definition: Year of diabetes is the number of years since the patients have been told that they have diabetes.

Operational definition: Participants self-reported their age at which they were diagnosed with diabetes.

Type of Treatment

Conceptual definition: Type of treatment is the treatment for T2DM prescribed by a licensed physician, physician assistant, or advanced practice nurse (nurse practitioner or clinical nurse specialist).

Operational definition: Participants were asked if their diabetes is under treatment by oral medication, insulin injection, or other methods (participants specified the treatment).

Chronic Health Conditions

Conceptual definition: Chronic health conditions are "conditions that last a year or more and require ongoing medical attention and/or limit activities of daily living" (U.S. Department of Health & Human Services [HHS], 2010, p.2).

Operational definition: Participants were asked to report existing medical conditions other than diabetes, using a 9-item list of chronic diseases and conditions (hypertension, heart problem, cancer, arthritis) that was used in the Asian Americans Quality of Life survey in 2015 (Jang, 2016) using a yes/no response format.

Acculturation

Conceptual definition: "A process of cultural and psychological changes that involves various forms of mutual accommodation, leading to some longer-term psychological and sociocultural adaptations in individuals and groups" (Berry, 2005, p. 699).

Operational definition: Acculturation level was tested by a 12-item acculturation inventory.

Illness Perception

Conceptual definition: Illness perception refers to how patients perceive their symptoms, timeline, control, and cause of their diabetes.

Operational definition: English and Chinese language versions of the Chinese Illness Perception Questionnaire, modified from the Illness Perception Questionnaire Revised (IPQ-R), was used. IPQ-R was based on CSM.

Diabetes Management Self-Efficacy

Conceptual definition: "Self-efficacy is behavior specific and dynamic, in that it focuses on beliefs about personal abilities in a specific setting or regarding a particular behavior, such as dieting or exercise" (Resnick, 2003, p.3).

Operational definition: A Chinese language version of the Diabetes Management Self-Efficacy questionnaire was used.

Diabetes Distress

Conceptual definition: "The understandable sense of burden or defeat that may occasionally punctuate your life with diabetes" (Gebel, 2013).

Operational definition: A Chinese language version of the Diabetes Distress Scale (DDS) was used.

Depressive Symptoms

Conceptual definition: "The presence of sad, empty, or irritable mood, accompanied by somatic and cognitive changes that significantly affect the individual's capacity to function" (American Psychiatric Association, 2013, p. 155). This study assessed participants' elevated depressive symptoms in the previous week whether or not they met criteria for the clinical diagnosis of depression.

Operational definition: The Center for Epidemiological Studies-Depression (CES-D) 20-item scale was used to measure depressive symptoms.

Self-Management Activities

Conceptual definition: Self-management refers to what an individual does with their family, within their communities, and with healthcare professionals "to manage [their] symptoms, treatments, lifestyle changes, and psychosocial, cultural, and spiritual consequences" (Richard & Shea, 2011, p. 261) of T2DM.

Operational definition: The Summary of Diabetes-Care Activities (SDSCA) was used to measure participants' diabetes daily self-management activities.

Assumptions

For the purpose of this study, the following assumptions are made:

1. Chinese Americans hold a different conception of their diabetes compared to residents in the U.S. from other backgrounds.
2. Culture influences illness perceptions.
3. The questionnaires used in this study are appropriate for measuring Chinese Americans' psychosocial characteristics.
4. All participants answered the survey honestly and accurately.

Limitations

1. Snowball sampling potentially creates biases because participants might be likely to refer people with whom they are familiar, thus providing the researcher with a small variability of measured variables (Polit & Beck, 2011). The researcher did her best to reach out to different sites and varied religious and interest groups for data collection.

2. The design measures only a snapshot at one point in time with a cross-sectional design. Caution should be exercised when generalizing the findings and inferring causality (Polit & Beck, 2011).
3. Since the data collection transpired in selected regions in Texas., the findings of this study might not reflect the circumstances of Chinese immigrants in other areas of Texas or the U.S.
4. The self-administered questionnaire could result in misunderstanding or lack of understanding of the questions by respondents. In order to reduce this possibility, the researcher asked participants if they have questions and provide clarification if needed.

Summary

Diabetes is the seventh-leading cause of death in the U.S. and is also one of the five leading causes of death for Asian Americans. Patients with diabetes must engage in effective self-management to minimize diabetes-related complications. Thus, diabetes care is a critical issue for Chinese Americans. Illness perceptions, diabetes distress, depressive symptoms, and self-efficacy impact diabetes self-management activities. Despite this, limited research exists on the effects of diabetes illness perceptions, diabetes distress, depressive symptoms, and self-efficacy on diabetes self-management among Chinese Americans. The study used a modified version of the CSM to investigate the relationships among Chinese American patients' illness perception, diabetes distress, depressive symptoms, and self-efficacy and the impact of these factors on diabetes self-management activities. Findings from this research could contribute to the understanding of for Chinese Americans with T2DM.

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CHAPTER TWO: LITERTURE REVIEW

This review of the literature describes: the (1) natural progression of diabetes; (2) epidemiology of diabetes; (3) diabetes self-management; (4) self-efficacy and diabetes self-management; (5) diabetes distress; (6) synthesized research findings related to depression in diabetes; (7) depression in Chinese Americans; (8) CSM of Self-Regulation; (9) CSM of self-regulation applied to diabetes; and (10) background factors and diabetes self-management among Chinese Americans.

Pathophysiology of Type 2 Diabetes

T2DM, formerly called non-insulin-dependent or adult-onset diabetes, is a chronic condition that affects the homeostasis of glucose. The pathophysiology underlying T2DM is multifactorial; a problem in elevated blood glucose occurs due to the progression of insulin secretory defects in the pancreas or cells becoming resistant to insulin, or by both reasons. Although the exact cause of T2DM is unknown, it can arise from a history of hyperglycemia, prediabetes, gestational diabetes, overweight and obesity, physical inactivity, genetics, family history, age, high blood pressure, and abnormal cholesterol levels (ADA, 2018b).

T2DM is diagnosed based on fasting serum or plasma glucose levels, a plasma glucose (2-h PG) value two hours after a 75 g oral glucose tolerance test (OGTT; ADA, 2018b), or hemoglobin$A1_C$ (A1C) criteria. A1C is the percentage of hemoglobin, a protein in red blood cells that carries oxygen, to which glucose is bound. A1C reflects blood glucose bound to hemoglobin on the surface of red blood cells which can last for the life span of the red blood cell. Therefore, A1C reflects glycemic level over the previous three months (Peterson, Pavlovich, Goldstein, Little, England, & Peterson, 1998). Higher A1C levels indicate worse glycemic control. Normal A1C levels for those without diabetes are

5% or less, whereas a person with uncontrolled diabetes may have an A1C level above 9%. A target A1C goal for non-pregnant adults with diabetes is < 7% (ADA, 2018b). The criteria for the diagnosis of diabetes are as follows: A1C ≥ 6.5% or FPG ≥ 126 mg/dl (7.0 mmol/L) or 2-h PG ≥ 200 mg/dl (11.1 mmol/L) during an OGTT or in a patient who reports the classic symptoms of hyperglycemia or hyperglycemia with a non-fasting plasma glucose level ≥ 200 mg/dL (11.1 mmol/L; ADA, 2018b).

Patients with T2DM are at heightened risk of both microvascular and macrovascular complications. The three major manifestations of microvascular diseases include retinopathy, nephropathy, and neuropathy, and each is strongly associated with hyperglycemia. The prevalence of retinopathy in people with diabetes is 28.5%; damage to the peripheral retina and macula might result in blindness. Diabetes nephropathy includes symptoms of microalbuminuria and eventually leads to renal failure. The risks for diabetes-related nephropathy include hyperglycemia, longer duration of diabetes, dyslipidemia, hypertension, and obesity. These factors are associated with thickened glomerular basement membranes and hyper-filtration that result in the expansion of the kidney's blood vessels and aggravation of hyperalbuminemia, which ultimately results in renal failure (Cade, 2008). Diabetes kidney disease occurs in 20-40% of patients with diabetes (ADA, 2018a). Neuropathy is the most common clinical complication of diabetes, a chronic sensorimotor polyneuropathy, which is associated with severity and duration of hyperglycemia. Hyperglycemia will cause nerve axonal thickening and an eventual loss of neurons and nerve cells (Cade, 2008). The symptoms are varied, and the most common include pain, dysesthesia (e.g. unpleasant burning or tingling), and numbness (ADA, 2018b).

Diabetes macrovascular complications include cardiovascular disease (CVD), cerebrovascular disease, and peripheral artery disease (PAD). After adjusting for age

differences, hospitalization rates for myocardial infarction (a manifestation of CVD) were 1.8 times higher while rates for stroke (a manifestation of cerebrovascular disease) were 1.5 times higher among adults aged 20 years or older diagnosed with diabetes than among adults who did not have diabetes (CDC, 2014). CVD is the leading cause of death in people with T2DM (Cade, 2008). Cerebrovascular disease is strongly related to diabetes. Even after controlling for patients' age, blood pressure, dyslipidemia, heart failure, and atrial fibrillation, diabetes is a strong predicator of stroke. Moreover, epidemiology studies confirm an association between diabetes and PAD (ADA, 2018b). PAD commonly affects patients' lower extremity function capacity; there is a four-fold risk of amputation at every level of ankle perfusion pressure as measured by the ankle-brachial index for patients with diabetes compared with patients without diabetes (Aquino et al., 2001). Overall, the amputation rate of lower limbs is 10 to 20 times higher in patients with diabetes than in patients who do not have diabetes (WHO, 2016).

These complications threaten patients' health both physically and mentally, and are likewise a threat to their quality of life (Siersma et al., 2013; Solli, Stavem, & Kristiansen, 2010). The current guidelines from the ADA recommend a target A1C level of < 7.0% achieved through medication and daily diabetes self-management activities in order to prevent and delay onset of complications (ADA, 2018b).

Epidemiology of Diabetes

Diabetes is ranked as the seventh-leading cause of death for both genders in 2016 (CDC, 2018a) and the fifth-leading cause of death in women in the U.S. in 2015 (CDC, 2018b), and is therefore one of the preeminent health problems of our time. T2DM accounts for around 90% of all diabetes worldwide. Several factors have contributed to the emergence of diabetes as an epidemic. First, its incidence has risen at an extraordinary rate.

The global prevalence of diabetes among adults aged 18 or older nearly doubled from 1980 to 2014. In 2014, about 422 million people in the world had diabetes, which is about 8.5% of the adult population. Diabetes was reported as the direct cause of 1.5 million deaths worldwide. Higher-than-optimal levels of blood glucose lead to an increased risk of cardiovascular disease and other complications, which are responsible for an additional 2.2 million deaths (WHO, 2016; 2018).

Although the global problem of diabetes is growing most rapidly in low-and middle-income countries, diabetes is one of the most common chronic diseases in the U.S., affecting approximately 30.3 million Americans, of whom 7.2 million are undiagnosed (ADA, 2018a). Diabetes occurs in both younger and older age adult groups; 4% of people in the 18- to 44-year-old age group and 25.2% of all people aged 65 or older have diabetes (National Diabetes Statistics Report, 2017). A person diagnosed with diabetes at age 50 dies, on average, six years earlier than a counterpart without diabetes (ADA, 2017).

Diabetes incidence is exceeding projections in the U.S. Boyle et al. (2001) projected that the number of people in the U.S. diagnosed with diabetes will increase to 29 million (prevalence of 7.2%) by the year 2050; however, in 2015, there were already about 30.3 million Americans afflicted with diabetes (prevalence of 9.4%; ADA, 2018a). Huang, Basu, O'Grady, and Capretta (2009) predicted that the numbers of diagnosed and undiagnosed diabetes will increase to 44.1 million by the year 2034, but the actual number of people with diabetes is likely to exceed this projection.

The total estimated cost of diabetes treatment was $245 billion in the U.S. in 2012, and average medical expenditures for people with diagnosed diabetes were about $13,700 per year. About $7,900 of this amount was attributed to diabetes (ADA, 2013). Diabetes-related spending is expected to exceed the projection of $336 billion in 2034 (Huang et al, 2009).

Diabetes Self-Management

Self-management is defined as an "individual's ability to manage [the] symptoms, treatment, physical, and psychological consequences, and lifestyle changes inherent in living with a chronic condition" (Barlow, Wright, Sheasby, Turner & Hainsworth, 2002, p. 178). For patients with diabetes, self-management behaviors include seven domains as recommended by the American Association of Diabetes Educators (AADE) that include healthy eating, physical activity, medication taking, glucose self-monitoring, problem solving, healthy coping, and risk reduction (AADE, 2018).

Self-Efficacy and Diabetes Self-management

Self-efficacy denotes the individual's confidence in his/her skills and ability to purposefully execute specific behaviors in order to be able to reach specific goals (Bandura, 1977). It refers to the person's confidence to perform a variety of diabetes self-management behaviors such as medication adherence, compliance with a treatment plan, certain regimens of diet, exercise, or preventive behaviors (Sarker, Fisher, & Schilllinger, 2006).

Studies have consistently shown that higher levels of self-efficacy are related to better diabetes self-management activities and glycemic outcomes (King et al., 2010; Williams & Bond, 2002). Self-efficacy is a robust predictor for diabetes self-management behaviors regardless of race or ethnic differences. Earlier studies of the relationship of self-efficacy and self-management activities among Asian/Pacific Islander, African American, Latino, and Caucasian groups in the United States found consistent positive relationships between self-efficacy and self-management activities across different ethnic groups. Patients with higher self-efficacy were more likely to report optimal diet, exercise, blood glucose self-monitoring, and foot care (Sarker et al., 2006). These relationships are consistent with research performed in Jordan and several other countries where self-efficacy significantly predicted patients' diet control, exercise, blood glucose level, and

medication adherence (Al-Khawaldeh, Al-Hassan, & Froelicher, 2012; Wu, Cortney, Edwards, Mcdowell, Shortride-Baggett, & Chang, 2007; Sharoni & Wu, 2012). Moreover, diabetes self-management efficacy mediates the relationship between depressive symptoms and glycemic control (Cherrington, Wallston, & Rothman, 2010), and depressive symptoms and self-management (Gharaibeh, Gajewski, Al-smadi, & Boyle, 2016). Interventions to improve diabetes management self-efficacy have been effective in enhancing patients' behavior changes and treatment adherence, and reducing diabetes stress (Fisher, Hessler, Masharani, & Strycker, 2014).

Diabetes Distress

Diabetes requires lifelong physical (e.g. change in diet, regular exercise, blood glucose monitoring) and psychological (e.g. fear, anxiety) management that can negatively impact individuals' psychological and emotional well-being. Diabetes distress is an emotional condition found in individuals with diabetes who feel overwhelmed with responsibilities of self-management and experience long periods of anger, reduced motivation, guilt, and frustration (Gebel, 2013). The terms "depression" and "emotional distress" have been used interchangeably to describe any form of negative affect among patients with diabetes. However, diabetes distress is stress directly caused by diabetes and is defined as "the understandable sense of burden or defeat that may occasionally punctuate your life with diabetes" (Gebel, 2013). Diabetes distress is distinguished by feelings of frustration, anger, and discouragement that patients experience while negotiating the demands of the complex regimen associated with effective self-management. It is identified in four distress-related domains:

> [1] emotional burden (e.g., feeling overwhelmed by the demands of living with diabetes), [2] physician-related distress (e.g., feeling that my doctors

> do not take my concerns seriously enough), [3] regimen-related distress (e.g., feeling that I am not sticking closely enough to a good meal plan), and [4] diabetes -related interpersonal feelings (e.g., feeling that my family/friends do not appreciate how difficult living with diabetes can be). (Polonsky, Fisher, Earles, Dudl, Lees, Mullan, & Jackson, 2005, p. 627)

Regimen-related distress is the most common challenge for patients (Fisher, Gonzalez, & Polonsky, 2014). Diabetes distress is related to outcomes of diabetes self-management. Poor medication adherence, lower physical activities, worse diet control, and higher A1C have been found to be associated with diabetes distress in both cross-sectional and longitudinal studies (Fisher, Glasgow, & Strycker, 2010; Fisher, Mullan, Arean, Glasgow, Hessler, & Maasharanj, 2010). Fisher, Hessler, et al. (2014) tested an intervention that showed that reducing participants' diabetes distress could significantly improve their healthy eating habits, increase physical activities, and enhance medication adherence. Zang et al. (2013) reported that diabetes distress was negatively correlated with treatment adherence from a study of patients with T2DM in mainland China.

Diabetes and Depressive Symptoms

"Depressive disorders include disruptive mood dysregulation disorder, major depressive disorder, persistent depressive disorder(dysthymia), premenstrual dysphoric disorder, substance/medication-induced depressive disorder and unspecified depressive disorder" (American Psychiatric Association, 2013, p.155). Major depression disorder is diagnosed according to the diagnostic criteria of the DSM-V (See Table 1), the symptoms include somatic symptoms, depressed mood, and loss of interest or pleasure, e.g. appetite change, body weight change, insomnia, fatigue, feelings of worthlessness (American Psychiatric Association, 2013). People with diabetes may experience these symptoms,

although the degree and the length of their symptoms may not meet major depression diagnosis criteria, elevated depressive symptoms have a negative impact on practicing daily self-management as evidenced by both cross-sectional (Gonzalez et al, 2007) and longitudinal studies (Gonzalez, Safren, & Delahanty et al, 2008; Gonzalez, Tanenbaum, & Commissariat, 2016; Lin et. al., 2004; Lin et. al., 2010). Depressive symptoms also predict increased complications and mortality (Black, Markides, & Ray, 2003) which suggests that subclinical depressive symptoms can represent emotional distress specific to the burden of living with diabetes rather than a comorbid depressive mood disorder (Fisher et al., 2007).

Meta-analyses in 42 studies shows that people with diabetes have higher levels of depressive symptoms. For instance, about 11% of major depression and 31% of clinically relevant depression have been reported in people with diabetes, which is two times higher than for people without diabetes (Ali, Stone, Peters, Davies & Khuni, 2006; Anderson, Freedland, Clouse & Lustman, 2001; Egede et al, 2002; Rotella & Mannucci, 2013). The causal influence between diabetes and depression is still unclear (Eaton, 2002; Egede, & Ellis, 2010). Some research suggests that the association between T2DM and depression is bi-directional in which depression is a risk factor for T2DM and T2DM is a risk factor for depression (Chen, Chan, Chen, Ko & Li, 2013). Regardless of the causative relationship, depression-related symptoms, such as loss of interest, reduced decision-making ability, decreased physical activity, and fatigue likely contribute to poor glycemic control and worse self-management (Egede & Ellis, 2008).

Detecting depressive symptoms in patients with diabetes is difficult because the symptoms of depression are similar to the signs of poor management of diabetes. For example, fatigue, gain or loss of body weight, change in appetites, and sleep disturbances are common symptoms of both depression and poor diabetes management (Adriaanse et al., 2005). Ludman et al. (2004) studied 4,168 patients with diabetes and found that those

with major depression report significantly more diabetes symptoms than participants without depression. Additionally, Ludman et al. (2004) also found that the association between depression and diabetes symptoms is stronger than the association between diabetes symptoms with other diabetes' complications (e.g. numbness in hands or feet, blurred vision, feeling faint so on) after adjusting for A1C level, age, gender, number of complications, race/ethnicity, and duration of diabetes. Further, depressive symptoms are associated with worse diabetes self-management such as poorer foot ulcer care (Pearson, Nash, & Ireland, 2014), lower medication adherence (Gonzales et al., 2008), poor blood sugar monitoring (Daly et al, 2009), and increased health care use and costs (Egede & Ellis, 2010). Patients with depressive symptoms also exhibit a higher incidence of diabetes-associated complications and mortality than patients without depression symptoms (Park, Katon, & Wolf, 2013).

Clearly, depressive symptoms and diabetes often coexist and can worsen diabetes outcomes due to impaired diabetes self-management (Lin et al, 2004). Therefore, this study focuses on the elevated depressive symptoms that participants experienced over the past week to explore their relationship to self-management activities.

Table 2.1. Criteria for Diagnosing Major Depression (APA, 2013, p.160-161).

A	Five (or more) of the following symptoms have been present during the same two-week period and represent a change from previous functioning; at least one of the symptoms is either (1) depressed mood or (2) loss of interest or pleasure	1. Depressed mood most of the day, almost every day, indicated by subjective report or by the report of others. This mood might be characterized by sadness, emptiness, or hopelessness. 2. Markedly diminished interest or pleasure in all or almost all activities most of the day nearly every day. 3. Significant weight loss when not dieting or weight gain. 4. Inability to sleep or oversleeping nearly every day. 5. Psychomotor agitation or retardation nearly every day. 6. Fatigue or loss of energy nearly every day. 7. Feelings of worthlessness or excessive or inappropriate guilt (which may be delusional) nearly every day. 8. Diminished ability to think or concentrate, or indecisiveness, nearly every day. 9. Recurrent thoughts of death (not just fear of dying), recurrent suicidal ideation without a specific plan, or a suicide attempt or a specific plan for committing suicide.
B	Symptoms cause clinically-significant distress or impairment in social, occupational, or other important areas of functioning.	
C	The episode is not due to the effects of a substance or to a medical condition.	
	Criteria A-C represent a major depressive episode	
D	The occurrence is not better explained by schizoaffective disorder, schizophrenia, schizophreniform disorder, delusional disorder, or other specified and unspecified schizophrenia spectrum and other psychotic disorders.	
E	There has never been a manic episode or a hypomanic episode.	

Depression in Chinese Americans

Chinese Americans might present depressive symptoms differently because of their background and cultural health beliefs, which vary significantly from the American mainstream. Takeuchi et al. (1998) sampled 1,747 foreign-born Chinese American adults in Los Angeles, California to estimate the rate of major depressive episodes and persistent mild depression. They found that approximately 6.9% of the responders had experienced an episode of major depression and 5.2% had experienced dysthymia in his or her lifetime. Yeung et al. (2002) screened 503 Chinese Americans for depression using a Chinese version of the Beck Depression Inventory (CBDI) in a primary care clinic at a community health center. They found that 15% of patients screened positive for mild depression and the prevalence of major depression was 19.6%. Although the prevalence of depression in Chinese and Asian Americans in general is high, symptoms of depression were reported less often in clinical encounters, help-seeking behaviors were low, and the symptoms of mental illness tended to be more severe (Chen, Sullivan, Lu & Shibusawa, 2003; Sue, Fujino, Hu, Takeuchi & Zane, 1991; Sue & McKinney, 1975; Zong, Snowden & Sue, 1998).

Factors influencing Asian Americans' attitudes and behaviors towards seeking professional help include limited language proficiency, reduced financial circumstances, lack of culturally congruent health care services, culturally constructed beliefs and conceptions of mental illness, feelings of shame and social stigma about disease, and misunderstanding about Western medicine (Atkinson & Gim, 1989; Fung & Wong, 2007; Kung & Lu, 2008; Leung, Cheung & Tsui, 2012; Leong & Lau, 2001; Mui & Kang, 2006). This information implies that depression may be hard to detect among Chinese Americans with diabetes, and that the depressive symptoms negatively impact an individual's diabetes self-management activities and blood glucose outcomes.

Early investigators of depression among Chinese commonly pointed out that depressive symptoms in these patients were physical or somatic manifestations and suggested that patients either purposefully or unconsciously did not report mental health issues, implying that depressive symptoms could be harder to identify among Chinese Americans. In one instance, Kleinman (1980) supported the idea that mental health representations and the actions that follow are influenced by the cultural context in which people live. He provided a description of how citizens of Taiwan were influenced by Chinese culture in how they reported symptoms and their effects. Because psychological symptoms and the expression of negative feelings, such as depression, are highly stigmatized in the Chinese culture, Taiwanese individuals were less able to describe and communicate their emotional states when compared to individuals from Western cultures. For example, there was the case of a woman who sought help for energy loss, late afternoon fatigue, headaches, and rising early in the morning without being able to go back to sleep, who was asked to describe her "bad feelings" in greater detail. The woman was unable to do so and proceeded to complain about her physical symptoms. Kleinman's example demonstrates that culture determines which of the many symptoms people will report.

If somatic symptoms are more acceptable than psychological symptoms to people in a given culture, the somatic symptoms will be described and the psychological problems will be ignored. Yeung and Kam (2005) interviewed 29 depressed Chinese American patients and found that 76% complained of somatic symptoms. Among them, 41% presented general physical symptoms (e.g., fatigue, insomnia, headache, coughing, pain, dizziness, and cervical problems), and 34.5% displayed neurovegetative symptoms (e.g., sleep disturbance and/or marked weight loss or weight gain) that are used as criteria for diagnosing a major depression disorder.

This difference of depressive symptoms expression can result in Chinese American patients with diabetes retaining their psychological problems, which in turn will influence their self-management behaviors and consequently lead to unfavorable outcomes. As a result, accounting for cultural context is important in understanding the experience of depression and the performance of diabetes self-management.

CSM of Self-Regulation

Self-regulation, as defined by Leventhal, Nerenz, and Straus (1982), is the information-processing and coping a person does in response to perceived health threats. The CSM suggests that when patients with acute or chronic diseases sense an imminent threat, they will act to cope or relieve the threat (Leventhal, Phillips, & Burns, 2016a). The CSM was developed in the 1960s as an extension of the then-popular Fear-Drive Model of health behavior, which assumed fear was a motivational state driving people to alter behavior in reaction to threats to their health. A higher fear message was presumably more effective than a lower fear message in changing people's attitudes about strategies for avoiding the presented threat, making people more likely to perform those strategies. However, studies soon demonstrated that the effect of fear on attitudes was short-lived (lasting only 24 to 48 hours). In addition, if an action plan was combined with the fear message, the level of the fear message had no effect on whether people succeeded in generating action. Further, the behavioral effects elicited by including an action plan proved much stronger in size and durability, lasting for days to weeks after delivery of the threat message, which was long after the effect generated by fear had disappeared. These studies demonstrated the absence of an interaction between fear level and generation of action, leading to efforts to identify other fear-reducing factors that might generate action (Cameron & Leventhal, 2003).

Subsequently, the CSM of Self-Regulation was developed based on empirical data that suggested a parallel process model composed of two paths: emotional states of fear and distress and cognitive representations of threat. The model explains the process of self-regulation by which individuals form cognitive and emotional representations of health threats to perform self-regulation of behaviors and alter health outcomes. The theory has a series of three sequential stages: (1) representation; (2) coping and engaging in health-related behaviors to reduce the health threat; and (3) appraisals (Figure 3). The CSM of Self-Regulation and its three interrelated but sequential steps will be discussed in further detail.

Representation:

The process of self-regulation begins with illness representation, which is activated through cues from individuals' perceptions of themselves, their illness, and treatments. Individuals' illness perceptions are the culmination of prior illness experiences, physical conditions, observations of others, and communication among family, friends, and the media. Quite similarly, perception for specific illnesses, personal experiences with the illness (symptoms and diagnosed or labelled), observations of illnesses and management by others, and media-based message become repositories for treatments decision and self-management strategies (Leventhal, Phillip, & Burns, 2016a).

Five dimensions of perceptions that comprise illness representation are: (1) identity (pattern, location and severity of somatic sensations/symptoms); (2) timeline (rate of onset, illness duration, and rate of decline); (3) consequences (functional, social, and financial) due to the illness and/or treatment; (4) control (how to stop the symptoms of disease); and (5) cause of illness (e.g., genetics, aging). These five dimensions can also describe the representation of treatments and self-management: (1) identity (labels of the associated

effects from treatments of self-management, e.g., good/poor blood sugar after medication treatment or diet control); (2) timeline (duration of treatment; expectations for time required until treatment benefits are observed); (3) consequences (treatment/management outcomes and side effects); (4) control (action for the illness problems, estimation of how far treatment goes towards curing the disease or condition management); and (5) cause (underlying mechanism of illness, e.g., taking insulin to treat problems with high blood sugar) (Leventhal, Phillip, & Burns, 2016b).

In other words, individuals' representations of illness are shaped by past experiences with illness, interaction with illness from others, and social influences such as the media and cultural beliefs, and information from the media or the hospital (Leventhal, 2016b). Patients' perspectives of each of the five dimensions of illness representation (identity, timeline, consequences, control, and cause) are influenced by their age and their expectation of longevity, personal assessments of their overall health, and physical constitution (Leventhal, 2016b) illness perceptions determine which coping procedure(s) people believe will be most effective in managing their illnesses (Leventhal, Diefenbach, & Leventhal, 1992).

Coping procedures:

Coping procedures consist of the strategies used for dealing with the perceived threat of the illness, or the plans and performances of activities used to control the threat (Cameron & Leventhal, 2003). For example, if an individual perceives having high blood glucose as dangerous, then the individual might develop the skills for using glucose testing meters and learns significant knowledge about the treatment of diabetes to achieve a normal blood glucose level. If a person experienced difficulty coping with diabetes, the process of self-regulation might be impaired (Cameron & Leventhal, 2003). In this study coping

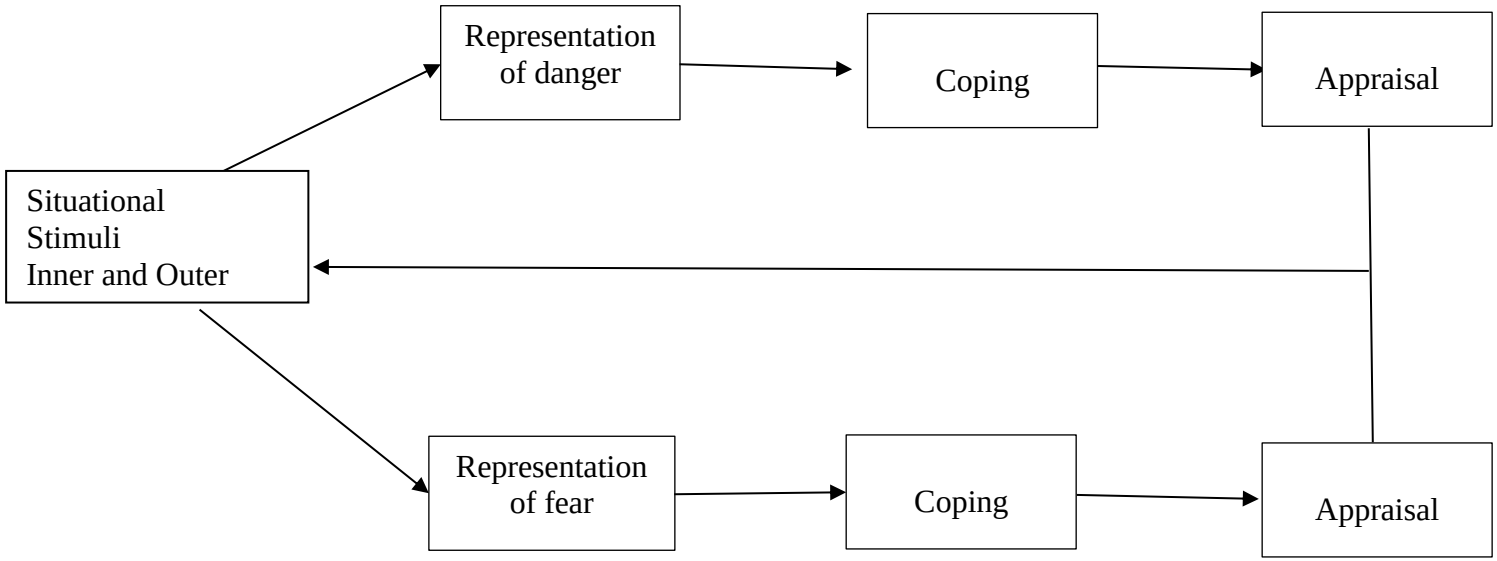
procedures are represented by the outcome variable, diabetes self-management activities. Engaging in more diabetes self-management behaviors would represent positive coping strategies for dealing with diabetes.

Outcome appraisals:

Outcome appraisal occurs when an individual evaluates the effectiveness of the coping plan. After outcome appraisal, an individual might revise the illness representation and subsequent coping mechanisms. Outcome appraisals depend on the standards or criteria by which individuals' judge and monitor coping responses to determine whether they have moved away from the threat of illness or achieved specific goals (Cameron & Leventhal, 2003).

Symptomatic diseases potentially motivate individuals to elicit more straightforward responses for their disease because they act as strong motivators for seeking care. Conversely, asymptomatic diseases or altered perceptions of symptoms prove more problematic and might cause patients to wrongly understand their disease or hinder acceptance of their health conditions. Symptoms could be absent or interpreted differently, and similarly, patients can evaluate their progress individually (Keller, Ward, & Baumann, 1989). Outcome appraisals are not measured in this study.

Figure 3.1 The Parallel Processes of the Common Sense Model (Cameron & Leventhal, 2003, p.46)



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Application of CSM of Self-Regulation to Diabetes Self-Management

Griva, Myers, and Newman (2000) reported that patients with diabetes perceived they could control diabetes with individual health behaviors; 39% of the variance in adherence to glucose monitoring, insulin use, healthy diet and exercise was explained by patients' beliefs in their abilities to control diabetes. Likewise, patient beliefs that diabetes could be controlled by treatment were significant predictors of medication adherence (Searle, Norman, Thompson, & Vedhara, 2007). A meta-analysis that reviewed nine cross-sectional studies concluded that patients who reported more symptom identifications, more severe consequences, more cyclical timelines, and higher emotional distress about their diabetes had significantly higher A1C. In contrast, greater personal control was significantly associated with lower A1C (McSharry et al., 2011).

Illness representations also relate significantly to depressive symptoms and distress. Patient perceptions of higher personal control of their diabetes were associated with lower emotional distress, while lower levels of perceived treatment control and more severe consequences were linked directly to higher levels of depressive symptoms (Al-Amer, Ramjan, Glew, Randall, & Salamonson, 2016). A meta-analysis by Hagger and Orbell (2003) reviewed 45 studies and revealed that perceptions of a strong symptom identify were significantly and positively related to the better coping strategies and avoiding negative emotion expression. In addition, Hagger and Orbell found that the more patients perceived their illness as controllable, the more likely they reported lower psychological distress and better social function. These findings are consistent with Joshi, Dhungana and Subba (2015)'s cross-sectional survey with 379 patients in a clinical setting with T2DM that found a relationship between illness perception and depressive symptoms. Joshi et al. (2015) found that patients who perceived more symptoms related to diabetes, less illness

coherence, more severe consequences, and higher emotional distress to diabetes were likely to have more depressive symptoms.

Patients of different ethnicities may differ in illness perceptions of diabetes and those differences could relate to their diabetes self-management and outcomes. In 86 European-origin, 86 South Asian-origin, and 87 Pacific Islander-origin New Zealanders with T2DM, Pacific Islanders reported more symptoms, worse consequences, poorer medication adherence, and less-frequent glucose-monitoring behaviors compared to the other groups. Moreover, both South Asians and Pacific Islanders held shorter timeline perceptions about diabetes than Europeans and New Zealanders. This could imply that the chronic nature of diabetes is not fully understood by Pacific Islanders or South Asians and that perception might negatively influence self-management behaviors (Bean, Cundy, & Petrie, 2007).

Other studies have also reported differences in diabetes perceptions between ethnic groups. Barnes, Moss-Morris, and Kaufusi (2004) investigated illness belief and diabetes self-care differences between Tongan and European-origin patients with T2DM in New Zealand. Tongans were more likely to perceive their diabetes as acute and cyclical in nature, uncontrollable, and caused by factors out of their control such as God's will, pollution in the environment, and poor medical care in the past; in addition, they felt less need for medication, had higher emotional distress related to their diabetes, and significantly poorer control over their diabetes than European-origin patients. Similarly, in the United Kingdom; Abubakari et al. (2011) the associations between illness perceptions, self-management activities and metabolic-control outcomes (A1C and BMI) revealed that perceptions of greater personal control were the major determinant of change to better self-management among African-origin patients more than among the White-British patients with T2DM. In addition, several dimensions of illness representations impacted the self-management

activities differently between African-origin group and White-British group. For example, in White-British patients having severe consequences was associated with less exercise self-management and high frequency self-monitoring of blood glucose, but in the African-origin group, perceiving diabetes with severe consequences was associated with less feet management, diet behaviors, and overall self-management. It is not known how Chinese Americans' illness perceptions is related to their diabetes self-management activities.

Although a number of studies demonstrated illness perception is linked to patients' self-management and A1C, the correlations varied between ethnic groups and no one type of perception consistently predicted self-care behaviors. Furthermore, the majority of research on illness perception in diabetes has not focused on Asian groups; scant data exists so far on Chinese immigrants or patients from Chinese-speaking communities specifically.

Only one qualitative study applied the CSM of self-regulation to understand Chinese Americans with T2DM (Jayne & Rankin, 2001). Jayne and Rankin (2001) interviewed 30 Chinese immigrants with T2DM in the U.S. and reported that participants were uncertain about the etiology and chronicity of diabetes and interpreted the illness as stigmatizing. Seventy-four percent of participants described the causes of their diabetes as related to their eating behaviors such as eating too much sugar, overeating, eating unhealthy foods, eating too much meat or eating irregularly. Other reported causes of diabetes were stress and depression, lack of exercise, environment, hereditary factors, and gaining weight. Participants reported the classic symptoms of diabetes including thirst, fatigue, weight loss, frequent urination, and blurred vision. They identified the severity of their T2DM using the acuteness of the symptoms, the presence of complications, whether they used insulin injections to control their disease, and how much the illness interfered with usual life activities. They also mentioned neuropathy and peripheral vascular disease complications

including blindness, amputation, and "brain problems" as consequences in the interview (Jayne & Rankin, 2001).

Jayne and Rankin's (2001) participants also conveyed their fears about diabetes consequences, felt annoyed about changing eating habits to control their diabetes because it resulted in being labeled as different from family and friends, and felt socially isolated. Their timeline and control were not clearly described since some participants indicated that they expected to get well and to not have diabetes at some point, and about half of the participants did not answer if they considered diabetes a chronic disease. Coping strategies included wishful thinking; for example, one participant said, "I wish I could be cured and my diabetes will not come back, thereafter I will be very cautious about my diet" (Jayne & Rankin, 2001, p. 57). Also, participants exercised discretion about having diabetes and avoided telling others as well as social situations where it would be revealed. They reported hiding diabetes due to a fear of losing their jobs because of health issues and fear of giving other people a bad impression of themselves. They would thus not be able to devise more effective coping strategies to manage their diabetes.

This qualitative study suggests that Chinese Americans report a variety of illness perceptions (i.e. causes and consequences of T2DM, how perceptions regulate disease). Consequences and control have been significantly correlated with self-management behaviors in other ethnic groups. Therefore, variations in illness perception measured quantitatively may be correlated with Chinese American self-management activities and diabetes outcomes. However, little is known about Chinese American perceptions of the diabetes timeline and control. In addition, Chinese Americans may interpret the causes of diabetes differently from other ethnic groups because their health beliefs. Jayne and Rankin's research did not use illness perception labels, or evaluate diabetes distress and depressive symptoms with patients' self-management activities. Thus, the proposed

quantitative research will evaluate the illness perception about diabetes consequences and control, diabetes distress, and depressive symptoms with diabetes self-management activities beyond the self-efficacy among this population.

Background Factors and Self-Management Outcomes among Chinese Americans

Age

Previous studies support the assertion that older patients report better diabetes self-management behaviors and glucose levels. Bains and Egede (2011) reported that older patients with T2DM (n=125) had significantly better diet control and foot care. Vallis et al. (2003) found that older participants with T2DM were more likely to be in the action and maintenance stages of the Transtheoretical Model for taking antihyperglycemic medication than those less likely to be in the precontemplation, contemplation, or preparation stages. Xu, Pan and Liu (2011) studied 211 Chinese immigrants with T2DM and found that older Chinese Americans were more likely to engage in self-management practices than younger patients. In terms of specific behavior, older Chinese Americans were more likely to follow dietary recommendations (odds ratios: 1.04), perform regular exercise (odds ratios: 1.04), and carry out foot care (odds ratio: 1.04; Xu et al., 2011).

Gender

Research on gender differences in diabetes self-management among Chinese Americans is inconsistent. Xu, Pan, & Liu. (2010) showed there was no difference between the two genders on medication adherence, following dietary recommendations, engaging in exercise, blood sugar self-monitoring, and foot care. This result is inconsistent with Xu et al.'s (2011) report that showed females have better overall diabetes self-management. Chesla, Kwan, Chun, and Stryker's (2014) comparison of gender differences in diabetes care showed that there was no significant difference in diabetes self-efficacy, which is the

belief that one has the ability to manage disease requirements such as diet, regular exercise, and general health. The inconsistent results from prior studies, and the fact that the role of females in Chinese culture might make it more complicated for women to address their individual needs and concerns in managing their diabetes point to a need to control for gender differences. In this study, gender was controlled for when analyzing the relationship between the independent variables and dependent variables.

Education and Income

Education and income are usually combined as one socioeconomic indicator, because the two typically show positive correlations together. However, this condition varies in Chinese immigrant populations. Xu et al. (2010) reported that patients with higher education reported taking medication less regularly (odds ratio = .64), but were more likely to exercise (odds ratio = 1.71) and self-check blood sugar regularly (odds ratio = 1.88). There were no significant relationships between income and self-management found. Although previous studies did not show a positive relationship between education and medication adherence or a significant relationship between income and self-management, education level and financial status are important factors for patients with diabetes practicing self-management. Thus, this study included education level and financial status, and they were controlled for when analyzing the relationship between the independent variables and dependent variables.

Marital Status

A qualitative study involving 16 Chinese Americans with T2DM and their spouses explored how patients accommodate their disease to achieve their health care goals within their family (Chun & Chesla, 2004). Chun and Chesla found that patients' spouses play an important role in accommodating the enactment of social concerns and practice to balance

quality of life for individuals and families with quality of diabetes care. These concerns included balancing diabetes care and harmony in social relations in the face of disease requirements. Thus, in this study, marital status was controlled for when analyzing the relationship between the independent variables and dependent variables.

Year of Diabetes and Type of Treatment

Patients with longer duration of diabetes could better describe the classical signs of diabetes (Jayne & Rankin, 2001), and were more likely to take medication and self-check blood glucose regularly (Xu et al., 2010). Additionally, patients using insulin for treatment of their diabetes had a tendency to suffer from depressive symptoms at a rate 2.3 times higher than people on oral medication (Joshi et al, 2015). Chinese Americans using insulin had significantly higher levels of taking medication and blood testing behaviors (Xu et al., 2010). Therefore, in this study, the length of diabetes and type of treatment was controlled for when analyzing the relationship between the independent variables and dependent variables.

Chronic Health Conditions

Diabetes frequently coexists with other chronic health conditions. Kerr et al. (2007) reported that 40% of patients with diabetes had at least one microvascular comorbidity, 79% had at least one macrovascular comorbidities, and 61% had at least one non-diabetes-related comorbidity. Comorbid conditions have been linked to poor diabetes self-management activities, low quality of life, and low prioritization of patients' health care (Huang, 2016; Kerr, et al., 2007). Thus, in this study, chronic health conditions were controlled for when analyzing the relationship between the independent variables and dependent variables.

Acculturation

Acculturation has been defined as "a process of cultural and psychological changes that involve various forms of accommodation, leading to some longer-term psychological and sociocultural adaptations in individuals and groups" (Berry, 2005, p. 699). Acculturation is often related to health behaviors. For example, higher levels of acculturation predicted better medication adherence, whereas stronger beliefs in TCM than Western treatment (lower acculturation) predicted poorer medication adherence in Chinese immigrants with T2DM (Eh, McGill, Wong, & Krass, 2016). Xu et al. (2011) analyzed diabetes self- care activities among 211 Chinese Americans and reported that 80% of the participants took medication every day, 42% performed food care daily, 40% of the participants exercised more than 5 times per week. However, only 36% and 26.8% of participants followed diet recommendations and self-monitored their blood glucose level daily, respectively. Additionally, the study also showed patients with lower acculturation levels were more likely to perform diabetes self-management than those with lower acculturation levels. In this study, acculturation level was controlled for when analyzing the relationship between the independent variables and dependent variables.

Summary

The proportion of patients with diabetes as well as the gross number of patients with diabetes with diabetes is escalating, and imposing significant burdens on individuals, families, communities, and health care systems. Practicing self-management on a daily basis plays a crucial role in alleviating these burdens and is fundamental to controlling the complications of diabetes and prolonging health. Illness perceptions, diabetes distress, and depressive symptoms have been demonstrated to be associated with the quality of self-management performance. Although previous research has shown the existence of a relationship between background factors and patients diabetes management performance,

there is scant research focused on Chinese Americans to clearly depict the impact of illness perceptions, diabetes distress, and depressive symptoms on self-management activities after controlling for self-efficacy. A deep understanding of the impact of these variables will allow for the improvement of self-management in this growing minority population.

CHAPTER THREE: METHODS

This chapter describes the methods that were used to conduct the study. The purposes of this study are: (1) examine the relationships among diabetes illness perception factors, depressive symptoms, diabetes distress, and diabetes management self-efficacy with diabetes self-management activities; (2) assess the impact of diabetes illness perception factors, depressive symptoms, and diabetes distress on diabetes self-management activities beyond diabetes management self-efficacy and background factors; (3) explore the mediator effects of diabetes management self-efficacy on the relationship between diabetes illness perception and self-management activities; (4) Whether diabetes management self-efficacy mediate the relationship between emotional distress and diabetes self-management behaviors?

This chapter includes the description of the research design and methods that were used in the study, including instruments, population and sampling, research setting, protection of rights of human subjects, procedures for data collection, and procedures for data analysis.

Research Design

A predictive, correlational, cross-sectional design was employed to understand the relationships among illness perception (consequences, personal control, treatment control, and cause), diabetes management self-efficacy, diabetes distress, depressive symptoms, and diabetes self-management activities. The correlational design was applied to describe relationships among variables. Using a cross-sectional design is useful for describing the status of phenomena or relationships among phenomena at a fixed point in time (Polit & Beck, 2011).

Setting and Sampling

Setting

The participants in this study were recruited from three metropolitan areas in Texas with relatively higher percentages of Chinese Americans compared to the rest of the state: Greater Austin (Cities of Austin, Cedar Park, Round Rock), Greater Houston (Cities of Houston, Sugar Land, and Missouri city), and the Dallas- Fort Worth metroplex (Cities of Dallas, Fort Worth, Plano, and Richardson). According to the 2016 American Community Survey: of the approximately 5,862,893 residents in these areas, 11.98 % are Asians, and about 94,835 are Chinese Americans (U.S Census Bureau, n.d.). Diabetes is the sixth leading cause of death and there is an 8% prevalence rate of diabetes among Asians in Texas (University Health System, 2015). The Asian American Quality of Life at Austin Survey, which was conducted in 2015, collected data from a convenience sample of 640 Chinese Americans, of whom 6.9% stated they had diabetes (Jang, 2016) and 57% of people with diabetes were older than 60 years old (Jang, 2016b). The prevalence of diabetes in the AAQOL study is higher than the national 4.3% prevalence in Chinese Americans (ADA, 2018b).

Sample

Convenience and snowball sampling methods were used for participant recruitment. Participants were included in this study if they: (1) self-identified as immigrants from Chinese-speaking countries or influenced by Chinese culture; (2) had been diagnosed with T2DM; (3) could speak in English, Mandarin, Taiwanese, or Cantonese or were able to read English and Chinese; and (4) were above 18 years of age. Exclusion criteria included participants with type 1 diabetes, gestational diabetes, acute infections, or undergoing treatment for cancer. Participants who were interested in this study were screened with five

questions used to determine their eligibility for participation: (1) *Do you self-identify as an immigrant from a Chinese speaking country?* (2) *Have you been diagnosed with T2DM?* (3) *Do you speak English, Mandarin Chinese, Cantonese, or Taiwanese? Or do you read English or Chinese?* (4) *Are you over 18 years old?* (5) *Do you have cancer or acute infections currently under treatment?*

Sample Size Estimate:

The G* power 3.1 analysis program (Faul, Erdfelder, Buchner & Lang, 2009) was used to determine an appropriate sample size for the study based on the analyses for research question 2. Because studies of the relationships among all the study concepts have not been conducted with Chinese American or Asian samples, the effect size calculation is based on the effect size of relationships between four of the illness perception dimensions (consequences, personal control, treatment control, cause), and self-management scores (the primary variables in the study) in a sample of Black-African, Black-Caribbean, and White-British patients with T2DM who were over 18 years old in the U.K. The correlation coefficients ranged from 0.01 to 0.37 with an average of 0.145 (Abubakar, 2011). The effect size (f^2) was calculated for multiple regression analysis and obtained a value of .17. Therefore, for this study, a sample size of 135 for an alpha of .05, effect size (f^2) of .17, two-tailed study, using linear multiple regression (fixed model, r^2 increase) with 7 tested predictors, and 17 total predictors, the power was .95.

Recruitment Procedure

Convenience sampling was performed by advertising this study and recruiting participants at local Chinese churches, temples, restaurants, supermarkets, senior centers, and organizations that serve Chinese speaking communities in the Greater Austin, Greater Houston, and Dallas-Fort Worth metropolitan areas. The researcher contacted the directors

of community organizations and asked them to disseminate the information about this study to their members. After successfully contacting the groups and disseminating information about the study, the researcher set up several sites to collect data. The places were widely accessible and convenient for people to participate in this study. For example, recruitment was done during senior lunch activities at the Asian American Resource Center (AARC) in Austin, before or after workshops held by the Light and Salt organization in Houston and Austin, and at the Chinese Activities Center in Dallas (Appendix A). Additionally, the researcher also approached potential participants through Chinese community service agencies and annual community events such as health fairs and food festivals. Research information was also distributed on social media such as Facebook, WeChat, LINE, and through local newspapers. The purpose, procedure, inclusion criteria, estimated time for participation, and potential risk and benefits of the survey were included in the advertising document. The flyers were distributed at Chinese churches, temples, grocery stores, activity centers, local Chinese-speaking physician clinics, and traditional medicine clinics. The researcher also gave presentations about this research and provide diabetes self-management tips for people who were interested in this study topic. Any people interested in participating in this study could contact the researcher for further confirmation that they meet the research criteria. Participants received a $10 Walmart gift card for the compensation of their time.

Snowball sampling was applied to reach new participants by providing the researcher's contact information to study participants for referrals for other people who fit the inclusion criteria and might be willing to participate in the study (Polit & Beck, 2011). The recruitment period was from September 2017 to June 2018.

Protection of Rights of Human Subjects

The proposal for this study was approved by the Institutional Review Board (IRB) of the University of Texas at Austin (IRB number: 2017-01-0001, Appendix B). After IRB approval, the researcher and an assistant started to recruit participants in the target local Chinese interest groups, churches, temples, grocery stores, local private clinics, and traditional medicine clinics. The purpose, procedures, estimated time for participants, potential risks, and potential benefits of this study appeared in a written form and was provided to participants (Appendix C). After being verbally informed of the study and verbally agreeing to participate this study, participants were told that they can refuse to participate or stop participating at any time without any penalty, loss of benefit, or impact on their relationship with the University of Texas at Austin. The researcher assigned a unique code number for each participant. The completed questionnaires were kept in a locked cabinet to ensure confidentiality. Additionally, code numbers were applied to the completed questionnaires instead of participants' names. The data from this study was used for research purposes only and all publications of this study will not include any information that can identity any of the participants.

Instruments

A background information form, Acculturation Inventory, IPQ-R Questionnaire, Diabetes management self-efficacy scale, Diabetes Distress Scale, CES-D scale, and SDSCA scale were used in this study. All instruments were provided in English and Mandarin Chinese; both traditional and simplified versions of Chinese were provided to cover different regions from which Chinese immigrants originated from.

Background Information Questionnaire

The background information questionnaire measures demographic information (age, gender, education, and income), disease characteristics (length of diabetes, type of treatment, and list of chronic health condition), and acculturation (Appendix D).

Acculturation Inventory

Level of acculturation to mainstream American culture was determined by using a 12-item acculturation inventory (Jang, Kim, Chiriboga, & King-Kallimanis, 2007; Appendix E). This inventory was developed for older Korean adults to address orientation toward both home and host- cultures. The inventory covers six domains including language use, media consumption, food consumption, social relations, sense of belonging, and familiarity with culture. Each response choice ranges from 0 to 3 and the total scores could range from 0 to 36. Higher scores indicate greater level of acculturation to mainstream American culture (Jang et al., 2007). This inventory has been used widely with Korean American participants (Jang, Yoon, Park, Chiriboga, & Kim, 2014; Roh, Jang, Chiriboga, Kwag, Cho, & Bernstein, 2011). Lin, Liu, and Jang (2014) translated it into a Chinese version and used it to evaluate the role of cultural factors and depressive symptoms among older Chinese Americans.

Cronbach's alpha was .77 on 12 items given to 472 Korean elders from two different areas in Florida (Jang et al., 2007), and coefficient alpha of .78 with 420 foreign-born Korean immigrants in New York City metropolitan area (Roh et al., 2011), and .93 with 209 Korean American elders in Central Texas (Jang et al., 2014). Lin et al. (2014) reported the Cronbach's alpha as .89 with 108 first-generation elderly Chinese immigrants, indicating good internal consistency.

Concurrent validity of the Acculturation Inventory was demonstrated by examining the relationship between the 12 items on the Korean orientation scale and American

orientation scale. The correlations between most of the comparable items in each orientation scale were statistically significant in a negative direction with r = -.69 to -.90. The correlation coefficient between Korean and American scales' total scores was -.57 ($p < .001$, Jang et al., 2007). Using exploratory factor analysis, three factors accounting for 52% of variance were identified: (1) six items related to media and food consumption, ethnicity of friends, and celebration of holidays; (2) social relationships; and (3) language usage (Jang et al., 2007).

Revised Illness Perception Questionnaire (IPQ-R)

Illness perceptions was measured using Moss-Morris and colleagues' revised Illness Perception Questionnaire (IPQ-R, 2002). The IPQ-R was revised from the Illness Perception Questionnaire (IPQ), which was developed by Weinman, Petrie, Moss-Morris, and Horne (1996) based on Leventhal's Self-Regulatory Model. The IPQ provides a quantitative assessment of the five dimensions of illness representation: identity; cause; time-line; consequences; and cure control. Moss-Morris et al. (2002) revised the IPQ based on the utilization and adaptability of the IPQ with different populations and illness feedback from the experience of researchers. The IPQ-R more accurately represents theory and measurement of constructs of the Common-Sense Model. Based on factor analysis, the cure control scale was modified into two separate subscales: personal control and treatment control. The time-line subscale was also divided into two subscales, which included timeline acute/chronic and timeline cyclical. In addition, an emotional representation subscale was added to reflect parallel cognitive and emotional representation in the CSM. Moreover, to assess if patients' illness representations reflected a coherent understanding of their illness, the illness coherence Subscale was added. The IPQ-R includes nine subscales and a total of 70 items. The nine subscales include Identity, Timeline

(acute/chronic), Consequences, Personal control, Treatment Control, Illness Coherence, Timeline Cyclical, Emotional Representation, and Causes. Each subscale of the IPQ-R is analyzed separately. For the symptom identity, 14 symptoms are listed and patients were asked to indicate for each symptom whether they had experienced this symptom since being diagnosed and whether they perceived this symptom to be related to their diabetes (Yes/No). The symptom scores are totaled for a subscale score that ranges from 0-14. The rest of the subscales use a five-point Likert-type rating scale (1 = strongly disagree, 5 = strongly agree). The IPQ-R scale scores are obtained by summing the value for the items on each subscale. Higher scores on the Timeline, Consequences, Timeline Cyclical, and Emotional representation subscales have a negative connotation, indicating beliefs that illness will have a longer timeline, more negative consequences, a more cyclical nature, and a greater emotional impact. Higher scores on the personal control, treatment control, and coherence scales have a positive connotation, representing beliefs that illness is amenable to personal efforts or treatment, and a greater personal understanding of the condition.

The IPQ-R has been translated into several languages and used on patients with different types of diseases (The Illness Perception Questionnaire, n.d.). Chen et al. (2008) translated the IPQ-R into Chinese and modified the items of the Causes subscale for a study about hypertension medication adherence among Taiwanese with hypertension. The Chinese version excluded the items about accidents and germs, hereditary, past poor medical care, and aging from the original IPQ-R because they are irrelevant to causing hypertension. The Chinese version added items to cover health beliefs of inner body ecological balance and external influence such as violation of religious morals or taboos, which are cultural health beliefs. Specifically, the items address pa-tzu (the specific time of one's birth or fate), *feng-shui* (geomancy or predicting a person's luck in a given year),

and weather or environmental factors (Chen & Swartzman, 2001). The Chinese version of the IPQ-R includes four causal factors (psychological, balanced, cultural, and risk factors) with other 18 items in the Cause subscale. However, for this study, the items pertaining to hereditary, poor medical care in my past, and aging were included. There were 21 items of the Cause subscale.

The Identity and Cause subscales of the IPQ-R were separately tested for reliability. The Identity subscale showed a good degree of internal consistency with a Cronbach alpha of .75. The Causal subscale demonstrated adequate to good Cronbach alphas ranging from .67 to .86 for each of four causal factors produced in a factor analysis: psychological attributions, risk factors attributions, immune attributions, chance attributions. The rest of the subscales in the IPQ-R showed good internal consistencies with Cronbach alphas from .79 to .89. The IPQ-R showed adequate stability with a three-week test-retest period; Pearson's correlations ranged from .46 to .88 (Moss-Morris et al., 2002).

The Chinese IPQ-R also showed the internal consistency with Cronbach alphas ranging from .67 to .87 for each subscale (except Identity) and composite reliability with range .73-.88 (Chen et al., 2008). When comparing scores with the symptoms experienced subscale from the original IPQ, Weinman et al. (1996) demonstrated concurrent criterion-related validity for the 14 items in the Identity subscale. The analysis showed an expected and significant difference between somatization and illness identity ($t = 15.94$, $p < .001$). Discriminant validity also has been demonstrated for the IPR-Q. Correlation coefficient with the Positive and Negative Affect Schedule (PANAS; Watson, Clark & Tellegen, 1988) showed that the scores on the IPR-Q are significantly associated with the scores on the Positive and Negative Affect scale ranging between -.26 and .54 (Moss-Morris et al., 2002).

Confirmatory factor analysis provided evidence of satisfactory validity of the Chinese IPQ-R. Convergent validity is demonstrated by the factor loading values of .51-.86

for subscales of illness perception and .51-.87 for Cause. Discriminant validity was supported by the correlation coefficients testing between each of the two subscales. Data shows that each pair of constructs is empirically distinct (Chen et al., 2008). This study will use the revised Chinese version of IPQ-R (Chen et al., 2008) subscales of Consequences, Personal control, Treatment control, and Cause to assess Chinese Americans with diabetes (Appendix F).

Diabetes Management Self-Efficacy (DMSES)

The DMSES was used to measure participants' confidence of management their diabetes. The instrument was originally developed by a team of researchers who are part of the International Partnership in Self-management and Empowerment (IPSE) (Bijl, Poelgeest-Eeltink, & Shortridge-Baggett, 1999; Appendix G) and has been adapted and used in several countries, including the United Kingdom, Untied States, Australia, and Taiwan (McDowell, Courtney, Edwards, & Shortridge-Baggett, 2005; Shortridge-Baggett, & Alcena, 2002; Sturt & Hearnshaw, 2002; Wu, Courtney, Edwards, McDowell, Shortridge-Baggett & Chang, 2008). The DMSES is a self-administrated scale containing 20 items, assessing the extent to which participants are confident they can manage their blood sugar, diet and level of exercise. Responses range from "cannot do at all" (0), "maybe yes/maybe no" (5), and "certain can do" (10). Possible scores range from 0-200, with a higher score indicating greater self-efficacy.

Wu et al. (2008) translated the DMSES to Chinese and tested the validity of the Chinese DMSES (C-DMSES) with 230 patients with T2DM aged 30 years or older in Taiwan. The C-DMSES was evaluated by eight experts on diabetes care for Content Validity Index (CVI) and obtained a total average score of 0.86. Construct validity was demonstrated by the principal- component factor analysis yielding a four- factors structure.

The four factors explained 68.3% of the total variance with factor loadings ranging from 1.08 to 9.33. The internal consistency for all items was good with a Cronbach's alpha of .93, and for the four subscales separately: nutrition (α = .93), physical exercise and weight (α =.81), medical treatment (α = .79), and blood sugar and feet check (α = .77). Test- retest reliability for the total C-DMSES scores generated a Pearson correlation coefficient of r = .86. The convergent validity also provided evidence that C-DMSES measure the strength dimension of self-efficacy by showing a significant correlation with the Chinese version of the General Self-Efficacy Scale with r = .55. Criterion-related validity was demonstrated by showing that the C-DMSES was a significant predictor of the Summary of Diabetes Self-Care Activities score (SDSCA) accounting for 33.6% of the variances in the total SDSCA score.

Diabetes Distress Scale (DDS)

The Diabetes Distress Scale (DDS) was used to assess diabetes-specific emotional distress over a month (Appendix H). DSS contains 17 items using a 6-point Likert-type scale to measure diabetes distress level. Each item is scored on a scale ranging from 1-6, a possible total score is 17-102, with higher scores indicating higher distress, and a mean item score of ≥ 3 indicates high distress (Fisher, Hessler, Polonsky, & Mullan, 20012). Exploratory factor analyses on the scores for participants recruited from four clinical sits: waiting room at a primary care clinic (n= 200), waiting room at a diabetes specialty clinic (n= 179), a diabetes management study program (n=167), and an ongoing diabetes management program (n =158) yielded four factors pertaining to emotional burden, physician-related distress, regimen-related distress, and interpersonal distress. The DDS is internally consistent, α = .93 for the total scale, and a range of α = .88 to α = .90 for the four factors subscales. The validity of the DDS was demonstrated by a correlation

coefficient of r = .56 with the depressive symptomatology (CES-D scale), poorer adherence to diet control (r = .30), lower level of exercise (r = .13; Polonsky et al., 2005).

The DDS has been translated into Chinese and tested with 189 participants with T2DM, aged 18-65 years in Hong Kong. The Chinese version of DDS (CDDS) was modified to 15 items to accommodate the medical care system in Hong Kong where patients cannot choose their own doctor (deleted item 15); and to avoid redundancy by deleting item 12 (feeling that I am not sticking closely enough to a good meal plan). The internal consistency Cronbach's alpha of the 15-item CDDS was .90, the test-retest coefficient was .74. Congruent validity was demonstrated by correlations with the CES-D (r = .511), Patient Health Questionnaire (PHQ-9; r = .43), and Quality of life (EQ-5D; r = - .29; Ting et al., 2011). Since the 15-item CDDS has a high correlation with 17-item CDDS and the health care system in the U.S. is different than that in Hong Kong, the 17-item CDDS was used for this study.

Center for Epidemiological Studies Depression Scale (CES-D)

The National Institute of Mental Health in the United States developed the 20-item CES-D to measure depressive symptoms over a single week (Appendix I). Items in the CES-D were drawn from research literature and factor analytic studies that identified the major components of depressive symptomatology (Radloff, 1977). It consists of 16 negatively-worded items and four positively-worded items. Each item is scored from 0-3, based on the frequency of occurrence of the symptom during the past week; a score of zero means that a symptom was present less than 1 day during the past week, a score of one means a symptom is present some or a little of the time (one to two days during the past week), a score of two means a symptom is present occasionally or in a moderate amount of time (three to four days during the past week), and a score of three, the highest score for

an item, means a symptom is present most or all the time (five to seven days during the past week). An individual's CES-D score is the sum of all 20 items' scores with a range of 0-60 after the four positively-worded items are reversed. Higher scores indicate more depressive symptoms. The cut-off value of ≥ 16 has been used to define clinical depression (Radloff, 1977).

Principal components factor analysis of the CES-D was conducted in three general populations. Data showed four factors with eigenvalues greater than one, which together explained 48% of the total variance. The four factors were depressed affect (blues, depressed, lonely, cry sad), positive affect (good, hopeful, happy, enjoy), somatic and retarded activity (bothered appetite, effort, sleep, and get going), and interpersonal problems (unfriendly, disliked; Radloff, 1977). The CES-D has been translated into Chinese and many other languages (Smarr & Keefer, 2011). It is also widely used to determine depressive symptoms in samples with varied types of diseases from different cultural groups including Chinese Americans, Chinese Canadians, and people living in many areas and countries such as Mainland China, Hong Kong, Singapore, and Taiwan (Tai, Ma, Wang, & Yang, 2014; Zhang et. al., 2015; Stahl, Sum, Lum, Liow, Chan & Verma et. al, 2008). The Chinese version possesses strong reliability and validity in samples with different diseases including diabetes as noted below by Stahl et. al. (2008 and Zhang et al. (2015), and is suitable for this study

Strong evidence exists indicating that the CES-D is a reliable measure. Radloff (1977) tested three general populations using item analysis that revealed inter-item correlations ranged from .30 to .70; item-scale correlations ranged from .30 to .70, and the internal consistency reliability (Cronbach's Alpha) ranged from .84 to .90. The evidence for stability reliability of the CES-D using test-retest correlation is in the moderate range from r = .51 to .67 at two to eight weeks apart. Higher test-retest correlations (r = .48 to .54)

were found among people having no events happening between the two tests, whereas lower test-retest correlations (r = .31 to .47) were found among people having events after the first test.

The internal consistency of the Chinese version of the CES-D has been demonstrated in Hong Kong and Singapore. The results showed the internal consistency Cronbach's Alpha was .85 and test-rest consistency coefficient r was 0.64 at two to four weeks apart when testing 545 patients with T2DM (Zhang et. al., 2015). Cronbach's Alpha coefficient was 0.72 when testing 207 Chinese Singaporeans with diabetes (Stahl et. al, 2008).

The concurrent validity of the CES-D was demonstrated by a correlation coefficient of r = 0.83 with Symptom Checklist-90 (SCL-90), and r = .60 with the Bradburn Negative Affect Scale. The predictive validity of the CES-D was demonstrated by the finding that subjects who expressed the need for mental health services because of emotional problems reported significantly higher CES-D scores than those who expressed no need for services. The CES-D also provided predictive ability over the course of depression: the CES-D scores decreased as the patient recovered after treatment (Radloff, 1977). The construct validity of the Chinese version of CES-D was demonstrated by factor analysis yielding a four-factor structure: (1) depressed affect; (2) somatic symptoms; (3) positive affect; and (4) interpersonal problems. This four-factor model accounted for 61.1% of the scale variance, with factor loadings ranging from 0.62 to 0.88 (Zhang et al., 2015).

Summary of Diabetes-Care Activities (SDSCA)

The Summary of Diabetes-Care Activities (SDSCA) is a brief questionnaire that assesses individuals performing diabetes self-care activities (Appendix J). The SDSCA includes 11 items about five activities: diet (four items); exercise (two items); self-glucose

testing (two items); foot care (two items); and smoking behaviors (one item). Participants are asked to report the frequency of performing each activity over the previous seven days. Each response is scored on an 8-point Likert scale ranging from 0 to 7 (Toobert, Hampson, & Glasgow, 2000). Scores for each of the activities are calculated independently, with a higher score meaning participants have better self-management behaviors. For the smoking behavior item, a score of 0 indicates a participant is not a smoker and a score of 1 indicates a participant is a smoker (Toobert, et al., 2000)

The Chinese version of the SDSCA was translated and modified taking into consideration Chinese culture (Xu, Savage, Toobert, Pan, & Whitmer, 2008). The Chinese SDSCA consists of ten items with five domains, including diet (two items), medication adherence (two items), physical activity (two items), blood sugar testing (two items), and foot care (two items). The item about smoking was deleted from the Chinese version. Items can be summed to create a total SDSCA score and the passible range is 63; higher scores mean participants have greater self-care. For this study, the smoking item was used because smoking cessation is recommended to be included in diabetes self-management (ADA, 2018b). The smoking item was scored 0=nonsmoker and 1= smoker.

Toobert et al. (2000) examined scores on the SDSCA from seven different studies with a total of 1,988 patients with diabetes to evaluate reliability. The internal consistency of the subscales as assessed using inter-item correlations was viewed as acceptable with mean of .47 except for the subscale for diet which had lower inter-item correlations of .07- .23. The test-retest correlation for temporal stability over three to four months was reported as moderate with a mean r of .40 for medication and .78 for glucose testing. For the Chinese SDSCA, inter-item correlations were .69 for the exercise subscale and .77 for the blood glucose testing subscales with 201 Chinese participants with T2DM in Mainland China (Xu, Toobert, Savage, Pan, & Whitmer, 2008). With a larger sample, the SDSCA

was internally consistent with a Cronbach's alpha of .68 with 211 Chinese Americans with T2DM (Xu et al., 2011).

The validity of the diet subscale was assessed by examining comparisons with other measures. For dietary comparisons, criterion measures were derived from food record, food-frequency questionnaire, the Food Habits Questionnaire and Block Fat Screener. Exercise was assessed through comparisons with the Stanford 7-Day Recall, the Physical Activity Scale for the Elderly and report activity data. The correlations with these other measures of diet and exercise supported the validity of the SDSCA subscales; correlations ranged from r = -. 23 to .50 for diet and r = .20 to .58 for exercise (Toobert et al., 2000). For the Chinese version SDSCA, the construct validity using factor analysis showed that the five domains explained 90% of the variance (Xu, et al., 2008). Table 2 presents the variables and instruments in this proposed study.

Table 3.1 Study Variables and Instruments

Variables	Theoretical Definition	Instrument	Data Obtained
Demographic Characteristics	Age, sex, education, income, marital status	Demographic Characteristics Survey	Nominal, Ordinal, Interval
Disease Characteristics	Time since diagnosis, type of treatment, chronic health condition	Disease Characteristics Survey	Nominal, Interval
Immigration Characteristics	Acculturation	12 items - acculturation inventory	Interval
Diabetes Illness Perception	Consequences, Personal control, Treatment control, Cause	Chinese IPQ-R,	Interval
Diabetes Management Self-Efficacy	Nutrition, Physical exercise, Weight, Medical treatment, Blood sugar and feet check	Chinese version of Diabetes Management Self Efficacy Scale (C-DMSES)	Interval
Depressive Symptoms	Depressed affect, Positive affect, Somatic and retarded activity, Interpersonal problems	Chinese version of Center Epidemiological Studies-Depression(CES-D)	Interval
Diabetes Distress	Emotional burden, Physician-related distress, Regimen-related distress, Interpersonal distress	Chinese version of Diabetes Distress Scale (C-DDS)	Interval
Self-Management Activities	Medication adherence, diet management, physical activity, blood sugar testing, foot care, smoking	The Summary of Diabetes-Care Activities (SDSCA)	Interval

Data Analysis

Before the participant left the data collection interview, all the questionnaires were examined carefully for completeness and, if possible, any missing data were obtained from the participant. The data was entered into a database using the Statistical Package for the Social Sciences (SPSS) Windows release 25.0. The statistical significance level for all research questions was set at $p < .05$. Prior to conducting descriptive analyses, all data was examined for accuracy, missing data, and normality. For the missing values, the researchers followed the guidelines of the instrument developers. The amount of missing value was checked, with 5% of missing value as the cutoff (Schafer, 1999). Additionally, the Principal Investigator conducted missing value analysis in SPSS 25.0 using the EM (expectation-maximization) algorithm to determine whether they are missing at random, then based on the missing value pattern (missing completely at random, missing at random, and missing not at random) to decide which data deletion methods will be used, list-wise deletion or pairwise deletion (Polit & Beck, 2011).

Descriptive statistics, including means, standard deviations, range of scores, and frequencies were used to describe characteristics of participants and provide a description of study variables, including subscales scores and total scale score for each instrument in this study. Cronbach's alphas were used to assess internal consistency of the instruments with the study participants.

Question 1

What are the relationships among the independent variables of illness perceptions factors (consequences, personal control, treatment control, and cause), diabetes self-efficacy, emotional distress (diabetes distress and depressive symptoms) with the dependent variable of diabetes self-management activities among Chinese Americans with T2DM?

Pearson correlations and Phi correlations were used to examine the relationships among these variables. Before conducting data analyses, assumptions were verified by examining: (1) the distribution of the variables for normality; (2) for the requirement of homogeneity of variance; and (3) if the relationships between the variables is linear (Field, 2013).

Question 2

How do diabetes illness perception factors (consequences, personal control, treatment control, and cause), emotional distress (diabetes distress and depressive symptoms) predict diabetes self-management activities after controlling for diabetes management self-efficacy and background factors?

Two hierarchical multiple regression models were conducted separately of illness perception factors, diabetes distress, and depressive symptoms to determine the variance of diabetes self-management activities. The variances of diabetes self-management activities were explained by illness perception, diabetes distress, and depressive symptom after controlling for the background variables and diabetes management self-efficacy. The set of predictors for the first model was sequentially introduced to the model with an order of (a) background variables, (b) diabetes management self-efficacy and (c) diabetes illness perception. The second model introduced emotional distress (diabetes distress and depressive symptoms) instead of diabetes illness perception in the first model. The squared correlation coefficient (R^2) was used to determine the amount of variation explained by the combined predictor variables at each step of the regression model (Field, 2013).

Question 3

Whether diabetes management self-efficacy mediate the effect of illness perception (consequences, personal control, treatment control, and cause) on self-management activities?

Mediation analyses using ordinary least squares path analysis were used to explore the direct and indirect (through diabetes management self-efficacy) effects of diabetes illness perception factors on self-management activities. Andrew Haye's PROCESS procedure for mediation analysis will be utilized, as compared to more traditional mediation methods that can only assess one mediator at a time and therefore cannot account for the effects of other potential meditational processes; this is a more robust statistical analysis (one-step hypothesis testing vs. three). It also allows for inferential quantification of the indirect effects of dependent variables through mediator variables (Hayes, 2013). This method utilizes bootstrap confidence intervals to test and interpret the effect size of the indirect effects of the independent variables on the dependent variables. "Bootstrapping is less susceptible to the influence of outliers in small populations than other method and it doesn't rely on large sample asymptotic" (Andrew Hayes, 2013, page 105). There are five patterns of mediation models defined

> (1) Complementary mediation: Mediation effect and direct both exist and point at the same direction; (2) Competitive mediation: Mediation effect and direct effect both exist and point in opposite directions; (3) Indirect -only mediation: Mediation effect exists, but no direct effect; (4) Direct-only nonmediation: Direct effect exists, but no indirect effect; (5) No-effect nonmediation: Neither direct effect nor indirect effect exists. The first two meditation models suggest that researchers need to consider the likelihood

of an omitted mediator in the direct path. (Zhao, Lynch, & Chen, 2010, p. 200-201)

In each mediation model self-management activities total score was entered as the dependent variable; each illness perception variable was entered separately as the independent variables; diabetes management self-efficacy was entered as the mediator variable; and background variables were entered as covariates. The direct effects of illness perception subscales on diabetes self-management activities was determined by the regression coefficient magnitude and significance ($p < .05$), and the indirect effect of the illness perception was determined by a significant effect size (95% Bootstrap CI does not include "0").

Question 4

Whether diabetes management self-efficacy mediate the relationship between emotional distress and diabetes self-management behaviors?

The mediation effect of self-efficacy on the relationship between emotional distress and self-management activities were analyzed using the same methods as for Question 3. The frequency of diabetes self-management activities was entered as the dependent variable, each emotional distress variable (diabetes distress and depressive symptoms) was entered separately as independent variables, then diabetes management self-efficacy was entered as the mediator variable, and background variables were entered as covariates.

Summary

This chapter describes the methodology that was used for this study. A correlational and cross-sectional study was applied to gain more understanding of Chinese Americans with diabetes self-management outcomes. Target sample, estimate sample sizes, study procedure, instruments, and expected data analyses to answer research questions were

addressed. Data was analyzed using SPSS 25. Protection of human subjects for this study was also reviewed.

CHAPTER FOUR: FINDINGS

This chapter describes the findings of this study that examines the factors impacting type 2 diabetes self-management activities among Chinese Americans. Survey data were collected to explore the relationships of illness perceptions of diabetes, self-efficacy, and emotional distress with diabetes self-management activities while controlling for the background factors and self-efficacy.

The research questions of this study are:

1. What are the relationships among the independent variables: background information (age, sex, education, income, marital status, length of diabetes, insulin treatment, number of chronic disease, acculturation level), illness perceptions (consequences, personal control, treatment control, and cause subscale scores), diabetes self-efficacy, emotional distress (diabetes distress and depressive symptoms) with the dependent variable diabetes self-management activities among Chinese Americans with T2DM?
2. How do diabetes illness perceptions (consequences, personal control, treatment control, and cause) and emotional distress (diabetes distress and depressive symptoms) predict diabetes self-management activities after controlling for diabetes management self-efficacy and background factors?
3. Whether diabetes management self-efficacy mediate the effect of illness perception (consequences, personal control, treatment control, and cause) on self-management activities?
4. Whether diabetes management self-efficacy mediate the relationship between emotional distress (diabetes distress and depressive symptoms) and diabetes self-management behaviors?

A total of 158 participants were recruited from community settings (see Appendix A) in the Greater Austin, Greater Houston, and Dallas- Fort Worth Metroplex areas. Five participants completed less than 50% of the survey questions and their data were excluded from the data analysis. The researcher confirmed that there were no significant differences on age, gender, duration of diabetes, education, years living in the U.S., and income between the five incomplete surveys and the remaining 153 participants that were included in the analysis.

Demographic of the Sample

The overall participants' ages ranged from 31 to 95 years, with a mean age of 69 years, although the 29 participants recruited from the Dallas area were on average significantly older (by 8 years) and had one more chronic condition than participants who were recruited from the other two areas. Overall, more than half of the participants were female (52%). The sample was well-educated (average years of education obtained was nearly 14 years); and the average acculturation score was relatively low compared to the full score of 36. Most participants were married or living with a significant other (71%). Although more than half (51%) reported that their household income was less than $40,000 a year; a large majority (81%) of them stated that the income met their needs. The plurality of the participants (44%) originated from Taiwan, 30% from Mainland China, 18% from Hong Kong, 4% from Vietnam, 3% from Malaysia, and 1% from other countries, including Singapore and South Korea. Almost all of the participants were first generation immigrants, and the average length of residency in the US was over 28 years. Participants reported an average of one concurrent chronic disease and had been diagnosed with diabetes for an average of 13, but ranged from newly diagnosed to 48 years. Almost 78% were prescribed

oral medication, 14% were insulin. The detailed demographic characteristics are presented in Table 4.1.

Table 4.1. Descriptive Characteristics of Sample

Variables	All participants (N=153)	Austin (n=51)	Houston (n=73)	Dallas (n=29)	Critical value and significance
	M ± SD/ n (%)	M ± SD / n (%)	M ± SD / n (%)	M ± SD / n (%)	χ^2/F
Female	80 (52.3%)	22 (43.1%)	42 (52.3%)	16 (255.2%)	.27
Age	69.17 ± 10.78	67.61±12.47	67.95±9.58	75.00±8.62	5.56**
Family originally from					11.74
Taiwan	67 (43.8%)	27 (52.9%)	27 (37.0%)	13 (44.8%)	
Mainland China	46 (30.1%)	14 (27.5%)	23(31.5%)	9 (31.0%)	
Hong Kong	28 (18.3%)	6 (11.8%)	17.2(23.3%)	5 (17.2%)	
Vietnam	6 (3.9%)	3 (5.9%)	2 (2.7%)	1 (3.4%)	
Malaysia	4 (2.6%)	1(2.0%)	3 (4.1%)	0%	
Other	2 (1.4%)	0%	1 (1.3%)	1 (3.4%)	
Foreign born (Yes)	150 (98.0%)	50 (98.2%)	1 (98.6%)	28 (96.6%)	.47
Length of residency	28.54 ± 12.88	27.43	29.94	27.10	7.82
Years of education	13.87 ± 3.55	14.57	13.43	13.76	1.57

Table 4.1 (Continued) Descriptive Characteristics of Sample

Variables	All participants (N=153)	Austin (n=51)	Houston (n=73)	Dallas (n=29)	Critical value and significance
	M ± SD/ n (%)	M ± SD / n (%)	M ± SD / n (%)	M ± SD / n (%)	χ^2/F
Marital status					2.02
Single	44 (28.7%)	11 (21.6%)	23 931.5%)	10 (34.5%)	
Married or living with a significant other	109 (71.3%)	40 (78.4%)	23 (31.5%)	19 (65.5%)	
Annual family income before tax					15.81
Less than $20,000	54 (35.3%)	9 (20.5%)	33 (46.5%)	12 (50.0%)	
$20,001- $30,000	10 (6.5%)	5 (11.4%)	3 (4.2%)	2 (8.3%)	
$30,001- $40,000	14 (9.2%)	6 (13.6%)	6 (8.5%)	2 (8.3%)	
$40,001- $50,000	7 (4.6%)	1 (2.3%)	4 (5.6%)	2 (8.3%)	
$50,001- $75,000	21 (13.7%)	9 (20.5%)	9 (12.7%)	3 (12.5%)	
$75,001- $100,000	15 (9.8%)	8 (18.2%)	7 (9.9%)	0%	
More than $100,000	18 (11.8%)	6 (13.6%)	9 (12.7%)	3 (12.5%)	

Table 4.1(Continued) Descriptive Characteristics of Sample

Variables	All participants (N=153)	Austin (n=51)	Houston (n=73)	Dallas (n=29)	Critical value and significance
	M ± SD/ n (%)	M ± SD / n (%)	M ± SD / n (%)	M ± SD / n (%)	χ^2/F
Income meets your needs (Yes)	124 (81.0%)	46 (95.8%)	55 (77.5%)	23 (92.0%)	8.96
Years since being diagnosed with diabetes	13.42 ± 10.20	12.71±9.62	12.69±10.51	16.41±10.17	1.56
Type of treatment					
No medication	58 (37.9%)	19 (37.3%)	30 (41.7%)	9 (31.0%)	1.02
Oral medication	119 (77.8%)	38 (74.5%)	58 (80.6%)	23 (79.3%)	.66
Insulin	22 (14.4%)	5 (9.8%)	10 (13.9%)	7 (24.1%)	3.11
Alternative treatment	5 (3.3%)	1 (2.0%)	4 (5.6%)	0%	2.39
Number of chronic diseases	1.30 ± 1.27	.96 ± 1.06	1.22±1.27	2.07±1.51	8.01***
Acculturation	14.82 ± 7.66	16.55 ± 7.21	14.47 ± 7.89	12.57 ± 7.4	2.64

Note: * $p < .05$; ** $p < .01$; *** $p < .001$

Descriptive Statistics for Study Variables

Illness Perception

Scores on the IPQ-R subscales are displayed in Table 4.2. Participants reported that they have experienced an average of four symptoms from 14 listed symptoms and identified that two of 14 may be related to their diabetes. The most common symptoms participants identified were fatigue (65.2%), sleep difficulties (42.1%), and weight loss (38.4%). Each of these symptoms was identified by fewer than half of the participants as being related to their diabetes: 49.6% of participants said fatigue was related to diabetes; 28.8% for sleep difficulties, and 32.4% for weight loss.

For the illness representation subscales, the highest mean score was Timeline (3.71 ± 0.63), followed by personal control (3.73 ± 0.64), and treatment control (3.60 ± 0.56). This means that participants largely think that their diabetes is a chronic condition that can be controlled by personal efforts and treatment. The subscales were internally consistent for each with α from .70-.90.

The Cause of diabetes subscale was revised for this study by adding *bad feng- shui*, *pa-tzu, hotness or blood blockage, sleeplessness*, and *weather change* to address Chinese health beliefs of inner body ecological balance and cultural health beliefs (Tseng, et al., 2013). However, 88.8% and 81.3% of participants chose strongly disagree and disagree, respectively, for the *feng-shui and pa-tzu* items, thus these two items were excluded from further analysis. The factor structure of the remaining 19 items about diabetes causes was examined by Principal Components Analysis (PCA) and principal-axis factoring with varimax rotation. The number of factors was determined by examining the scree plot for 4 factors. Item distribution in each factor were the same in both PCA and principal-axis analysis, but PCA was chosen for the analysis because it explains more of the variance.

The items of *poor medical care in my past* and *aging* were deleted because they had low factor loadings < 0.4 (Pituch & Stevens, 2015). Thus, a four-factor solution was extracted which explained 58.71% of the variance in diabetes cause. The four factors were psychological attribution, balance, risk factors, and behaviors, and these respectively accounted for 30.54%, 12.03%, 9.19%, and 6.95% of the explained variance based on the PCA.

Seven items made up the balance subscale: weather changes, hotness or blood blockage, immunity, sleeplessness, chance or bad luck, hereditary, and personality. Three items composed the risk factors subscale that includes smoking, alcohol, and pollution in the environment. Psychological attribution subscale included five items: stress, mental attitude (e.g., thinking about life negatively), worries, overwork, and emotional state (e.g., feeling down, lonely, and empty). Only two items, "diet or eating habits" and "my own behaviors" were loaded on the behavior component. Cronbach's alpha for the Cause subscales ranged from 0.57 to 0.82.

Table 4.2 Description of Scores for the IPQ-R

Variables	# of Items	M ± SD (range)	Mean by Item	Internal Consistency (α)
Symptom	14	3.53±3.20 (0-12)		.83
Identity		2.31±2.90 (0-12)		
Representation				
Timeline	6	23.96±4.18 (10-30)	3.71±.63	.74
Consequences	6	21.70±4.19 (8-30)	2.97±.72	.76
Personal control	6	25.34±3.55 (11-30)	3.73±.64	.74
Treatment control	5	19.68±2.88 (10-25)	3.60±.56	.70
Illness coherence	5	17.37±4.65 (7-25)	3.36±.70	.79
Timeline cyclical	4	12.18±3.83 (4-20)	2.61±.79	.84
Emotional representations	6	17.91±5.83 (6-30)	2.70±.83	.90
Causes				
Balanced	7	18.51±4.67 (7-30)	2.67±.68	.74
Risk factor	3	6.77±5.83 (3-14)	2.27±.89	.82
Psychological attribution	5	13.51±4.16 (5-24)	2.73±.83	.82
Behavior	2	7.09±1.81 (2-10)	3.57±.89	.57

Diabetes Management Self-Efficacy (DMSES)

Scores on the DMSES ranged from 3 to 200 for the 20 items. Higher score indicated greater self-efficacy. The sample scored a mean of 149.02 ± 35.40. The DMSES internal consistency in this sample is evidenced by a Cronbach's alpha of .94. These findings are presented in Table 4.3.

Diabetes Distress Scale (DDS)

The average DDS score was 39.80 ± 16.41 (range 11-85), where higher scores mean higher distress. The internal consistency in this sample is evidenced by a Cronbach's alpha of .94. These findings are presented in Table 4.3.

Center for Epidemiological Studies Depression Scale (CES-D)

Scores on the CES-D ranged from 0 to 43, with higher scores indicating more depressive symptoms. The average score of CES-D in this sample was 11.25 ± 7.70. When applying the suggested cut-off score (≥16), 24.8% of the participants fell in the category of defined clinical depression. The internal consistency in this sample is evidenced by a Cronbach's alpha of .94. These findings are presented in Table 4.3.

Summary of Diabetes-Care Activities (SDSCA)

The mean score on SDSCA was 38.56 ± 11.97 (range 12-63). Only 6 (3.9%) participants answered that they smoke, with an average of 4.75 ± 3.86 cigarettes smoked on a typical day. The internal consistency in this sample (not including the smoke item) is evidenced by a Cronbach's alpha of .68. These findings are presented in Table 4.3.

Table 4.3 Descriptive of DMSES (N=153)

Variables	M± SD (range)	Internal Consistency (α)
DMSES	149.02±35.40 (3-200)	.94
DDS	39.80±16.41(11-85)	.94
CES-D	11.25±7.70 (0-43)	.86
SDSCA	38.56±11.97(12-63)	.68

Data Analysis

Data cleaning and error checking was done prior to data analysis. Missing data comprised less than 1% on items of diabetes self-management activity, year of education, chronic disease condition, acculturation level, IPQ-R consequence, IPQ-R balance, IPQ-R Risk factor, IPQ-R psychological attribution; 2% of data were missing on the items of length of DM; 5.9% data were missing on the income meet family need item. These missing items were checked by the expectation -maximization (EM) algorithm which showed the data were missing randomly ($p = .15$). List-wise deletion strategy for missing data was used for further analysis (Pituch & Stevens, 2015).

Frequencies and distribution analysis, including histograms, skewness, and the Kolmogorov-Smirnov statistic, were performed to identify normality and outliers. Except for age and diabetes self-management activities variables, the rest of the variables included length of diabetes, number of chronic health conditions, acculturation, illness perception, diabetes distress, and depressive symptoms were showed right-skewed, and education was left-skewed. Kolmogorov-Smirnov analysis also suggested the normality was violated on years of education, length of diabetes, number of chronic health conditions, acculturation, illness perception, diabetes distress, and depressive symptoms ($p < .05$). However, the outliers of these variables were retained because the values between the mean and 5% trimmed mean were small (range 0.01 to 2.48), which means the outliers scores do not have a strong influence on the mean (Pallant, 2013).

Before running correlations, the assumptions for using correlations were tested (Plichta, Kelvin, & Munro 2013.). First, the independence of observations was supported by the data collection process because data were collected separately. Second, the assumption of linear relationships between variables was supported by reviewing scatter plots that showed the relationships between variables was linear. Third, the assumption of

normality of the data was examined by using histogram skewness, and Kolmogorov-Smirnov statistics. Checking the 5% trimmed means confirmed that the outliers were not problematic.

Before performing the hierarchical regression analysis, assumptions for regression were tested included multicollinearity, outliers, normality, linearity, homoscedasticity and independence of residuals were confirmed. The multicollinearity between independent variables were examined by Tolerance (> .10) and VIF (< 10) values which showed that that there is no multicollinearity problem in this dataset. Normal Probability Plot (PP plot) of regression Standardized Residual and scatterplot were used to confirm the normality. The outliers' influence was analyzed with Cook's Distance. The maximum value for Cook's Distance was .099, suggesting no major problems because it was < 1 (Pallant, 2013).

Research Question One

The first research question is: What are the relationships among the independent variables of background information (age, sex, education, income, marital status, length of diabetes, insulin treatment, number of chronic disease, acculturation level), illness perceptions factors (consequences, personal control, treatment control, and cause), diabetes self-efficacy, emotional distress (diabetes distress and depressive symptoms) with the dependent variable of diabetes self-management activities among Chinese Americans with T2DM?

Marital status was re-coded so that participants who selected married and living with significant other were recoded into Married or living with a significant other = 1 and the rest were coded into Not Married = 0. Two types of correlation coefficients were conducted to check the relationships between two levels of measurement. Pearson correlation for interval level measurements; and Phi correlation for dichotomous variables

included gender, income met need, marital status, insulin usage. Table 4.4 presents the correlation between the independent variables and diabetes self-management activities.

Relationship between Predictors variables and Self-Management Activities

Diabetes self-management activity is significantly related to age (r = .32, $p < .001$), length of diabetes diagnosis (r = .25, $p < .01$), insulin use (r = .28, $p < .01$), self-efficacy (r = .37, $p < .001$), and acculturation level (r = - .18, $p < .05$). Participants who were older, diagnosed with diabetes longer, used insulin, and had higher self-efficacy had better self-management activities which matched the expected result. Illness perceptions (consequences, personal control, treatment control, and the four subscales of cause), diabetes distress, and depressive symptoms were not significantly correlated to diabetes self-management activities.

Relationship of Independent variables

Higher age was significantly related to duration of diagnosed diabetes (r = .33, $p < .001$), number of chronic conditions (r = .34, $p < .001$), and depression (r = .16, $p < .05$). In contrast, higher age was significantly related to lower acculturation (r = - .34, $p < .001$), lower personal control (r = - .25, $p < .01$), and lower treatment control (r = - .16, $p < .05$). Older participants were more likely to have lower acculturation levels and hold fewer beliefs that their diabetes is amenable to personal efforts or treatment. Also, older participates who had been diagnosed with diabetes longer reported having a greater number of chronic conditions and more symptoms of depression.

Gender was significantly related to education (r = .33, $p < .001$), marital status (r = .38, $p < .001$), and insulin usage (r = .17, $p < .05$). Males were more likely than females to be married, have a higher level of education, and receive insulin treatment for their diabetes.

Education was significantly related to income meeting family needs (r = .26, p < .01), marital status (r = .23, p < .01), acculturation level (r = .47, p < .001), and depression (r = - .16, p < .05). Participants with more years of education were more likely to report being married, higher acculturation levels, fewer depressive symptoms, and having incomes that met their family needs.

Income meeting family need was significantly correlated to marital status (r = .23, p < .01), number of chronic conditions (r = - .22, p < .01), consequences (r = - .36, p < .001), treatment control (r = .19, p < .05), balance (r = - .20, p < .05), depression (r = - .21, p < .05), diabetes distress (r = - .21, p < .05). Participates who reported that their family income met their needs were more likely to be married, have fewer chronic conditions, hold fewer beliefs that their diabetes has negative consequences, think that their diabetes could be controlled by treatment, and report a lower degree of diabetes distress and fewer depressive symptoms. They were also less likely to attribute the cause of their diabetes to inner body ecological balance or external influences.

Marital status was significantly correlated to acculturation (r = .21, p < .05), treatment control (r = .26, p < .01), self-efficacy (r = .22, p < .01), and depression (r = - .21, p < .01). Participants who were married had higher levels of acculturation, more likely to think their diabetes could be controlled by treatment, and reported higher diabetes self-management self-efficacy and fewer depressive symptoms.

Duration of diabetes diagnosis was correlated to insulin usage (r = .34, p < .001), number of chronic conditions (r = .26, p < .01), and depression (r = .21, p < .01). Participants who have had diabetes for more years reported a higher number of chronic conditions and more depressive symptoms. Insulin usage was also significantly correlated to number of chronic conditions (r = .19, p < .05) and consequences (r = .20, p < .05).

Participants who were insulin users were more likely to have more chronic conditions and think their diabetes has negative consequences.

Number of chronic conditions was significantly correlated to consequences (r = .36, $p < .001$), depression (r = .30, $p < .001$), and diabetes distress (r = .23, $p < .01$). In contrast, number of chronic conditions was negatively correlated to treatment control (r = - .23, $p < .01$), risk factors (r = - .21, $p < .01$), and self-efficacy (r = - .22, $p < .01$). Participants who reported more chronic conditions were more likely to think that their diabetes has negative consequences, have more depressive symptoms, and have a higher degree of diabetes distress. They were also more likely to think that their diabetes could not be controlled by treatment and not think risk factors such as smoking, alcohol, and pollution contributed to their diabetes; they also reported lower diabetes self-management efficacy.

Acculturation was positively correlated to personal control (r = .22, $p < .01$) and treatment control (r = .17, $p < .05$), but negatively correlated to depression (r = - .24, $p < .01$). Participants who had higher acculturation levels were more likely to believe that their diabetes can be controlled by personal efforts or treatment and report fewer depressive symptoms.

Consequences was positively correlated to psychological attribution (r = .21, $p < .01$), depression (r = .31, $p < .001$), diabetes distress (r = .39, $p < .001$), but negatively correlated to self-efficacy (r = - .24, $p < .01$). Participants who held stronger beliefs about negative consequences of their diabetes were more likely to think that psychological factors such as worries, stress, feeling down, or thinking about life negatively caused their diabetes. They were also more likely to report more depressive symptoms, higher diabetes distress, and lower diabetes management self-efficacy.

Personal control was positively correlated to treatment control (r = .61, $p < .001$) and behavior (r = .31, $p < .001$), and was negatively associated with depression (r = - .23,

$p < .01$). People who think their diabetes can be controlled by treatment were more likely to believe that diabetes was caused by their own behavior or eating habits, and reported less depressive symptoms.

Treatment control was positively correlated to behavior (r = .19, $p < .05$), self-efficacy (r = .25, $p < .01$), and was negatively correlated to diabetes distress (r = - .25, $p < .01$) and depression (r = - .38, $p < .001$). Participates who believed their diabetes is amenable to treatment were more likely to believe their diabetes was caused by their own behavior such as diet or eating habits, and also reported higher self-management efficacy and reported lower diabetes distress and lesser depressive symptoms.

Balance was positively correlated to risk factor (r = .45, $p < .001$), psychological attribution (r = .51, $p < .001$), depression (r = .25, $p < .01$), and diabetes distress (r = .32, $p < .001$). Participants who believed the inner body ecological balance or external influences contributed to their diabetes were more likely to think psychological factors such as feeling lonely, stress, or worries contributed to their disease. They were also more likely to report more depressive symptoms and higher diabetes distress.

Risk factor subscale was positively correlated to psychological attribution (r = .32, $p < .001$). Participants who believed their diabetes was caused by risk factors such as smoking, alcohol, and pollution were more likely to report that psychological factors contributed to their diabetes.

Psychological attribution was positively correlated to behavior (r = .33, $p < .001$), depression (r = .30, $p < .001$), diabetes distress (r = .37, $p < .001$), and was negatively correlated to self-efficacy. Participants who believed their diabetes can be attributed to psychological factors were more likely think their own behaviors contributed to their diabetes, and were also more likely to report more depressive symptoms, higher diabetes distress, and lower self-management efficacy.

Behavior was negatively correlated to self-efficacy (r = - .19, $p < .05$). Participants who believed their diabetes was caused by their own behaviors also reported lower self-management efficacy. In addition, self-efficacy was negatively correlated with depression (r = - .38, $p < .001$) and diabetes distress (r = - .40, $p < .001$). Participants who reported higher self-management efficacy had fewer depressive symptoms and lower diabetes distress.

Table 4.4 Correlations among Background Characteristics, Diabetes Illness Perceptions, DMSES, DSS, CESD, and SDSCA

	1	2	3	4	5	6	7	8	9	10
1. SDSCA	-									
2. Age	.32***	-								
3. Male	.09	-.02	-							
4. Education	-.11	-.144	.33***	-						
5. Income met need	.01	.08	.10	.26**	-					
6. Married	.08	.05	.38***	.23**	.23**	-				
7. Length of diabetes	.25**	.33***	.14	-.01	.06	.01	-			
8. Insulin	.28**	.12	.17*	.96	-.08	-.07	.34***	-		
9. Number of chronic conditions	.07	.34***	-.07	-.09	-.22**	-.01	.26**	.19*	-	
10. Acculturation	-.18*	-.34***	.11	.47***	.23**	.21*	-.01	.10	-.14	-
11. Consequences	-.06	-.05	-.03	-.04	-.36***	-.15	.13	.20*	.36***	-.05
12. Personal Control	- .07	-.25**	.02	.06	.10	.09	-.04	.00	-.12	.22**
13. Treatment control	.01	-.16*	.10	.02	.19*	.26**	-.11	-.12	-.23**	.17*
14. Balance	.10	-.01	-.02	-.13	-.20*	.11	-.09	-.06	.11	-.09
15. Risk factor	.12	-.12	.15	.14	.02	.10	-.10	.07	-.21**	.09
16. Psychological	.08	-.02	-.08	.02	-.04	-.10	.06	-.02	.04	.02
17. Behavior	-.13	-.13	.06	.05	.11	.05	-.09	-.14	-.03	.04
18. DMSES	.38***	.03	.05	-.07	.12	.22**	-.06	-.04	-.22**	.00
19. DSS	-.02	-.02	-.03	-.13	-.21*	-.13	.14	.21*	.23**	-.01
20. CES-D	.06	.16*	-.12	-.16*	-.21*	-.21**	.21**	.14	.30***	-.24**

Table 4.4 (Continued) Correlations among Background Characteristics, Diabetes Illness Perception, DMSES, DSS, CES-D, and SDSCA

	11	12	13	14	15	16	17	18	19	20
1. SDSCA										
2. Age										
3.Male										
4.Education										
5. Income										
6. Married										
7. Length of diabetes										
8. Insulin										
9. Number of chronic conditions										
10. Acculturation										
11. Consequences	-									
12. Personal Control	.04	-								
13. Treatment control	-.13	.61***	-							
14. Balance	.14	-.07	-.09	-						
15. Risk factor	-.01	-.00	.07	.45***	-					
16. Psychological	.21**	.06	-.04	.51***	.32***	-				
17. Behavior	.13	.31***	.19*	.09	.01	.33***	-			
18. DMSES	-.24**	.11	.25**	-.04	.08	-.18*	-.19*	-		
19. DSS	.39***	-.12	-25**	.32***	.05	.37***	.11	-.40***	-	
20. CES-D	.31***	-.23**	-.38***	.25**	.05	.30***	-.06	-.38***	.47	-

Note: * $p < .05$; ** $p < .01$; *** $p < .001$; SDSCA: Summary of Diabetes-Care Activities; DMSES: Diabetes Management Self-Efficacy; DDS: Diabetes Distress Scale; CES-D: Center for Epidemiological Studies Depression Scale

Research Question Two

The second research question is: How do diabetes illness perception dimensions (consequences, personal control, treatment control, and cause) and emotional distress (diabetes distress and depressive symptoms) predict diabetes self-management activities after controlling for diabetes management self-efficacy and background factors?

Two hierarchical multiple regression models were conducted separately for illness perception subscales and emotional distress to determine the variance of diabetes self-management activities that is explained after controlling for the background variables and diabetes management self-efficacy. The set of predictors for the first hierarchical multiple regression mode was sequentially introduced to the first model is this order: (a) background variables (age, gender, education, income meet need, marital status, years of diabetes, insulin usage, number of chronic conditions, and acculturation); (b) diabetes management self-efficacy; and (c) illness perception subscales (consequences, personal control, treatment control, balance, risk factor, psychological attribution, behavior factor). The second hierarchical multiple regression model introduced diabetes distress and depressive symptoms instead of illness perception subscales in the last steps, the first two steps remained the same predictors.

Results of Hierarchical Multiple Regression

After using list-wise deletion for missing data, 135 cases were included in the first hierarchical multiple regression model (Table 4.5). In the first step, age and insulin usage were found to be significant predictors. In the next step, self-efficacy was added to the model, and age, insulin usage, and self-efficacy were significant predictors of diabetes self-management activities. In the last step, after controlling for the background variables and self-efficacy, none of the illness perception predictors were significantly related to the

diabetes self-management activities, but age (β = .26, p < .01), insulin usage (β = .28, p < .01), and self-efficacy (β = .44, p < .001) remained significant. The entire hierarchical multiple regression model accounted for 41.5% of the variance in diabetes self-management activities (F = 4.89, p < .001).

There were 136 cases included in the second hierarchical multiple regression model after using a list-wise deletion strategy for the missing data. The same demographic predictors that were used in step 1 of the first hierarchical multiple regression model were introduced, and once again age and insulin usage were found to be significant predictors. Self-efficacy was also a significant predictor in the second step. In the last step, after controlling for the background variables and self-efficacy, neither depression nor diabetes distress predictors were significantly related to the diabetes self-management activities, but age (β = .28, p < .01), insulin usage (β = .24, p < .01), and self-efficacy (β = .46, p < .001) remained significant. This entire hierarchical multiple regression model accounted for 38.5% of the variance in diabetes self-management activities (F = 6.42, p < .001; Table 4.6).

Table 4.5. Hierarchical Multiple Regression Model of Demographics, DMSES, Illness Perceptions and SDSCA (n=135)

Predictor	Standardized Coefficient (β)		
Age	.25*	.25**	.26**
Male	-.02	-.01	.01
Education	-.05	.02	.02
Income met need	.01	-.03	-.01
Married	.16	.07	.06
Years of diabetes	.12	.12	.12
Insulin usage	.26**	.26**	.28**
Number of chronic conditions	-.10	-.02	-.02
Acculturation	-.13	-.12	-.11
DMSES		.40***	.44***
Consequences			-.01
Personal control			-.02
Treatment control			-.00
Balance			.10
Risk factor			.02
Psychological attribution			.15
Behavior	.073	.08	.01
R^2	.23***	.37***	.43***

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; DMSES: Diabetes Management Self-Efficacy

Table 4.6. Hierarchical Multiple Regression Model of Demographics, DMSES, DDS, CES-D, and SDSCA (n=136)

Predictor	Standardized Coefficient (β)		
Age	.25*	.25**	.26**
Male	-.02	-.01	.00
Education	-.05	.01	.02
Income met need	.01	-.03	-.00
Married	.16	.07	.08
Years of diabetes	.12	.12	.11
Insulin usage	.26**	.26**	.24**
Number of chronic conditions	-.10	-.02	-.04
Acculturation	-.13	-.12	-.10
DMSES		.40***	.46***
DDS			.09
CES-D			.09
R2	.23***	.37***	.39***

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; SDSCA: Summary of Diabetes-Care Activities; DMSES: Diabetes Management Self-Efficacy; DDS: Diabetes Distress Scale; CES-D: Center for Epidemiological Studies Depression Scale

Research Question Three

Whether diabetes management self-efficacy mediate the effect of illness perception (consequences, personal control, treatment control, and cause) on self-management activities?

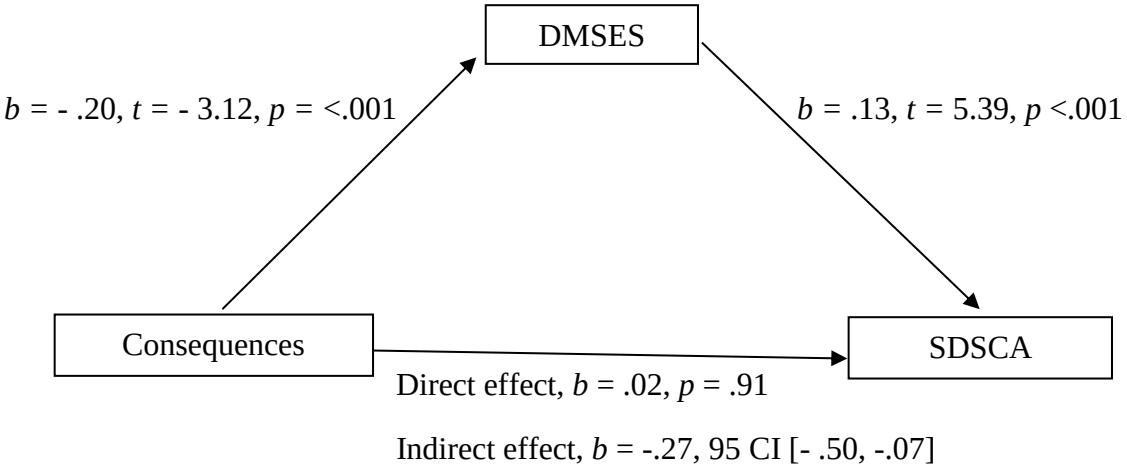
Seven mediation analysis models to test mediation effects of self-efficacy on the relationship of one of the seven illness perception subscales (consequences, personal control, treatment control, balance, risk factor, psychological attribution, behavior factor) with diabetes self-management activities were conducted. Each model contained the following variables:

- Illness perception subscale (each model contained one of the following: Consequences, Personal Control, Treatment Control, Balance, Risk Factor, Psychological Attribution, Behavior Factor)
- Testing mediator: Diabetes Management Self-Efficacy (DMSES)
- Outcomes variable: diabetes self-management activities (SDSCA)
- Covariates: age, and insulin usage

Model 1 shows that consequences significantly predicted DMSES (b = - 2.03, t = - 3.12, p < .001). Self-efficacy also significantly predicted diabetes self-management activities (b = .13, t = 5.39, p < .001). Consequences did not have a significant direct effect on diabetes self-management activities (b = .02, t = .11, p = .91). However, there was a significant indirect effect of consequences on diabetes self-management activities through self-efficacy, b = -.27, 95% CI [- .50, - .07]. This means that self-efficacy mediates the relationship between belief about consequences and diabetes self-management activities. This could imply that self-care activities could be improved by decreasing a person's

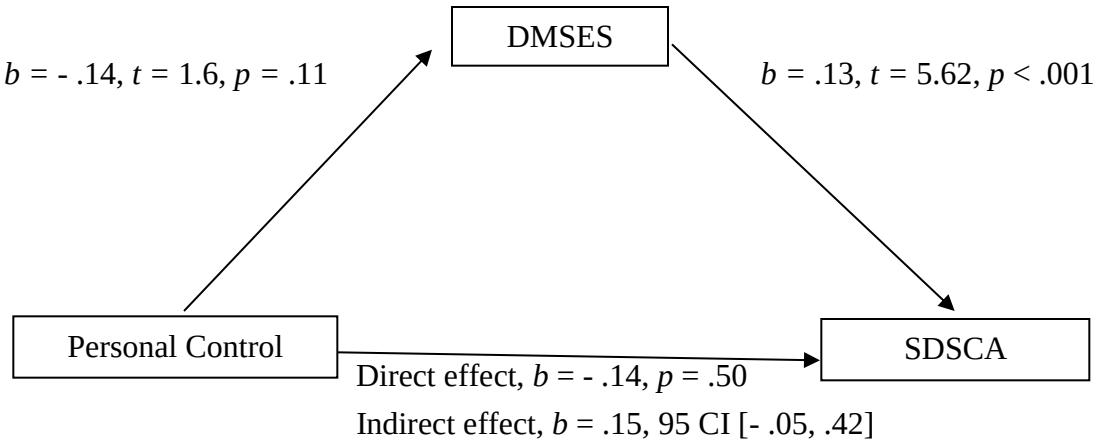
beliefs about worse consequences of their diabetes and increasing their sense of self-efficacy (Figure 4.1).

Figure 4.1 The mediating effect of DSMSES on the Relationship between Consequences and SDSCA



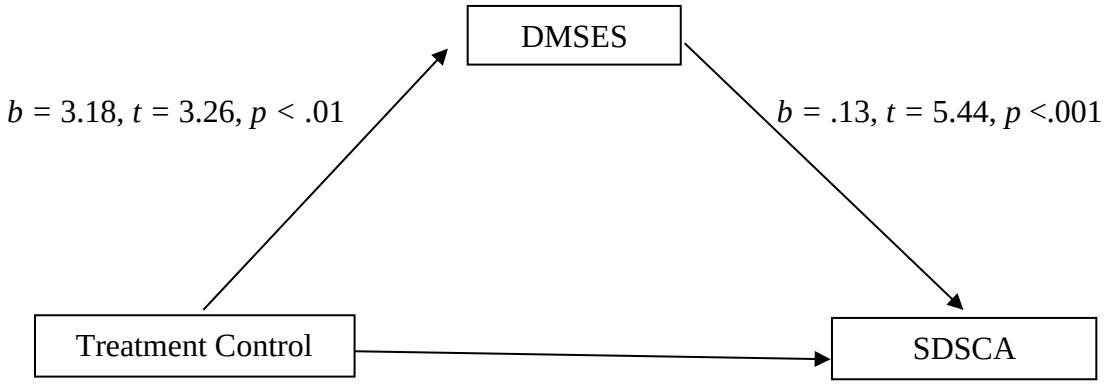
Model 2 shows that personal control did not predict self-efficacy (b = - .14, t = 1.60, p = .11). Thus, diabetes management self-efficacy is not a mediator for the relationship between personal control and diabetes management activities (Figure 4.2).

Figure 4.2 The mediating effect of DSMSES on the Relationship between Personal Control and SDSCA



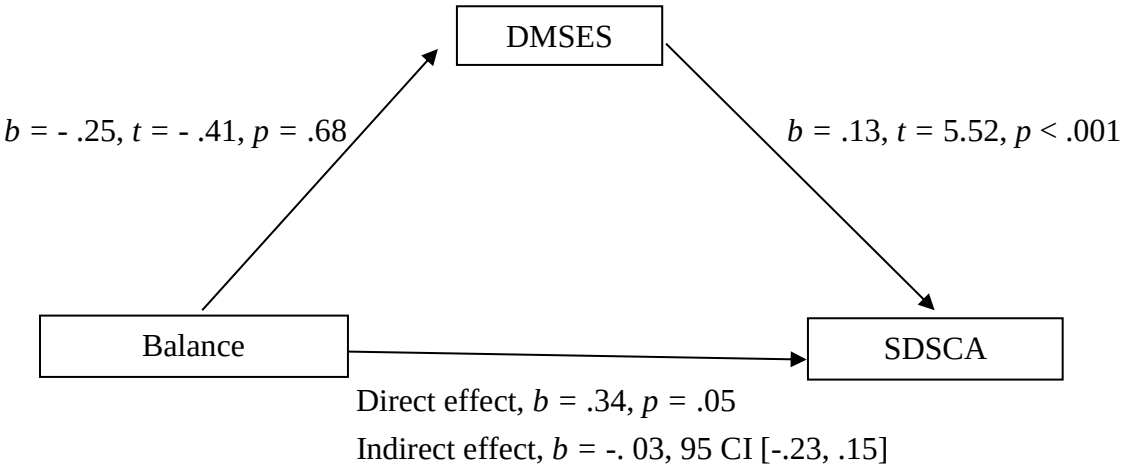
Model 3 shows that treatment control significantly predicts self-efficacy (b = 3.18, t = 3.26, p < .01). Self-efficacy also significantly predicts diabetes self-management behaviors (b = .13, t = 5.44, p < .001). Treatment control does not have a significant direct effect on diabetes self-management behaviors (b = - .07, t = - .23, p = .82). However, there was a significant indirect effect of treatment control on diabetes self-management behaviors through self-efficacy (b = .42, 95% CI [.14, .77]). This means that self-efficacy mediates the relationship between beliefs about treatment control and diabetes self-management behaviors. This could mean the presence of diabetes management self-efficacy could help to increase the effects of belief of Treatment Control on self-Management activities (Figure 4.3).

Figure 4.3 The mediating effect of DSMSES on the Relationship between Treatment Control and SDSCA



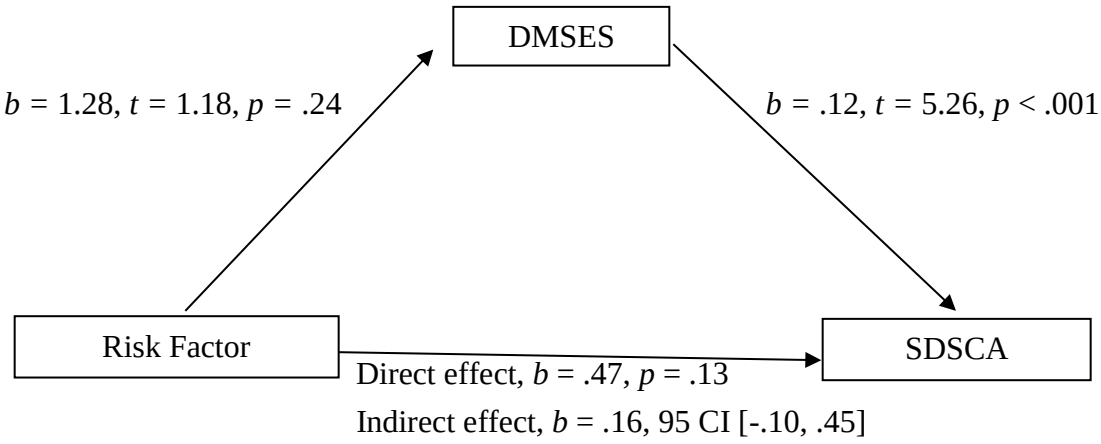
Model 4 shows that balance did not significantly predict self-efficacy (b = -.25, t = -.41, p = .68). Thus, diabetes management self-efficacy is not a mediator for the relationship between the belief of balance and diabetes management activities (Figure 4.4).

Figure 4.4 The mediating effect of DSMSES on the Relationship between Balance and SDSCA



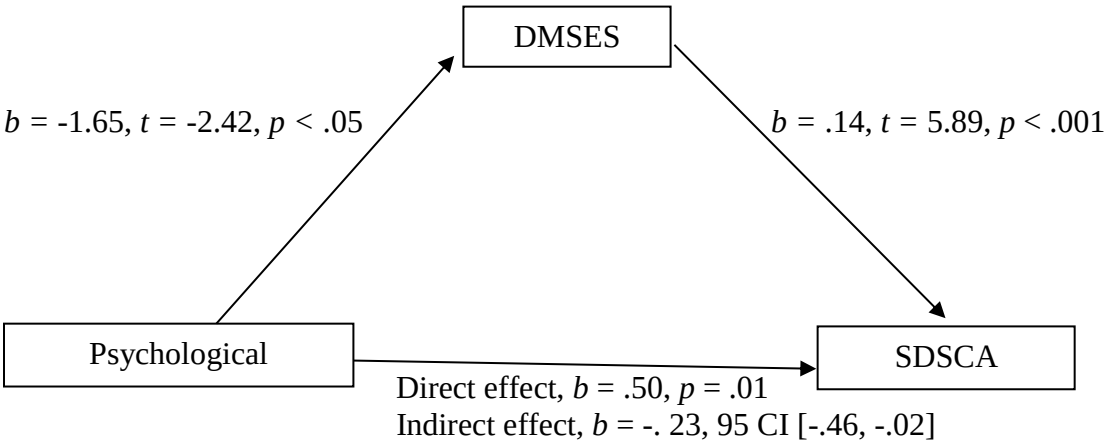
Model 5 shows that risk factors did not significantly predict self-efficacy (b = 1.28, t = 1.18, p = .24). Thus, diabetes management self-efficacy is not a mediator for the relationship between the belief of risk factors and diabetes management activities (Figure 4.5).

Figure 4.5 The mediating effect of DSMSES on the Relationship between Risk Factor and SDSCA



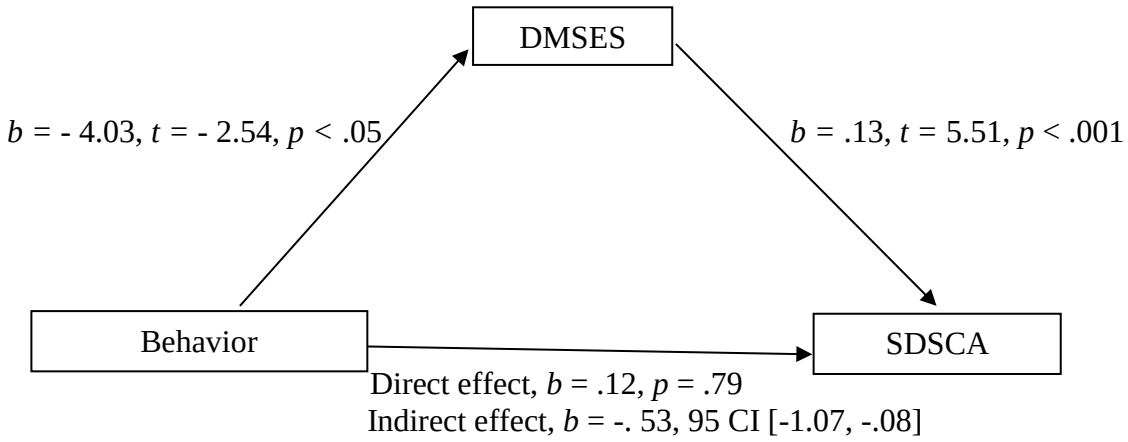
Model 6 shows that belief that psychological attribution causes diabetes significantly predicts self-efficacy (b = -1.65, t = -2.42, p < .05). Self-efficacy also significantly predicts diabetes self-management behaviors (b = .14, t = 5.89, p < .001). Psychological attribution has a significant direct effect on diabetes self-management behaviors (b = .50, t = 2.5, p < .05). Moreover, there was a significant indirect effect of psychological attribution on diabetes self-management behaviors through self-efficacy, b = - .23, 95% CI [- .46, -.02]. This means that self-efficacy is a competitive mediator (Zhao, et al., 2010) that mediates the relationship between beliefs about psychological attribution and diabetes self-management behaviors. This could imply that there is an omitted mediator in this mediation model. This model suggests that self-care activities can be improved by decreasing psychological attribution as a cause of diabetes and increasing self-efficacy (Figure 4.6).

Figure 4.6 The mediating effect of DSMSES on the Relationship between Psychological Attribution and SDSCA



Model 7 shows that beliefs that one's personal behavior causes diabetes significantly predict self-efficacy (b = - 4.03, t = - 2.54, p < .05). Self-efficacy also significantly predicts diabetes self-management behaviors (b = .13, t = 5.51, p < .001). Beliefs about behavior do not have a significant direct effect on diabetes self-management behaviors (b = .13, t = .27, p = .79). However, there was a significant indirect effect of beliefs about behavior on diabetes self-management behaviors through self-efficacy (b = - .53, 95% CI [- 1.07, -.08]). This means that self-efficacy mediates the relationship between beliefs about behavior and diabetes self-management behaviors. This suggests that self-care activities could be improved by decreasing a person's beliefs about certain behaviors (e.g., "my own behaviors") as a cause of their diabetes and increasing self-efficacy (Figure 4.7).

Figure 4.7 The mediating effect of DSMSES on the Relationship between Behavior and SDSCA



Research Question Four

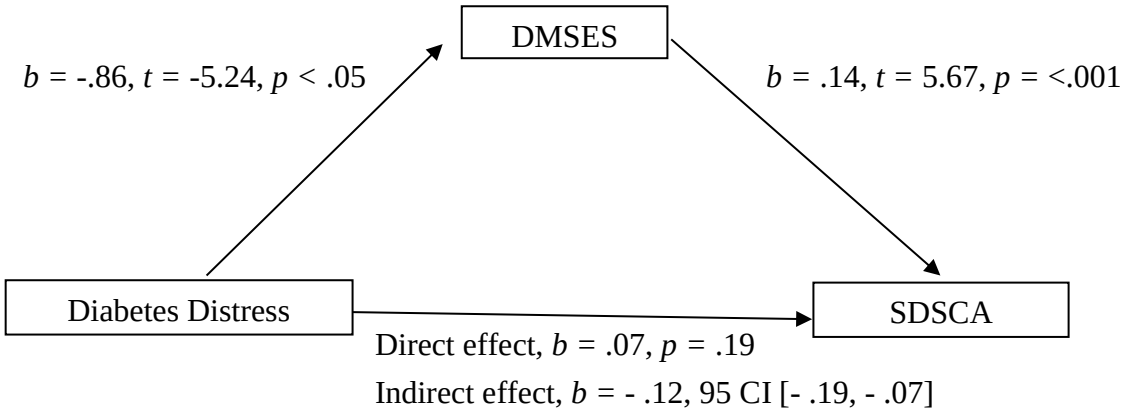
Whether diabetes management self-efficacy mediate the relationship between emotional distress (diabetes distress and depressive symptoms) and diabetes self-management activities?

Two mediation analysis models were conducted separately with the following variables:

- Emotional distress: diabetes distress (model 1), and depressive symptoms (model 2)
- Testing mediator: diabetes management self-efficacy (DMSES)
- Outcomes variable: diabetes self-management activities (SDSCA)
- Covariates: age, and insulin usage

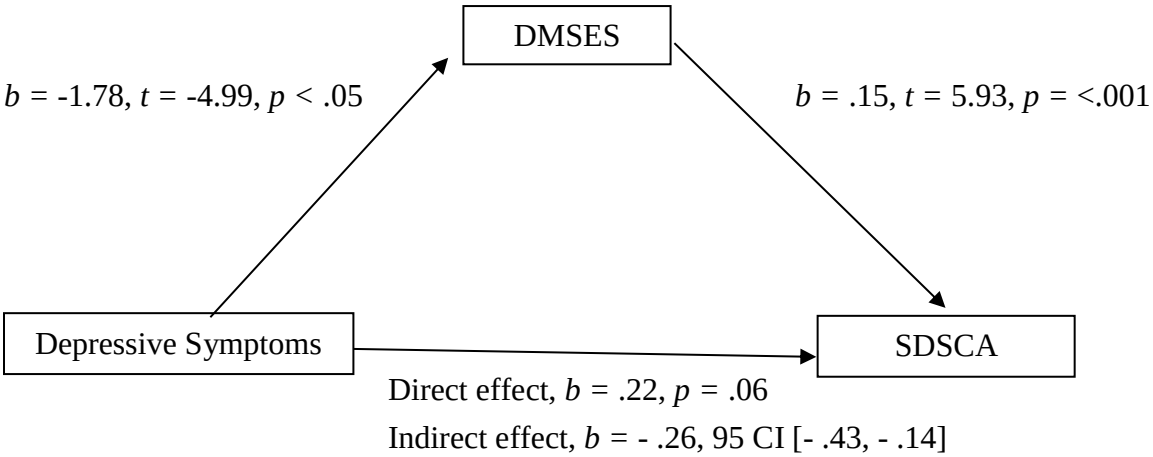
Model 1 shows that diabetes distress significantly predicts self-efficacy (b = -.86, t = -5.24, $p < .05$). Self-efficacy also significantly predicts diabetes self-management activities (b = .14, t = 5.67, $p < .001$). Diabetes distress does not have a significant direct effect on diabetes self-management activities (b = .07, t = 1.33, p = .19). However, there was a significant indirect effect of diabetes distress on diabetes self-management activities through self-efficacy (b = -.12, 95% CI [-.19, -.07]). This means that self-efficacy mediates the relationship between diabetes distress and diabetes self-management activities. This could imply that self-care activities could be improved by decreasing diabetes distress and increasing self-efficacy (Figure 4.8).

Figure 4.8 The mediating effect of DSMSES on the Relationship between Diabetes Distress and SDSCA



Model 2 shows that depressive symptoms significantly predict DMSES (b = -1.78, t = -4.99, p < .05). DMSES also significantly predicted SDSCA (b = .15, t = 5.93, p < .001). Depressive Symptoms does not have a significant direct effect on SDSCA (b = .22, t = 1.89, p = .06). However, there was a significant indirect effect of depressive symptoms on SDSCA through DMSES, b = -.26, 95% CI [- .43, -.14]. This means that DMSES mediates the relationship between depressive symptoms and SDSCA. In other words, self-efficacy mediates the relationship between depressive symptoms and self-management activities. This could imply that self-care activities could be improved by decreasing depressive symptoms and increasing self-efficacy (Figure 4.9).

Figure 4.9 The mediating effect of DSMSES on the Relationship between Depressive Symptoms and SDSCA



Summary

This chapter describes the sample and the variables used in this study, and the findings of the analyses. Two hierarchical multiple regressions were conducted to examine the variance of diabetes self-management activities by illness perception and emotional distress after controlling for background factors and self-efficacy. Neither the illness perception subscales nor emotional distress indicators were significant predictors, but age, insulin usage, and self-efficacy were the strongest significant predictors for diabetes self-management activities in both hierarchical multiple regression models. Self-efficacy was also a significant mediator for the relationship between illness perception and self-management activities. Self-efficacy significantly mediated the effect of beliefs about diabetes consequences, treatment control, the casual effects of psychological attributions on diabetes, and behavioral factors on diabetes self-management activities. Self-efficacy also mediated the relationship between emotional distress and self-management activities. This means that self-care activities could be enhanced by decreasing diabetes distress and depressive symptoms, and increasing self-efficacy.

CHAPTER FIVE: SUMMARY, DISCUSSON, IMPLICATIONS, AND RECOMMENDATIONS

This chapter summarizes the study and the findings, considers implications of the findings, and makes recommendations for future research and practice.

Summary of the Study

Purpose and Overview

The purpose of this descriptive correlational study was to explore the relationship between illness perceptions and emotional distress with self-management activities among Chinese Americans from three metropolitan areas in Texas. Illness perceptions of diabetes (consequences, personal control, treatment control, and cause), diabetes distress, and depressive symptoms were tested as predictors of diabetes self-management activities after controlling for demographic factors and diabetes management self-efficacy.

There has previously been little investigation into diabetes self-management from the perspective of Chinese Americans' illness perceptions and emotional distress. This study was guided by Leventhal's Common-Sense Model of Regulation to examine the impact of illness perceptions and emotional distress on diabetes self-management activities in Chinese Americans with T2DM. The model suggested that individuals' responses to their disease were influenced by their cognitive perceptions, fear, and distress of the diseases. The cognitive perceptions include (1) identity symptoms; (2) disease timeline (rate of onset, illness duration and rate of decline); (3) consequences (functional, social, and financial) of the disease; (4) control (how to stop the symptoms or cure the disease); and (5) cause of disease (Figure 3).

This study investigated the illness perception factors of consequences, control, and causes that have been reported to be significantly related to patients' self-management

outcomes in other ethnic groups, but previously remained unclear in Chinese Americans. Therefore, this study modified the Common-Sense Model and its questionnaire by adding items tailored to the Chinese culture to examine the impacts of consequences, control, and cause on diabetes self-management activities. Moreover, emotional distress (diabetes distress and depression) has been reported in multiple studies in patients with T2DM (Ali, et al, 2006; Fisher, Gonzales, & Polonsky, 2014; Rotella & Mannucci, 2013) but research pertaining to Chinese Americans is scarce. This study investigated how illness perceptions and emotional distress influence Chinese American patients' diabetes self-management after controlling for demographic factors and acculturation level.

In addition to the illness perceptions and emotional distress, diabetes management self-efficacy, a robust predictor of diabetes self-management, was also included in this study by examining its role as predictor and mediator after controlling for background factors. This study is expected to contribute to the understanding of factors influencing diabetes self-management which ultimately determines diabetes physiologic control and quality of life in Chinese Americans. The frameworks for this study are presented in Figure 1.1 and Figure 1.2in Chapter 1.

One hundred and fifty-three Chinese Americans were recruited from three major metropolitan areas in Texas. Individuals were recruited at community events, activities centers, and local service organizations. Those who were interested in participating were informed about the study. After oral consent was confirmed, paper questionnaires were self-administered or participants were assisted by the researcher. The data collected pertained to background information that includes demographics, disease characteristics, diabetes treatment, chronic health condition, acculturation, and illness perceptions, diabetes distress, depressive symptoms, diabetes management self-efficacy, and diabetes

self-management activities. Participants who completed the questionnaire were offered a $10 Walmart gift card to compensate for their time.

The researcher collaborated with local grass-root communities to recruit participants, used an oral consent form instead of a signature consent, and provided both English and Chinese (traditional and simplified) versions of questionnaire. In addition, the investigator and the research assistants speak English, Mandarin, Cantonese, and Taiwanese, increasing the language accessibility of people with different Chinese backgrounds. These methods enabled the completion of data collection. However, although the investigator met participants in person for the survey and explained the procedure of keeping data confidentiality, anecdotally, some participants expressed that they preferred to answer questions online instead of writing their responses on paper. Thus, an online survey should be considered in future studies, and could possibly help to reach an even wider audience with a more diverse age and income level range.

Data Analysis

The research questions for the study and the method of analysis for each question are summarized in Table 5.1

.

Table 5.1 Research Question and Method of Analysis

Number	Question	Method of Analysis
1	What are the relationships among the independent variables of background information (age, sex, education, income, marital status, length of diabetes, insulin treatment, number of chronic disease, acculturation level), illness perceptions factors (consequences, personal control, treatment control, and cause), diabetes self-efficacy, emotional distress (diabetes distress and depressive symptoms) with the dependent variable of diabetes self-management activities among Chinese Americans with T2DM?	Pearson correlation, and Phi correlation
2	How do diabetes illness perception factors (consequences, personal control, treatment control, and cause), emotional distress (diabetes distress and depressive symptoms) predict diabetes self-management activities after controlling for diabetes management self-efficacy and background factors?	Hierarchical multiple regression
3	Whether diabetes management self-efficacy mediate the of each illness perception (consequences, personal control, treatment control, and cause) on self-management activities?	Mediation analysis
4	Whether diabetes management self-efficacy mediate the relationship between emotional distress (diabetes distress and depressive symptoms) and diabetes self-management behaviors?	Mediation analysis

Sample Characteristics

Although the participants' age ranged from 31 to 95, only 14.4% of them were below 50 years old. Considering that the minimum age for inclusion in this study was 18 years old, the participants were relatively old. Moreover, 150 participants (98%) were

foreign born and have lived in the US for an average of 28.54 years. Although the participants have been living in the U.S. for about 30 years, their score for acculturation averaged 14.82 ± 7.66, out of a potential range of 0 - 36, indicating a relatively low level of acculturation. Most participants were recruited through senior fellowships in churches, senior activity centers, senior apartments, and Chinese health service organizations. First-generation immigrants are much more likely to be found in these settings, compared to second-generation immigrants. Similar observations had been found in Korean American communities: second-generation Korean Americans were more acculturated and expressed less need for social interaction with people from the same ethnic group via ethnically orientated service groups (Kim & Pyle, 2004). In this study, from the researcher's conversations with participants while they were completing the survey, it was revealed that most of them had retired in their home countries then moved to the U.S. to stay with their adult children, or they came to the U.S. for higher education then stayed in the U.S. for careers. This pattern possibly explains why the average age of the sample is relatively old, and nearly all were foreign born.

About half of the participants reported that their household income was less than $40,000, which is much lower than the median household income of $54,727 in Texas (Census, 2017). Anecdotally, when participants were completing the survey, many of them described that they were not sure how much their children, whom they lived with, earned. Therefore, they may not be able to answer this question correctly. Nevertheless, 81% stated that their income met their needs. This may be because most participants were retired, and either living with their children or living in senior apartments, and likely not needing much personal income. Although the survey did not collect health insurance information, most participants expressed anecdotally that they were covered by Medicare, had a pension from their work, or a spending allowance from their children, which was sufficient for their daily

lives. Thus, the annual family income variable is likely not an appropriate proxy to evaluate participants' financial condition in this study. Assessing their perceptions of whether the income met their needs or if they had insurance coverage may better indicators of their financial situation.

Participants reported an average of 1.3 chronic diseases. This finding is consistent with earlier studies that found patients with diabetes had at least one other comorbid chronic disease (Khuwaja, Lalani, Dhanani, Azam, Rafique, & White, 2010). About 78% of participants were prescribed oral medication and 14% were prescribed insulin, which is similar with Xu's research (2010) of Chinese Americans with T2DM in the Ohio and Chicago areas but it is a little lower than the CDC's data which reported that 17.8% of adults with diabetes used insulin (CDC, 2012). In traditional Chinese culture, it is believed that people who need treatment with insulin have more severe levels of diabetes, and at times daily insulin injection is a stigma (Chen, 2011; Wong, 2011). Anecdotally, a number of participants in this study expressed that insulin treatment was not as scary as previously thought, and some were even willing to share their personal experiences during casual conversations the researcher had with them.

Diabetes Management Self-Efficacy

The average score of self-efficacy in this study was 149.02 ± 35.40 (possible score ranged 0-200); the mean item score was 7.4 (range 0-10, high score means higher self-efficacy). This indicates that participants reported a level of 7.4 of 10 for their confidence to perform specific diabetes self-management tasks. The average score is higher than an earlier study among patients with T2DM in Taiwan, which reported an average score of 130.71 ± 43.31. However, when analyzing individual items, the statements with the lowest self-efficacy scores were "*I am able to follow a healthy eating plan during festive periods"*

(6.03 ± 2.63), followed by "*I am able to follow a healthy eating plan when I am away from home*" (6.31 ± 2.47), and "*I am able to choose different foods and maintain my eating plan when I am away from home*" (mean: 6.36 ± 2.47). The three items with the lowest scores were all related to diet control and food choices, indicating that participants lacked confidence to maintain healthy diets when eating out or during special events. Chesla and her colleagues (2009) had a similar finding in their qualitative study that included 40 foreign-born Chinese Americans. Participants in that study described their difficulties in following an appropriate diet when eating out, or during celebrations with family and friends that led some to withdraw from socializing over meals. Difficulties in managing the social elements of meals were intensified in ritual meals such as birthdays, weddings, or Lunar New Year banquets, when multiple courses and desserts were unavoidable.

The items with the top scores were "*I am able to take my medication as prescribed"* (8.83 ± 2.12), *"I am able to maintain my medication when I am ill*" (8.52 ± 2.23), and *"I am able to check my blood sugar if necessary"* (8.47 ± 2.65). These findings revealed that participants in this study know about the importance of medication adherence and blood sugar monitoring, and have confidence in accessing medical services. In contrast, social events and eating out posed challenges to maintaining a healthy diet and food selection for their diabetes management.

Illness Perceptions

Participants' perceptions of consequences of their diabetes, sense of control by personal efforts or treatment, and the causes of their diabetes were assessed in this study. The Consequences, Personal control, and Treatment control were evaluated by using the Revised Illness Perception Questionnaire (IPQ-R) subscale. The items for Cause of diabetes were modified from the IPQ-R by adding Chinese traditional health beliefs that

emphasizes inner body ecological harmony and cultural beliefs such as bad *feng-shui*, *pa-tzu*, hotness or blood blockage, and sleeplessness. The score range was from 1 (strongly disagree) to 5 (strongly agree).

The mean score by items for Consequences was 2.97 ± .72 indicating that participants neither disagree nor agree with the sentiment that the consequences of diabetes is a serious condition, has much of an effect on their life, or strongly affects the way others see them, or causes serious financial burdens. Although these results are similar to findings Paschalides and his team's study (2004), which included multiple ethnic groups in the United Kingdom (in which Asians made up 15%) and reported a mean of 2.9 ± .60 on the Consequences subscale, the response bias due to cultural influences still needs to be considered. In cultures influenced by Confucian philosophy, people tend to use neutral terms to address their emotional states or worries and are generally cautious about expressing extreme optimism or pessimism about the future (Kleinman, 1982). This mindset may cause participants to moderate their responses, thus resulting in a subscale score near the middle of the range of 1 to 5. The average score of the items for Personal Control was 3.73 ± .64 and for Treatment Control was 3.6 ± .56 out of a potential range of 1-5, indicating that participants moderately believed that their diabetes could be controlled by their efforts or treatment. The highest score in the Cause subscale was for behavior (3.57 ± .89), followed by psychological attribution (2.73 ± .83), implying that participants attributed their diabetes to diet or eating habits, stress or worry, feeling down, lonely, or anxious. This finding was consistent with Jayne and Rankin's qualitative study among 30 Chinese Americans. Participants in that study expressed that their diabetes was related to their eating behaviors and stress or depressive mood (Jayne & Rankin, 2001).

Diabetes Distress

The mean item score in this study was 2.36 ± .97 out 6, indicating a moderate level of diabetes distress (Fisher, Hessler, Polonsky, & Mullan, 2012). This data is similar to the pervious study by Fisher and his colleagues (2010) which reported a mean score of 2.1 ± 1.0 on 506 patients with T2DM. The top three scoring items were "*Feeling that I am not testing my blood sugars frequently enough*" (mean: 2.85), "*Feeling that I am not sticking closely enough to a good meal plan*" (mean: 2.83), and "*Feeling that I am often failing with my diabetes regimen*" (mean: 2.78). These items indicate that participants felt moderate distress about their diet control and blood sugar monitoring. This finding is consistent with the self-efficacy evaluation. Their concerns about diet and blood sugar management might be related to Chinese social norms around eating out with friends when there is a general expectation to eat as much as possible and eat whatever is served to you, without conspicuous regard for personal dietary concerns. This presents challenges to those trying to manage their diabetes.

Depressive Symptoms

The average score of CES-D in this study was 11.25 ± 7.70 out of 60. Almost a quarter of the sample, 24.8% of the participants, scored at or above the threshold score (≥16) on the CES-D, indicating they have a clinical level of depression. This proportion is higher than the reported 19.5% of 385 general Chinese Americans aged 55 and older in the Phoenix, AZ, area (Sun, Gao, Gao, Li & Hodge, 2018). However, the prevalence is low compared to a study that found 31.0% of Chinese adults with diabetes in Hong Kong had CES-D scores ≥16 (Zhang et al., 2015), and to an earlier meta-analysis focused on depression in patients with diabetes that reported about 31% of patients in 42 studies experienced significant elevated depressive symptoms (Anderson et al., 2001). Strong social support, family cohesion, and other sociocultural factors such as age, gender and

education, are thought to lower the risk for depression among Chinese Americans (Salant & Lauderdale, 2003, Zhu, 2018). What may explain the prevalence of depression in this study is that on average, participants were relatively older (mean age 69.17 years old). Several participants in the study said that their main concern was being able to catch the shuttle or a ride from a friend to the local senior activity center so that they could attend social activities, implying that they have existing social networks and not many other more stressful concerns.

Diabetes Self-Management

Participants were asked to report the frequency of performing nine diabetes self-management activities over the previous seven days. The mean of total score for this study was 38.56 out of 63, which means that participants performed the diabetes management activities about 4.3 days out of 7 days. When examining the nine activities individually, the blood sugar self-monitoring and check feet items had the lowest scores, occurring about 3.5 days out of 7. This is similar to findings in previous research with Chinese Americans: self-monitoring blood glucose was the self-management activity that people carry out the least frequently on a daily basis (only 27%), and 42 % of patients carried out foot care daily (Xu, 2010). The top two highest scores were for the items, "*eat your meal regularly*" (5.87 days of 7 days" and "*following your eating plan*" (4.97 days of 7 days). These healthy eating behaviors may be related to the illness perception that their diet habit was the cause of their diabetes. It may be also a reason they feel stress related to diabetes management when they were eating out or having meals in the events or festivals.

Instruments

Cronbach alphas were calculated to evaluate the reliability of five instruments. According to Polit and Beck (2004), a Cronbach's alpha above .70 is considered acceptable

and greater than .80 is desirable. The Cronbach alphas data of each instrument and subscale are listed in table 5.2.

5.2 Internal Consistency (Cronbach alpha) for instruments and subscales

Instruments	Item number	Cronbach alpha
Acculturation Inventory	12	.92
Illness Representation		
Consequences	6	.76
Personal Control	6	.74
Treatment Control	5	.70
Cause		
Psychological attribution	5	.82
Balanced	7	.74
Risk factor	3	.82
Behavior	2	.57
Diabetes management Self-efficacy	20	.94
Diabetes distress	17	.94
Depressive symptom (CES-D)	20	.86
Summary of diabetes-care activities (SDSCA)	9	.68

Except for the Behavior subscale (α= .57), which is one of the Causes of diabetes subscales, and SDSCA (α= .68), the remaining instruments in this study met the acceptable level of Cronbach's alpha. The items in the Causes of diabetes subscale in the IPQ-R questionnaire were modified by adding bad *feng-shui*, *pa-tzu*, hotness or blood blockage,

sleeplessness, and weather change to include traditional Chinese health beliefs that emphasize inner body ecological harmony and cultural beliefs such as fate. However, for these culturally tailored questions, about 90% of participants chose either strongly disagree or disagree, and 8.6% chose neutral for the *feng-shui* item; 81% chose strongly disagree or disagree and 14.6% chose neutral for the *pa-tzu* item. Because a high percentage of participants did not believe that their diabetes was related to *feng-shui* or *pa-tzu*, these two items were removed for the factor analysis for Cause scale. This finding is different from Chen et al.'s (2008) study of medication adherence among Taiwanese with hypertension. Chen and her team found that *feng*, *shui*, *pa-tzu*, and bad luck were clustered into the cultural component in her factor analysis, with an α= .80. It is possible that because participants in this study have been in the US for a long time (mean 28.54 years), they are less likely to believe that traditional Chinese health beliefs play a role in the causes of their diabetes. They may have been influenced by Western perceptions of illness, such as seeking solutions to control and fight illness rather than just an acceptance that their illness is an inevitable physical deterioration (Chen, Chang, Hsieh, Huang, Lial & Li, 2013; Nilchaikovit & Holland, 1993). However, except for these two items, the new items that included weather changes, hotness or blood blockage, and sleeplessness were found to perform as they did in Chen's study. These items made up the Balance factors for the Cause scale with an α= .74. This means that Chinese Americans think that inner ecological imbalance, the concept of *yin-yang*, is related to their diabetes. Patients viewed their diabetes as an imbalance of *yin-yang* energies, such as having excess inner heat (Tseng et al., 2013). The behavior subscales had the lowest internal consistency in the Cause scale. There were only two items in the behavior subscale: diet or eating habits and "my own behaviors." The inter-item correlation was good at .41($p < .001$). Thus, α may be low due to the small number of items (Tavakol & Dennick, 2011).

The Cronbach's alpha of the Chinese version of the Summary of Diabetes Care Activities (SDSCA) did not meet acceptable criteria (α= .680), which is same as with Xu's research among Chinese Americans in Chicago (Xu, et al., 2010). If the item "*how many of the last seven days did you eat your meal regularly*?" were deleted, the α would only slightly increase to .683 by increasing the scale variance. The Chinese version of the SDSCA was modified by reducing two items about diet behaviors and adding an item about medication adherence (Xu, 2008). Thus, there were 9 total items compared to the 11 items in the original English version. Reducing the number of items further would lower the Cronbach's alpha. Although the overall Cronbach's alpha is not desirable, the inter-item correlations for exercise (r = .69), glucose testing (r = .94), diet control (r = .34), and foot care (r = .55) were comparable with the results reported for the original English version of the measure (Toobert, et al., 2000). Moreover, the SDSCA measured five self-care activities and these activities are independent of one another. Thus, the Cronbach's alpha data might be influenced by both the number of items as well as the expected inter-relationships among items. Despite the low internal consistency, SCSCA scores were included in the analyses.

Discussion of Findings for Research Question

Research Question 1: Relationship Between Variables

Research Question 1 examined the relationship among the independent variables: background information (age, sex, education, income, marital status, length of diabetes diagnosis, insulin treatment, number of chronic disease, acculturation level), illness perceptions (consequences, personal control, treatment control, and cause), diabetes self-efficacy, emotional distress (diabetes distress and depressive symptoms) with the dependent variable of diabetes self-management activities among Chinese Americans with

T2DM. The significant bivariate correlations among variables included older participants, longer years of diabetes, insulin user, lower acculturation level, and participants with higher self-efficacy were more likely to report to have better self-management activities. The findings in this study are similar with earlier studies. Elderly Chinese Americans are more likely to follow dietary recommendations (OR:1.04), perform regular exercise (OR:1.04), and carry out foot care (OR: 1.04) when compared to younger patients (Xu et al., 2011). Among Chinese Americans those with longer duration of diabetes who could better describe the signs of diabetes were more willing to take mediation and self-check blood glucose (Jayne & Rankin, 2001; Xu, et al., 2010).

Differing from previous studies, the results in this study show that lower acculturation levels are correlated with better diabetes self-management. This finding is inconsistent with a previous study showing that Chinese Americans who were more acculturated were more likely to perform diabetes self-management compared to less acculturated ones (Xu, Pan, & Liu, 2011). Acculturation has been reported to affect health care experiences relevant to diabetes management among Asian Americans who underutilize health care (Salant & Lauderdale, 2003). People who were less acculturated have more communication difficulties, such as language barriers, or they may have other social determinants that are not in their favor, e.g., lack of insurance, transportation or housing instability, or they may hold more traditional Asian medical beliefs compared to their more acculturated peers (Geen et al, 2005; Ngo-Metzger et al, 2003). This study shows there was a small strength of association between acculturation and self-management activities (r= -.18). Almost half of the participants were recruited from senior activity centers, and senior fellowship groups. These organizations provided breakfast, snacks, lunch, and structured physical activity programs (e.g. Tai-Chi). Participants usually attended these culturally congruent community events daily or every other day. Thus,

although participants were not accultured, they had access to regular and healthy meals through these events, as evaluated in the SDSCA.

Diabetes management self-efficacy was shown to be positively correlated to diabetes self-management activities. Participants who had higher self-efficacy were more likely to perform diabetes self-management activities. This finding is consistent with previous studies that showed self-efficacy was an important predictor of self-care activities in patients with T2DM. The correlations between self-efficacy and self-care activities were reported to be .45 (p <.01) and .50 (p <.01) in the studies by Wu et al. (2007) and Xu et al. (2008), respectively.

Research Question 2: Predictors of Diabetes Self-Management

Research Question 2 examines how diabetes illness perceptions (consequences, personal control, treatment control, and cause) and emotional distress (diabetes distress and depressive symptoms) predict diabetes self-management activities after controlling for diabetes self-efficacy and background factors. Two hierarchical multiple regression models were conducted separately for illness perceptions and emotional distress to determine the variance accounted for in diabetes self-management activities. These models show that neither illness perceptions nor emotional distress significantly predicted diabetes self-management in this study. The findings differ from earlier studies that reported significant relationships between illness perceptions and emotional distress with diabetes self-management.

Patients' perception of the severity of diabetes consequences, and beliefs that their diabetes could be controlled, and complications could be prevented by personal efforts or treatment have been reported to be significantly related to diabetes self-management (Hampson, Glasgoq, & Strycker, 2000; Nsereko, Bavuma, Tuyizere, Ufashingabire,

Rwakageyo, & Yamuragiye, 2013). Compared to those studies, this study's participants were older and most of them were retired immigrants with unique cultural backgrounds. Although this study controlled for demographic factors when conducting data analysis, Abubakari et al. (2010) reported that illness perceptions show different patterns and influences on diabetes self-management in different ethnic groups. To this researcher's knowledge, this is the first quantitative study of the relationship between illness perceptions and diabetes self-management in Chinese Americans. More studies are needed to clarify the effect of patients' cognitive representations on their health care strategies and diabetes self-management.

Previous research has highlighted the connection between mental distress and diabetes self-management and how this relationship may influence patients' self-management behaviors including poor medication adherence, lower physical activities, worse diet control, and higher A1C (Eged et al., 2005; Fisher, Glasgow et al., 2010, Fisher, Mullan et al., 2010; Gonzalez, et al., 2008). However, this study did not find a significant relationship between mental distress and diabetes self-management. This study evaluated participants' overall self-management activities and summed it as a total score, and further analysis is needed to assess each self-management task specifically, such as examining the impact of emotional distress on medication adherence, physical activity, diet control, foot care, and blood sugar monitoring.

Older age, insulin usage, and diabetes management self-efficacy significantly predicted diabetes self-management. Older individuals did more diabetes self-management activities on more days. Similar findings have been reported by Ruggiero et al. (1997), Wang and Shiu (2004), and Xu et al. (2010). A possible explanation for this finding is that younger individuals who are employed could have busier schedules and multiple

responsibilities, making self-management diabetes behaviors, such as exercising, a low priority for them.

Insulin users were also more likely to engage in self-management. One possible interpretation of this finding is that individuals who used insulin may need to self-monitor their blood glucose to identify high or low blood glucose levels and to make timely adjustments with medication and self-management practices. Self-monitoring has been found to be effective in improving glycemic control in individuals with T2DM using insulin therapy (King et al., 2010; Williams & Bond, 2002). If people engage in one self-management behavior, like glucose monitoring, they might be more likely to engage in other self-management behaviors.

Diabetes management self-efficacy plays a crucial role in self-management activities in this study. According to Lorig, Ritter, and Jacquez (2005), self-efficacy was associated with better self-management behaviors in vulnerable populations, across races and ethnicity and health literacy levels. Our findings were consistent with several studies that found participants with higher self-efficacy had been reported as a robust predictor of self-management (Al-Amer et. Al., 2016; Indelicato, Dauriz, Santi, Bonora, Negri, & Cacciatori, et al., 2017; Sarker et al., 2006). Although this study found self-efficacy is a significant predictor of self-management even after adding the illness perceptions and mental distress variables, the self-management activities were analyzed in aggregate, rather than as specific tasks (such as exercise, diet, self-monitoring blood glucose, foot care). Further analysis is needed to clarify the relationship of self-efficacy and the practice of specific tasks of diabetes management.

Research Questions 3 and 4: Mediator of Diabetes Management Self-Efficacy

Research questions 3 and 4 examined the mediation effects of self-efficacy on the relationship between illness perceptions (consequences, personal control, treatment control and cause) and diabetes self-management activities; and on the relationship between emotional distress (diabetes distress and depressive symptoms) and diabetes self-management activities. Three mediation models of the illness perceptions (consequences, treatment control, and psychological attribution) and two mediation models of emotional distress (diabetes distress and depressive symptoms) on self-management show an indirect-only mediation effect of self-efficacy on the relationship between illness perception and emotional distress variables. These findings confirm the theoretical framework in this study that self-efficacy connects the relationship between illness perceptions and emotional distress with self-management. In other words, self-efficacy is an important factor in the relationship between perceptions about diabetes consequences, treatment control, psychological attribution, and emotional stress with self-management. Participants' self-management performance could be improved through reducing negative thoughts of diabetes consequences, behaviors causing their diabetes, and distress and depression level, and increasing self-efficacy. Moreover, self-efficacy increased the effect of treatment control on self-management activities. That means that an increase in self-efficacy could help to strengthen participants' belief that their diabetes can be controlled by treatment and performing self-management activities.

The mediation model for psychological attribution shows that both a direct effect and an indirect effect exist and point in opposite directions. This is considered competitive mediation and it implies there may be an omitted mediator in this mediation model (Zhao, et al.,2010). However, self-care activities can be improved by decreasing psychological attribution and increasing self-efficacy in the current model.

Self-efficacy mediated the relationship between depressive symptoms and glycemic control, and depressive symptoms and self- management in two other studies (Cherrington et al., 2010; Gharaibeh et al., 2016). Moreover, interventions to improve diabetes management self-efficacy have been effective in reducing diabetes stress and enhancing patients' behavior changes and treatment adherence (Fisher, Hessler et al., 2014). That is, a person's confidence in their own capabilities to successfully carry out a course of action influences their individual effort expenditures, activity choices, and persistence in the face of barriers or failure. Self-efficacy can attenuate the impact of the belief of the severity of diabetes and the mental distress related to performing diabetes daily self-management. Thus, self-efficacy is a critical pathway for helping an individual carry out the recommended diabetes self-management tasks.

Limitations and Strengths

There are some limitations of this study worth noting:

1. The nature of convenience sampling limits the generalizability of findings to the entire population of Chinese Americans with T2DM in the U.S. For example, participants in this study were relatively old even though the eligible age was 18. The majority of the participants in this study were recruited from church fellowships, community based senior activity centers, senior interest groups, and Chinese service groups. People who are socially isolated or were not a part of these social communities were much less likely to be involved in this study and may have different beliefs and behaviors.
2. This study used a cross-sectional design, so a causal relationship between self-management activities and the other variables cannot be determined, only a statistical relationship.

3. The results are subject to participants' feelings about social desirability and their recall response bias. Participants completed their own surveys, which may have prevented the need to provide socially desirable responses.

Despite the limitations, there are a few strengths of this study:

1. This study focused on an understudied population, Chinese Americans, that is one of the largest Asian groups in the U.S. Moreover, the participants were recruited from three major metropolitan cities in Texas, which has been identified as the state with the fastest growing Asian population over the past decade, outpacing states such as New York and California that have longer histories of Asian immigrant communities. Asians have experienced the highest growth rate in Texas, at a rate of 35.5%, significantly outpacing all other major demographic groups in the past six years (Ura, 2017).
2. The data-collection method was culturally and linguistically appropriate. The questionnaire was provided in English, and both traditional and simplified Mandarin Chinese. The investigator was fluent in English, Mandarin Chinese, and Taiwanese. In addition, the investigator's research assistant was fluent in English and Cantonese. This language coverage allowed the investigator to reach a diverse spectrum of individuals from different countries, but who all have backgrounds influenced by Chinese culture.
3. This is the first known quantitative study on the relationships among illness perceptions, emotional distress, and self-efficacy with diabetes self-management among Chinese Americans. The findings contribute to our understanding of the factors that facilitate patients to perform self-management activities on a daily basis among this population.

4. Findings from this study add to the existing literature about how illness perception, emotional distress, and self-efficacy collectively impact diabetes self-management activities among Chinese Americans. This study highlights the importance of higher self-efficacy in achieving better diabetes self-management performances. Meanwhile, illness perceptions and emotional distress impact self-management indirectly via self-efficacy. Health providers should target future interventions to decrease emotional distress through enhancing diabetes self-efficacy when educating patients about diabetes management. This could improve patients' adherence to diabetes self-management practices, and ultimately help them control glycemic levels and prevent or postpone diabetes-related complications.

Implications and Recommendations

The results of this study have implications for theory development, practice, education and research.

Theoretical Framework

The conceptual framework for this study was modified from the Common-Sense Model of Self-Regulation (Leventhal, 1982). The CSM includes two parallel processes, or paths, which are cognitive representation and emotional presentation. The theory suggests that individuals manage their health through a series of three sequential stages (1) representation; (2) coping and health-related behaviors to reduce the health threat; and (3) outcome appraisals (Figure 3). This study incorporated traditional Chinese beliefs about health into an existing instrument to evaluate the first two stages and added the self-efficacy factor, which is known a robust predictor, to clarify the relationship between cognitive representation and emotional presentation of diabetes and self-management among Chinese Americans. The participants in this study agreed with traditional Chinese beliefs

about health resulting from a balance between inner body tensions such as hot and cold balance and environmental harmony such as coping with weather changes. This adds evidence for the need to consider cultural context when eliciting illness representations in different ethnic groups. Therefore, cultural context should be added to the model. The overall amounts of predicted variances in diabetes self-management were not significant and suggest that only self-efficacy influences diabetes self-management. Nevertheless, self-efficacy, as well as emotional distress, should be included in future studies to further clarify their relationship with diabetes self-management among Chinese Americans.

Nursing Practice

To best serve the health care needs of different ethnic groups with diabetes, health care professionals must acknowledge each group's attitudes, beliefs, and values of their disease management. Perceiving these cultural differences may better prepare nurse professionals to understand their patients' perceptions of and emotional distress relating to diabetes and how to best manage it. Health providers need to assess how cultural factors influence patients' perceptions of their diabetes and impact their self-care behaviors. One tool to assess how patients' cultural background relate to their health is the CDC Practical Strategies for Cultural Competence. The tool's list of questions for health providers is based on Arthur Kleinman's work in medical anthropology. The questions include:

> "What do you think caused the problem? Why do you think it happened when it did? What do you think your sickness does to you? How does it work? How severe is your sickness? Will it have a short course? What kind of treatment do you think that you should receive? What are the most important results that you hope to receive from this treatment? What are

the chief problems that your sickness has caused for you? What do you fear most about your sickness?" (CDC, 2014b p.29)

Using Chinese culture as an example, some participants believed that inner body ecological balance contributes to their diabetes. Patients may view diabetes as an imbalance in yin-yang energies- an excess of heat, or yang (Tseng et al., 2014). Thus, they may choose to treat the diabetes with "cold" foods such as watermelon to restore balance. However, the sugar content in watermelon may be contraindicated for people with elevated glucose levels. Understanding patients' illness perceptions about their disease can help practitioners provide effective interventions or strategies to help patients to management their diabetes.

This study's findings indicated that around 25% of the participants have a clinical level of depression and a moderate level of distress related to managing diabetes. Although their depressive symptoms may not be related to their diabetes care directly, they felt stress associated with dietary management and glucose self-monitoring, especially when they were eating out and during social events. Health care providers should elicit patients' concerns related to general daily life by using patient-centered communication to help them to reduce stress, such as asking about the quality of their recent social activities and quality of sleep. Health care providers could also provide counseling and education to patients on how to eat healthy when dining out. These practices include choosing low glycemic index (GI) foods and eating proteins and vegetables before consuming carbohydrates to avoid surges in blood sugar levels.

Although illness perceptions and emotional distress were not found to be significant predictors of diabetes self-management, the results from the present study are consistent with previous findings that support the significant relationships between diabetes management self-efficacy and self-management activities and the mediation role of self-

efficacy. Patient education about diabetes knowledge is needed before helping patients build up coping skills to manage their own diabetes. This knowledge includes: causes of diabetes, signs of high and low blood sugar levels, diabetes-related complications, the importance of blood sugar control through meditation, diet, physical activities and blood sugar monitoring. Patients should also be assisted to build diabetes management self-efficacy through development of strategies such as goal-setting or problem-solving skills (AADE, 2018). Moreover, because traditional Chinese culture trends toward collectivism and family, familial support should be included when building self-efficacy among Chinese Americans (Chesla, et al., 2013). Accurately assessing patients' self-efficacy either by using proven tools such as the DMSES or by patient centered communication is a holistic approach to evaluating the confidence level of patients with T2DM in practicing diabetes management may provide valuable insight into which clinical interventions will be most effective, particularly for this immigrant population.

Nursing Education

Although the regression models only showed that age, insulin use, and level of self-efficacy significantly predicted self-management activities in this study, the correlation analysis revealed that age, duration of diabetes, insulin usage, acculturation levels, and self-efficacy were significant correlated to self-management activities. Nursing educators should teach students to understand the importance of social determinants of health and cultural awareness in the health care because these factors may influence patients' health care behaviors. For example, Chinese Americans may use Traditional Chinese Medicine (TCM) which includes herbal medicine and eating foods that they believe to have particular medicinal properties (Tseng, 2013). In addition, nursing educators need to teach students to be culturally sensitive to patients' cultural backgrounds as the American Association of

College of Nursing recommends for all levels of nursing education. The Essentials of Nursing states that, "the baccalaureate program prepares the graduate to…provide appropriate patient teaching that reflects developmental stage, age, culture, spirituality, patient preferences, and health literacy considerations to foster patient engagement in their care" (American Association of Colleges of Nursing, 2008, p.31). Institutions such as the University of Texas at Austin offers courses called "Socio-Cultural Influences of Health" and "Ethics of Heath Care" as part of its nursing degree programs. Topics such as culturally-sensitive perspectives towards medicine and diets should be incorporated into these course syllabi.

The findings also suggest that nursing staff could promote and support self-efficacy in patient's diabetes self-management skills to improve long-term health outcomes. For example, the American Association of Diabetes Educators (AADE) offers an online course titled "Facilitating Behavior Change" that trains diabetes educators to match strategies to the patient's stage of change. More specifically such training should include modules on how to recognize the stage of readiness of patients to practice self-care, and modules on how to help patients develop appropriate facilitation methods, including identifying barriers, setting goals, and establishing procedures to help reach patient goals. General nurse training programs should consider incorporating such modules into their required courses.

Nursing Research

The Common-Sense Model suggests two parallel paths, cognitive and emotional representation of health threats that regulate individuals' self-management behaviors. There are five dimensions of illness perception that comprise cognitive representation: (1) identify disease symptoms pattern; (2) timeline of the disease; (3) consequences due to the

illness or treatment; (4) control or cure the disease; and (5) cause of illness. This study only evaluated three of these five dimensions (consequences, control, and cause) of cognitive representation, and evaluated diabetes distress and depressive symptom as the emotional representation of health threats. More empirical work is clearly needed to assess the relationship of the rest of dimensions of illness perception and diabetes self-management to expand the findings. For example, disease symptoms have been found to be related to patients' self-care behavior in Hispanics (Garcia, Brown, Horner, Zuniga, & Arheart 2015). However, the researcher's conversations with participants in this study revealed that many of them were not aware of symptoms such as headaches, increased thirst and urination, blurry vision that could be caused by hyperglycemia or hypoglycemia. Being unaware of these symptoms may explain the variances of participants' diabetes self-management activities.

Second, expanding to additional collection sites or grouping participants by age or data collection sites when analyzing the data may minimize the selection bias because the convenience and snowballing sampling strategies used in this study might have introduced bias, limiting the generalizability of the findings. For example, the participants in this study were relatively old compared to the eligibility criteria for this study (18 years old), as most of them were retired. Moreover, participants who were recruited from the Dallas areas were significantly older, on average, than participants who were recruited from Austin and Houston areas; they also reported having more other chronic health conditions than participants who were from the other two areas. Expanding data collection sites or regrouping participants by their age or the areas they were living in to have a more equal representation across age groups would reflect a broader spectrum of illness perception and emotional distress related to diabetes and self-management and help to further illuminate specific health needs of and culturally-tailored interventions relevant to Chinese Americans.

Third, this study shows there was a small negative relationship between acculturation level and self-management activities. The acculturation level in this study was evaluated by the acculturation inventory which covers six domains including language use, media consumption, food consumption, social relations, sense of belonging, and familiarity of American cultural. However, English proficiency, one of the most common indicators for acculturation evaluation, has been reported to influence patients' health seeking behaviors and disease self-management. Specifically, English proficiency has been reported to highly impacts immigrants' health literacy, which includes speaking, reading, writing and numeracy. Health literacy is important for diabetes care because there is a need to communicate with health providers, read medication instruction, food labels, and other information about diabetes management (U.S. Department of Health and Human Services, nd). Thus, future data analysis may be needed to look into the association between language usage items in the Acculturation Inventory and self-care activities for this study.

There is an interesting finding in the answers about self-monitoring blood sugar in this study. The item with the highest score in the self-efficacy questionnaire was "*I am able to check my blood sugar if necessary*". This sentiment seems to run contrary to the statement that had the highest score in the diabetes distress questionnaire: "*feeling that I'm not testing blood sugar frequently enough*". In addition, in the self-reported activity items, "*checking blood sugar*" had the lowest frequency of occurrence within the past seven days, compared to all other tasks. Future studies are recommended to understand the seemingly contradictory responses to self-efficacy, distress, and carrying out blood sugar self-monitoring practice. More research is needed on how to enhance self-management efficacy, for instance increasing diabetes health literacy, peer support, or problem-solving skills. Reflecting on patients' efficacy of diabetes can help to develop evidence-based and patient-centered interventions such as culturally tailored interventions to reach the goal of

glycemic control and prevent/postpone the complications related to diabetes. In addition, because this study only evaluated self-reported daily diabetes care activities, future studies could include clinical outcomes such as A1C data and lipid profiles and use smart watch (e.g. fitbits) to collect objective physical activity data.

Finally, this study provides evidence for the mediation role of self-efficacy on the relationship between some illness perceptions (consequences, treatment control, psychology attribute, and behavior) and self-management activities. For future studies, qualitative research, using focus groups or individual interviews, is needed to clarify beliefs about self-efficacy, dimensions of illness perceptions, emotional distress, and self-management activities.

Implications for Health Policy

There are about 30 million Americans who have diabetes and that figure continues to rise (ADA, 2018a). Diabetes places a profound burden physically, mentally, and financially on individuals and their families, and more effort is needed to address the incidence and prevalence of diabetes nation-wide and across different ethnic groups. Appropriate self-management can delay or control diabetes complications. For example, maintaining a healthy weight, consuming healthy foods, and exercising regularly all reduce individuals' risk of developing or increasing the severity of T2DM. Thus, actions should be taken to encourage early adoption of these healthy habits to decrease the diabetes prevalence and complications. Policymakers could consider the following recommendations:

1. Promoting appropriate management of diabetes

   The ADA and the American Association of Diabetes Educators (AADE) provide diabetes care guidelines, self-management education and strategies

(ADA, 2018b; AADE, 2018). Health providers should follow the guidelines to clarify the myths of diabetes to patients and to help them to build up self-efficacy by self-management education. This aim to facilitate patient to perform better self-care includes better control of blood glucose, body weight, blood pressure, lipid profiled, regular foot exams, medical follow up, and receive mental health screening annually to help patients living with diabetes and preventing its complications.

2. Promoting healthy eating and encouraging physical activity

   Improving the food and beverage consumption through educational strategies to assist patients in making more informed food and beverage choices such as teaching them how to read the nutrition labels, and the impacts on blood sugar data by high GI and low GI food. Moreover, further policies should be developed to facilitate active lifestyles such as creating safe environments for walking and biking, providing access to parks and other places for recreation and physical activity, and offering worksite programs to facilitate regular physical activity for adults of all ages.

To carry out these recommendations above, the policy should focus on partnering with community organizations. Participants in this study were recruited from community-based settings in which organizations serving Chinese Americans had built strong relationships with individuals and were willing to share information about this study to organization members. This shows that immigrants place high level of trust in social networks that are tailored to their cultures and ethnic backgrounds. These organizations provide assistance to immigrant populations to deal with the day-to-day as well as foster environments for individuals to develop a social network and obtain peer support. Thus, health promotion programs in grass roots community-based organizations should be

feasible and effective. Public health policy makers could use these community-based organizations to promote health interventions or disease screening programs. This could include partnering with community leaders who are culturally sensitive and thereby be more effective in communicating and working with patients to strengthen self-care behaviors.

Summary

This chapter discussed the finding of the descriptive correlation study which examined the impact of illness perception, emotional distress, and self-efficacy on diabetes self-management among Chinese Americans with type 2 diabetes. The main finding of this study was that self-efficacy was the strongest predictor for self-management, and it also mediated the relationship of illness perceptions (consequences, treatment control, psychological attribution, and behavior), diabetes distress, and depressive symptoms with diabetes self-management. The limitations and strength of this study were stated, and the conclusions drawn. Recommendations were made for the theoretical, nursing practice, nursing education, and nursing research. This study provided the understanding in the factors that influence patient's diabetes self-management activities.

Appendices

Appendix A

List of data collection sites

Greater Austin

- Annual Health Fair held by the Austin Public Health Department
- Asian American Resource Center
- Austin Buddhist Tzu Chi Foundation
- Austin Fo Guang Shan Xiang Yun Temple
- Austin Light and Salt Services
- Health Faire held by Austin Vietnamese American Medical Professional Society

Greater Houston

- Chinese Association of Professionals in Science and Technology
- Chinese Seniors Health Service Center
- Fort Bend Community Church
- Houston Light and Salt Services
- Sugar Land Chinese Church

Dallas-Fort Worth Metroplex

- Asian American Cancer Care Services
- Dallas Buddhist Tzu Chi Foundation
- Dallas Chinese Christian Herald Crusades
- Dallas Chinese Community Center
- Sunray Senior Healthcare Service

Appendix B

Institutional Review Board (IRB) Approval

OFFICE OF RESEARCH SUPPORT
THE UNIVERSITY OF TEXAS AT AUSTIN
P.O. Box 7426, Austin, Texas 78713 · Mail Code A3200
(512) 471-8871 · FAX (512) 471-8873

FWA # 00002030

Date: 09/07/17
PI: Ya Ching Huang
Dept: Nursing
Title: The Impact of Illness Perception, Diabetes Management Self-Efficacy, and Mental Distress on Type 2 Diabetes Self-Management among Chinese Americans

Re: IRB Expedited Approval for Protocol Number 2017-01-0001

Dear Ya Ching Huang:

In accordance with the Federal Regulations the Institutional Review Board (IRB) reviewed the above referenced research study and found it met the requirements for approval under the Expedited category noted below for the following period of time: 09/01/2017 to 08/31/2018 . *Expires 12 a.m. [midnight] of this date.* If the research will be conducted at more than one site, you may initiate research at any site from which you have a letter granting you permission to conduct the research. You should retain a copy of the letter in your files.

Expedited category of approval:

☐ 1) Clinical studies of drugs and medical devices only when condition (a) or (b) is met. (a) Research on drugs for which an investigational new drug application (21 CFR Part 312) is not required. (Note: Research on marketed drugs that significantly increases the risks or decreases the acceptability of the risks associated with the use of the product is not eligible for expedited review). (b) Research on medical devices for which (i) an investigational device exemption application (21 CFR Part 812) is not required; or (ii) the medical device is cleared/approved for marketing and the medical device is being used in accordance with its cleared/approved labeling.

☐ 2) Collection of blood samples by finger stick, heel stick, ear stick, or venipuncture as follows: (a) from healthy, non-pregnant adults who weigh at least 110 pounds. For these subjects, the amounts drawn may not exceed 550 ml in an 8 week period and collection may not occur more frequently than 2 times per week; or (b) from other adults and children2, considering the age, weight, and health of the subjects, the collection procedure, the amount of blood to be collected, and the frequency with which it will be collected. For these subjects, the amount drawn may not exceed the lesser of 50 ml or 3 ml per kg in an 8 week period and collection may not occur more frequently than 2 times per week.

☐ 3) Prospective collection of biological specimens for research purposes by non-invasive means. Examples:
(a) Hair and nail clippings in a non-disfiguring manner.

(b) Deciduous teeth at time of exfoliation or if routine patient care indicates a need for extraction;
(c) Permanent teeth if routine patient care indicates a need for extraction.
(d) Excreta and external secretions (including sweat).
(e) Uncannulated saliva collected either in an un-stimulated fashion or stimulated by chewing gumbase or wax or by applying a dilute citric solution to the tongue.
(f) Placenta removed at delivery.
(g) Amniotic fluid obtained at the time of rupture of the membrane prior to or during labor.
(h) Supra- and subgingival dental plaque and calculus, provided the collection procedure is not more invasive than routine prophylactic scaling of the teeth and the process is accomplished in accordance with accepted prophylactic techniques.
(i) Mucosal and skin cells collected by buccal scraping or swab, skin swab, or mouth washings.
(j) Sputum collected after saline mist nebulization.

☐ 4) Collection of data through non-invasive procedures (not involving general anesthesia or sedation) routinely employed in clinical practice, excluding procedures involving x-rays or microwaves. Where medical devices are employed, they must be cleared/approved for marketing. (Studies intended to evaluate the safety and effectiveness of the medical device are not generally eligible for expedited review, including studies of cleared medical devices for new indications).
Examples:
(a) Physical sensors that are applied either to the surface of the body or at a distance and do not involve input of significant amounts of energy into the subject or an invasion of the subject's privacy.
(b) Weighing or testing sensory acuity.
(c) Magnetic resonance imaging.
(d) Electrocardiography, electroencephalography, thermography, detection of naturally occurring radioactivity, electroretinography, ultrasound, diagnostic infrared imaging, doppler blood flow, and echocardiography.
(e) Moderate exercise, muscular strength testing, body composition assessment, and flexibility testing where appropriate given the age, weight, and health of the individual.

☐ 5) Research involving materials (data, documents, records, or specimens) that have been collected, or will be collected solely for non-research purposes (such as medical treatment or diagnosis).
Note: Some research in this category may be exempt from the HHS regulations for the protection of human subjects. 45 CFR 46.101(b)(4). This listing refers only to research that is not exempt.

☐ 6) Collection of data from voice, video, digital, or image recordings made for research purposes.

☒ 7) Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.
Note: Some research in this category may be exempt from the HHS regulations for the protection of human subjects. 45 CFR 46.101(b)(2) and (b)(3). This listing refers only to research that is not exempt.

☐ Use the attached approved informed consent document(s).

☒ You have been granted a Waiver of Documentation of Consent according to 45 CFR 46.117 and/or 21 CFR 56.109(c)(1).

☐ You have been granted a Waiver of Informed Consent according to 45 CFR 46.116(d).

Responsibilities of the Principal Investigator:

1. Report immediately to the IRB any unanticipated problems.

2. Submit for review and approval by the IRB all modifications to the protocol or consent form(s). Ensure the proposed changes in the approved research are not applied without prior IRB review and approval, except when necessary to eliminate apparent immediate hazards to the subject. Changes in approved research implemented without IRB review and approval initiated to eliminate apparent immediate hazards to the subject must be promptly reported to the IRB, and will be reviewed under the unanticipated problems policy to determine whether the change was consistent with ensuring the subjects continued welfare.

3. Report any significant findings that become known in the course of the research that might affect the willingness of subjects to continue to participate.

4. Ensure that only persons formally approved by the IRB enroll subjects.

5. Use only a currently approved consent form, if applicable.
   Note: Approval periods are for 12 months or less.

6. Protect the confidentiality of all persons and personally identifiable data, and train your staff and collaborators on policies and procedures for ensuring the privacy and confidentiality of subjects and their information.

7. Submit a Continuing Review Application for continuing review by the IRB. Federal regulations require IRB review of on-going projects no less than once a year a reminder letter will be sent to you two months before your expiration date. If a reminder is not received from Office of Research Support (ORS) about your upcoming continuing review, it is still the primary responsibility of the Principal Investigator not to conduct research activities on or after the expiration date. The Continuing Review Application must be submitted, reviewed and approved, before the expiration date.

8. Upon completion of the research study, a Closure Report must be submitted to the ORS.

9. Include the IRB study number on all future correspondence relating to this protocol.

If you have any questions contact the ORS by phone at (512) 471-8871 or via e-mail at orsc@uts.cc.utexas.edu.

Sincerely,

James P. Wilson

James Wilson, Ph.D.
Institutional Review Board Chair

Appendix C

Survey Cover Letter

To Whom It May Concern,

You are invited to volunteer to participant in a research study. The purpose of this study is to explore the impact *of Diabetes Illness Perceptions, Diabetes Management Confidence, and Emotional Distress on Self-Management Outcome*s among Chinese Americans. The results from this study will help us improve diabetes care for Chinese Americans.

To be in this study, participants must: (1) self-identify as ethnic Chinese Americans (you or your family immigrated from Mainland China, Macau, Hong Kong, Singapore, Malaysia, Taiwan, Vietnam, and other places) live in Texas, (2) have been diagnosed with type 2 diabetes; (3) be able to speak Mandarin, Cantonese, Taiwanese, or English or be able to read English and Chinese; and (4) be above 18 years of age. People who have type 1 diabetes, gestational diabetes, acute infections, and or are under treatment for cancer are not eligible.

This survey is anonymous and it usually takes about 15-20 minutes to complete. After you complete the survey, you will obtain a $10 Walmart gift card. Please note that your privacy and confidentiality will be protected, all data will be coded and there will be no identifiers that allow anyone to trace your response.

Completion of this survey indicates your consent to participate in the research.

Prior, during or after your participation you can contact the researcher [Ya-Ching Huang] at [512-471-7956] or send an email to [yaching.huang@utexas.edu] for any questions or if you feel that you have been harmed. The study has been reviewed and approved by the University Institutional Review Board (study number 2017-01-0001). For questions about your rights or any dissatisfaction with any part of this study, you can contact, anonymously if you wish, the Institutional Review Board by phone at (512) 471-8871 or email at orsc@uts.cc.utexas.edu.

Thank you in advance for your participation and support!

Ya-Ching Huang, RN, MSN, Ph.D. candidate
University of Texas at Austin, School of Nursing

Appendix D

Background Information

1. Year of Birth: _____
2. Gender: □ Female □ Male
3. Where are you or your family originally from?

   □ Mainland China □ Hong Kong □ Macao □ Malaysia □ Singapore

   □ Taiwan □ Vietnam □ Indonesia □ Other (please specify_____)
4. Were you born in the United States? □ Yes □ No
5. How long you have been living in the United States? _____ years
6. Highest level of education completed:

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17+
	Elementary						Junior/ High school						College /Baccalaureate Degree				Graduate school

7. Marital Status (check one):

   □ Never married □ Separated □ Divorced □ Widowed

   □ Married □ Living with a Significant Other
8. What is your annual family income before tax? (check one)

   □ Less than $ 20,000 □ $ 20,001- $30, 000

   □ $ 30,001- $ 40,000 □ $ 40,001- $ 50,000

   □ $ 50,001- $ 75,000 □ $ 75,001- $ 100,000

   □ More than $ 100,000
9. Does your family income meet your need? □ Yes □ No
10. When were you diagnosed with diabetes? _____ years old
11. How would you rate your overall health at the present time?

□ Excellent □ Very good □ Good □ Fair □ Poor

12. How would you rate your mental/ emotional health at the present time?

□ Excellent □ Very good □ Good □ Fair □ Poor

13. Type of diabetes treatment?

□ diet □ oral med □ insulin

□ alternative treatments (please specify_____)

14. Has a doctor ever told you that you have any of the following conditions?

Hypertension	□ Yes	□ No
Heart disease	□ Yes	□ No
Stroke	□ Yes	□ No
Cancer	□ Yes	□ No
Arthritis	□ Yes	□ No
Hepatitis	□ Yes	□ No
Kidney problem	□ Yes	□ No
Asthma	□ Yes	□ No
Chronic Obstructive Pulmonary Disease (COPD)	□ Yes	□ No

Appendix E

Acculturation Inventory

1. How well do you speak English?
   □ very good □ good □ fair □ poor
2. In you daily life, how often do you use English language?
   □ all the time □ sometimes □ rarely □ never
3. Among TV program or Videos you watch, how much of them are in English?
   □ all of time □ most of time □ some of time □ none
4. Among newspapers or magazines you read, how much of them are in English?
   □ all of time □ most of time □ some of time □ none
5. Among food you eat at home, how much of them are non-Chinese food?
   □ all of time □ most of time □ some of time □ none
6. Among food you eat outside home, how much of them are non-Chinese food?
   □ all of time □ most of time □ some of time □ none
7. Among people you hang out with, how many of them are American (non-Chinese)?
   □ all of time □ most of time □ some of time □ none
8. How often do you attend gatherings or meeting with American (non-Chinese)?
   □ all the time □ sometimes □ rarely □ never
9. How much do you feel that you belong when you are with American (non-Chinese)?
   □ very much □ somewhat □ no very much □ not at all
10. How closely do you identify with American (non-Chinese)?
    □ very close □ somewhat close □ not very close □ not at all
11. How familiar are you with American cultures and traditions?
    □ very much □ quite □ a little bit □ not at all
12. How often do you celebrate American holidays such as Thanksgiving and Independence Day?
    □ every time □ most of the time □ occasionally □ never

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Appendix F

Illness Perception Questionnaire (IPQ-R)

YOUR VIEWS ABOUT DIABETES

Listed below are a number of symptoms that you may or may not have experienced since your diabetes. Please indicate by circling Yes or No, whether you have experienced any of these symptoms since your diabetes, and whether you believe that these symptoms are related to your illness.

	I have experienced this symptom since my diabetes		This symptom is related to my diabetes	
Pain	Yes	No	Yes	No
Sore Throat	Yes	No	Yes	No
Nausea	Yes	No	Yes	No
Breathlessness	Yes	No	Yes	No
Weight Loss	Yes	No	Yes	No
Fatigue	Yes	No	Yes	No
Stiff Joints	Yes	No	Yes	No
Sore Eyes	Yes	No	Yes	No
Wheeziness	Yes	No	Yes	No
Headaches	Yes	No	Yes	No
Upset Stomach	Yes	No	Yes	No
Sleep Difficulties	Yes	No	Yes	No
Dizziness	Yes	No	Yes	No
Loss of Strength	Yes	No	Yes	No

We are interested in your personal views of how you now see your current diabetes. Please indicate how much you agree or disagree with the following statements about your diabetes by checking the appropriate box

Views about your diabetes	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
My diabetes will last a short time					
My diabetes is likely to be permanent rather than temporary					
My diabetes will last for a long time					
This diabetes will pass quickly					
I expect to have this illness for the rest of my life					
My diabetes is a serious condition					
My diabetes has major consequences on my life					
My diabetes does not have much effect on my life					
My diabetes strongly affects the way others see me					
My diabetes has serious financial consequences					
My diabetes causes difficulties for those who are close to me					
There is a lot which I can do to control my symptoms					
What I do can determine whether my diabetes gets better or worse					
The course of my diabetes depends on me					
Nothing I do will affect my diabetes					
I have the power to influence my diabetes					
My actions will have no affect on the outcome of my diabetes					
My diabetes will improve in time					
There is very little that can be done to improve my diabetes					
My treatment will be effective in curing my diabetes					

Views about your diabetes	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
The negative effects of my diabetes can be prevented (avoided) by my treatment					
My treatment can control my diabetes					
There is nothing which can help my condition					
The symptoms of my condition are puzzling to me					
My diabetes is a mystery to me					
I don't understand my diabetes					
My diabetes doesn't make any sense to me					
I have a clear picture or understanding of my condition					
The symptoms of my diabetes change a great deal from day to day					
My symptoms come and go in cycles					
My diabetes is very unpredictable					
I go through cycles in which my diabetes gets better and worse.					
I get depressed when I think about my diabetes					
When I think about my diabetes I get upset					
My diabetes makes me feel angry					
My diabetes does not worry me					
Having this diabetes makes me feel anxious					
My diabetes makes me feel afraid					

We are interested in what you consider may have been the cause of your diabetes. There is no correct answer for this question. We are most interested in your own views about the factors that caused your diabetes rather than what others, including doctors or family may have suggested to you. Below is a list of possible causes for your diabetes. Please indicate how much you agree or disagree that they were causes for your diabetes by checking the appropriate box.

Possible Causes	**Strongly Disagree**	**Disagree**	**Neither Agree nor Disagree**	**Agree**	**Strongly Agree**
Stress or worry					
Diet or eating habits					
Bad Feng Shui					
Pollution in the environment					
My own behaviors					
My mental attitude (e.g. Thinking about life negatively)					
Worries caused my diabetes					
Hereditary- it runs in my family					
Poor medical care in my past					
Overwork					
My emotional state (e.g. feeling down, lonely, anxious, empty)					
Aging					
Alcohol					
Smoking					
Pa Tzu (Fate)					
My personality					
Altered immunity					
Hotness or blood blockage					
Chance or bad luck					
Sleeplessness					
Weather change					

Appendix G

Diabetes Management Self-Efficacy Scale (DMSES)

Below is a list of activities your may have to perform to manage your diabetes. Please read each one and then circle the number that best describes how confident you usually are that you could carry out that activity. For example, if you are completely confident that you are able to check your blood sugar levels when necessary, circle 10. If you feel that most of the time you could not do it, circle 1 or 2. If you feel that all of the time you could not do it, circle 0

Circle one number on each line

I am confident that:	**Cannot do at all**				**Maybe Yes Maybe No**						**Certainly can do**
1. I am able to check my blood sugar if necessary	0	1	2	3	4	5	6	7	8	9	10
2. I am able to correct my blood sugar when the sugar level is too high (e.g. eat different foods)	0	1	2	3	4	5	6	7	8	9	10
3. I am able to correct my blood sugar when the sugar level is too low (e.g. eat different foods)	0	1	2	3	4	5	6	7	8	9	10
4. I am able to choose the foods that are best for my health	0	1	2	3	4	5	6	7	8	9	10
5. I am able to choose different foods and maintain a healthy eating plan	0	1	2	3	4	5	6	7	8	9	10
6. I am able to control my body weight and maintain it within the ideal weight range	0	1	2	3	4	5	6	7	8	9	10
7. I am able to examine both of my feet (e.g. for cuts or blisters)	0	1	2	3	4	5	6	7	8	9	10
8. I am able to do enough physical activity (e.g. walking the dog, yoga, gardening, stretching exercises)	0	1	2	3	4	5	6	7	8	9	10
9. I am able to maintain my eating plan when I am ill	0	1	2	3	4	5	6	7	8	9	10
10. I am able to follow a healthy eating plan most of the time	0	1	2	3	4	5	6	7	8	9	10

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I am confident that:	Cannot do at all					Maybe Yes Maybe No					Certainly can do
11. I am able to do more physical activity if the doctor advises me to do	0	1	2	3	4	5	6	7	8	9	10
12. When doing more physical activity, I am able to adjust my eating plan	0	1	2	3	4	5	6	7	8	9	10
13. I am able to follow a healthy eating plan when I am away from home	0	1	2	3	4	5	6	7	8	9	10
14. I am able to choose different foods and maintain my eating plan when I am away from home	0	1	2	3	4	5	6	7	8	9	10
15. I am able to follow a healthy eating plan during festive periods	0	1	2	3	4	5	6	7	8	9	10
16. I am able to choose different foods and maintain a healthy eating plan when I am eating out or at a party	0	1	2	3	4	5	6	7	8	9	10
17. I am able to maintain my eating plan when I am feeling stressed or anxious	0	1	2	3	4	5	6	7	8	9	10
18. I am able to visit my doctor four times a year to monitor my diabetes	0	1	2	3	4	5	6	7	8	9	10
19. I am able to take my medication as prescribed	0	1	2	3	4	5	6	7	8	9	10
20. I am able to maintain my medication when I am ill	0	1	2	3	4	5	6	7	8	9	10

Appendix H

Diabetes Distress Scale (DDS)

Living with diabetes can sometimes be tough. There may be many problems and hassles concerning diabetes and they can vary greatly in severity. Problems may range from minor hassles to major life difficulties. Listed below are 17 potential problems that people with diabetes may experience. Consider the degree to which each of the items may have distressed or bothered you **DURING THE PAST MONTH** and circle the appropriate number.

Please note that we are asking you to indicate the degree to which each item may be bothering you in your life, NOT whether the item is merely true for you**. If you feel a particular item is not a bother or a problem for you, you would circle "1". If it is very bothersome to you, you might circle "6".**

Problems	**Not a problem**		**Moderate problem**		**Serious problem**	
	1	2	3	4	5	6
1. Feeling that diabetes is taking up too much of my mental and physical energy						
2. Feeling that my doctor doesn't know enough about diabetes and diabetes care						
3. Feeling angry, scared and /or depressed when I think about living with diabetes						
4. Feeling that my doctor doesn't give me clear enough directions on how to manage my diabetes						
5. Feeling that I am not testing my blood sugars frequently enough						
6. Feeling that I am often failing with my diabetes regimen						
7. Feeling that friends or family are not supportive enough of my self-care efforts (eg planning activities that conflict with my schedule, encouraging me to eat the "wrong foods")						
8. Feeling that diabetes controls my life						
9. Feeling that my doctors doesn't take my concerns seriously enough						
10. Not feeling confident in my day-to-day ability to manage diabetes						
11. Feeling that I will end up with serious long-term complications, no matter what I do						

Problems	Not a problem		Moderate problem		Serious problem	
	1	2	3	4	5	6
12. Feeling that I am not sticking closely enough to a good meal plan						
13. Feeling that friends or family doesn't appreciate how difficult living with diabetes can be						
14. Feeling overwhelmed by the demands of living with diabetes						
15. Feeling that I don't have a doctor who I can see regularly about my diabetes						
16. Not feeling motivated to keep up my diabetes self-management						
17. Feeling that friends or family don't give me the emotional support that I would like						

Appendix I

The Center for Epidemiologic Studies Depression Scale (CES-D)

Below is a list of some of the ways you may have felt or behaved. Please indicate how often you have felt this way during the **past week**: (*circle **one** number on each line*)

During the past week...	**Rarely or none of the time**	**Some or a little of the time**	**Occasional or moderate amount of time**	**Most or all of the time**
	(Less than 1 day)	**(1-2 days)**	**(3-4 days)**	**(5-7 days)**
1. I was bothered by things that usually don't bother me				
2. I did not feel like eating; my appetite was poor				
3. I felt that I could not shake off the blues even with help from my family				
4. I felt that I was just as good as other people				
5. I had trouble keeping my mind on what I was doing				
6. I felt depressed				
7. I felt that everything I did was an effort				
8. I felt hopeful about the future				
9. I thought my life had been a failure				
10. I felt fearful				
11. My sleep was restless				
12. I was happy				
13. I talked less than usual				
14. I felt lonely				

During the past week...	Rarely or none of the time (Less than 1 day)	Some or a little of the time (1-2 days)	Occasional or moderate amount of time (3-4 days)	Most or all of the time (5-7 days)
15. People were unfriendly				
16. I enjoyed life				
17. I had crying spells				
18. I felt sad				
19. I felt that people disliked me				
20. I could not get "going"				

Appendix J

Summary of Diabetes- Care Activities (SDSCA)

The questions below ask you about your diabetes self-care activities during the past 7 days. If you were sick during the past 7 days, please think back to the last 7 days that you were not sick.

1. On how many of the last SEVEN DAYS did you take diabetes pills by your health care provider?

0	1	2	3	4	5	6	7

2. On how many of the last SEVEN DAYS did you take your recommended insulin injections?

0	1	2	3	4	5	6	7

3. On how many of the last SEVEN DAYS did you followed your eating plan?

0	1	2	3	4	5	6	7

4. On how many of the last SEVEN DAYS did you eat your meal regularly?

0	1	2	3	4	5	6	7

5. On how many of the last SEVEN DAYS did you participate in at least 30 minutes of physical activity? (Total minutes of continuous activity, including walking).

0	1	2	3	4	5	6	7

6. On how many of the last SEVEN DAYS did you participate in a specific exercise session (such as swimming, walking, biking) other than what you do around the house or as part of your work?

0	1	2	3	4	5	6	7

7. On how many of the last SEVEN DAYS did you test your blood sugar?

0	1	2	3	4	5	6	7

8. On how many of the last SEVEN DAYS did you test your blood sugar number of time recommended by your health care provider?

0	1	2	3	4	5	6	7

9. On how many of the last SEVEN DAYS did you check your feet?

0	1	2	3	4	5	6	7

10. On how many of the last SEVEN DAYS did you dry between your toes after washing?

0	1	2	3	4	5	6	7

11. Have you smoked a cigarette- even on puff-during the past SEVEN DAYS?

____ No

____ Yes. If Yes, how many cigarettes did you smoke on an average day? _____

Appendix K

Chinese language version Questionnaires

敬啟者:

您被邀請參與一項有關於糖尿病自我照顧的研究問卷調查。此研究目的主要在於了解*在美華人對於糖尿病的認知、自我照顧效能及情緒壓力對於照顧成效的影響*。此研究結果將**為醫療人員對於在美華人糖尿病照護上提供寶貴的訊息，也將能更近一步提供符合接近華人文化的照顧。**

參與這研究，您必須符合以下幾點: 1. 在德州的華裔 (您本人或者您的家庭來自於中國大陸、澳門、香港、新加坡、馬來西亞、台灣、越南或者其他國家的華人) 。2. 曾被診斷為第二型糖尿病。3. 能以華語、廣東話、台語或英文溝通。4.年滿 18 歲。 第一型糖尿病、妊娠糖尿病、目前有急性感染的健康狀況或癌症正在治療則不適合參與此研究。

這個問卷調查大約需要 15-20 分鐘完成，問卷完成後您將會得到價值$10 的 Walmart 禮卡。您的一切隱私跟資料將會被保密，所有的資料將會以編碼分析並且無法能追朔您的個人訊息。完成此問卷調查表示您同意參與此研究。

不論在填寫問卷之前、當中或者是完成問卷之後，若您有任何問題或者覺得權益受損，您可以透過電話[512-471-7956]或者電子郵件[yaching.huang@utexas.edu] 與研究者[黃雅靖]聯絡。此研究已得到德州大學奧斯丁分校研究委員會審核通過，編號: 2017-01-0001。您若是對自己的權益有任何疑問，可向大學研究審核委員會聯繫(可匿名)。電話 [512-471-8871] 或者電子郵件[orsc@uts.cc.utexas.edu]。

謝謝您的參與及支持!

計畫主持人

黃雅靖 護理博士候選人

德州大學奧斯丁分校

個人資料

1.出生年份: _ _ 年

2.性別: □ 女 □ 男

3.您或您的家人來自於哪裡?

□ 中國大陸 □ 香港 □ 澳門 □ 馬來西亞 □ 新加坡 □ 臺灣 □ 越南 □ 印尼 □ 其他 (請說明 _ _ _ _ _ _)

4.您是在美國出生的嗎? □ 是 □ 否

5.您在美國住多久了? _____ 年

6.您的最高學歷是?

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17+
	小學						國中/高中						學院/大學				研究所以上

7. 您目前的婚姻狀況是 (單選) ?

□ 從未結婚 □ 分居 □ 離婚 □ 喪偶

□ 已婚 □有固定伴侶

8. 請問您去年全家年**稅前**收入約多少 (單選) ?

□ < $20,000 □ $20,001 – $30,000

□ $30,001 – $40,000 □ $ 40,001 – $50,000

□ $ 50,001 – $75,000 □ $ 75,001 – $100,000

□ > $100,000

9. 請問您是否認為你家每個月的總收入能夠負擔家庭支出? □ 是 □ 否

10. 請問您在什麼時候被診斷出糖尿病? _____ 歲

11. 您覺得您目前整體健康狀況如何?

□ 極佳 □ 很好 □ 好 □ 普通 □ 不好

12. 您覺得您目前的心理健康狀況如何?

□ 極佳 □ 很好 □ 好 □ 普通 □ 不好

13. 請問您目前治療糖尿病的方式為何?

□ 飲食控制 □ 口服糖尿病藥 □ 施打胰島素

□ 其他治療方式（請說明 _ _ _ _ _ _ _ _ _ _）

14. 醫生是否曾經告知過您，您有以下的疾病或健康問題?

高血壓	□ 是 □ 否
心臟病	□ 是 □ 否
中風	□ 是 □ 否
癌症	□ 是 □ 否
關節炎	□ 是 □ 否
肝炎	□ 是 □ 否
腎臟問題	□ 是 □ 否
氣喘	□ 是 □ 否
慢性阻塞性肺病(COPD)	□ 是 □ 否

文化適應

1. 您的英語程度如何?

□ 很好 □ 好 □ 普通 □ 不好

2. 您多常使用英語?

□ 隨時隨地 □ 有時候 □ 不常 □ 從不

3. 在您所看的電視節目或影片中，有多少是英語發音的?

□ 所有的 □ 大部分 □ 有一些 □ 沒有

4. 在您閱讀的報紙雜誌中，有多少是英語的?

□ 所有的 □ 大部分 □ 有一些 □ 沒有

5. 在您家中所吃的食物，有多少食物**不是**華人的飲食?

□ 所有的 □ 大部分 □ 有一些 □ 沒有

6. 在您外面所吃的食物，有多少食物**不是**華人的飲食?

□ 所有的 □ 大部分 □ 有一些 □ 沒有

7. 您所來往的朋友中，有多少人**不是**華人?

□ 所有的 □ 大部分 □ 有一些 □ 沒有

8.您多常參與非華人的聚會?

□ 經常 □ 偶爾 □ 很少 □ 從不

9.當您和美國人（非華人）相處時，您多常感受到歸屬感?

□ 經常 □ 偶爾 □ 很少 □ 從不

10. 當您和和美國人（非華人）相處時，您覺得自己可以融入美國人（非華人）的圈子嗎?

□ 非常可以 □ 可以 □ 不太可以 □ 不可以

11.您對美國的文化和傳統熟悉程度如何?

□ 非常熟悉 □ 熟悉 □ 不太熟悉 □ 一點也不熟悉

12. 您多常慶祝美國的節日（像是感恩節和美國國慶）

□ 每次 □ 經常 □ 偶爾 □ 從不

您本人對糖尿病的看法及觀感

以下是在一般疾病可能會出現的症狀，有些症狀您可能經歷過，有些則或許您從來也沒經歷過。請您能根據您的情況，圈出，第一，您被診斷出糖尿病後是否有過以下症狀；第二，您認為您的症狀與您的糖尿病是否有關。

	在患糖尿病後我有(無)此症狀		此症狀和我目前的糖尿有(無)關	
疼痛	有	無	有	無
喉嚨痛	有	無	有	無
噁心作嘔	有	無	有	無
呼吸困難	有	無	有	無
體重減輕	有	無	有	無
疲倦	有	無	有	無
關節僵硬	有	無	有	無
眼痛	有	無	有	無
氣喘	有	無	有	無
頭痛	有	無	有	無
胃部不適	有	無	有	無
睡眠問題	有	無	有	無
頭暈	有	無	有	無
全身乏力	有	無	有	無

除了您的症狀以外，我們也希望能了解，您個人對目前糖尿病病情的看法。

以下問題是關於您對糖尿病觀點的同意度，請在符合您想法的空格內打勾。

我認為我的糖尿病...	完全不同意	不同意	沒意見	同意	非常同意
將在短時間內痊癒					
是永久性而非暫時性的					
會拖很長一段時間					
應該很快就會好了					
會跟著我一輩子					
是一個嚴重的病					
對我的生活有很大的影響					
對我的人生沒有什麼太大的影響					
嚴重影響到別人對我的看法					
嚴重影響經濟狀況					
對我身邊的人造成許多困難					
我可以用很多方法控制我的疾病症狀					
我個人所做的可以決定我病情的好壞					
糖尿病病程變化在於我做了什麼					
不管我做什麼都無法影響我的糖尿病					
我有能力可以影響我的糖尿病					
不管我怎麼做，對我的糖尿病結果都沒什麼幫助					
病情將會隨著時間而有所改善					
要改善我的糖尿病，能做得很少					
目前治療方法將會有效治好我的糖尿病					

我認為我的糖尿病…	完全不同意	不同意	沒意見	同意	非常同意
目前治療方法可以預防或避免因疾病造成的不良後果					
目前的治療方法，可以控制住我的疾病					
沒有什麼辦法可以幫助我的糖尿病					
有很多症狀讓我很不解					
對我來說糖尿病跟謎一樣					
我對糖尿病一點概念也沒有					
我實在無法理解我的糖尿病					
所有的病情及變化我都很了解					
我的糖尿病病況變化很大，似乎每天都有所不同					
症狀總是反反覆覆、來來去去的					
我的糖尿病是完全沒法子預測的					
我已經歷了多次來來回回、好好壞壞的病情					
只要一想到糖尿病，我就感到很憂鬱					
每當想到我的糖尿病時，我就感到很心煩					
我的糖尿病讓我感到生氣					
我一點也不擔心我的糖尿病					
事實上，得糖尿病讓我十分煩惱焦慮					
我的糖尿病讓我感到害怕					

人們對為什麼患糖尿病有不同的看法，我們想知道您的看法如何。以下問題沒有一定正確的答案，不論醫生、或您家人怎麼說，我們想知道的是您對糖尿病病因的看法。以下問題請勾出與您想法最接近的答案。

我認為我罹患糖尿病的可能原因是…	**非常不同意**	**不同意**	**沒意見**	**同意**	**非常同意**
壓力或擔憂					
食物或飲食習慣					
流年不利、風水不好或犯沖					
環境汙染					
我的個人生活型態 (如靜態沒運動的生活型態)					
我的心態問題 (例如對人生負面想法)					
過度煩惱所致					
遺傳 (家族性)					
過去缺乏醫療照顧					
工作過度勞累					
我的情緒狀態 (如感覺沮喪、寂寞、焦慮或空虛)					
自然的老化過程					
飲酒					
抽煙					
八字輕					
與我自己性格有關					
因免疫力不如從前					
體內燥熱或氣血循環差					
運氣不好					
失眠					
天氣變化					

以下為你在糖尿病自我管理中可能要做的事項。請仔細閱讀每一個項目，然後選出最能代表你**自己執行這件事的信心程度**。例如:如果你認為自己在「當有需要時我有能力自行檢測血糖」非常有自信的話，請圈選 10;完全無法做到(完全沒自信的話)請圈選 0。

請在每一列中圈選出一個數字

我有信心	完全無法做到					也許可以也許不可以					完全可以做到
1.當有需要時，我有能力自行檢測血糖	0	1	2	3	4	5	6	7	8	9	10
2.當我的血糖太高時，我有能力調整我的血糖值(例如:食用不同種類的食物)	0	1	2	3	4	5	6	7	8	9	10
3.當我的血糖太低時，我有能力調整我的血糖(例如:食用不同種類的食物)	0	1	2	3	4	5	6	7	8	9	10
4.我有能力選擇最有利於我健康的食物	0	1	2	3	4	5	6	7	8	9	10
5.我有能力選擇不同種類的食物來維持健康的飲食計畫	0	1	2	3	4	5	6	7	8	9	10
6.我有能力將我的體重控制在理想範圍內	0	1	2	3	4	5	6	7	8	9	10
7.我有能力自行檢查我的腳(例如:傷口或起水泡)	0	1	2	3	4	5	6	7	8	9	10
8.我有能力做足夠的身體活動(例如:溜狗、瑜珈、園藝、或伸展運動等)	0	1	2	3	4	5	6	7	8	9	10
9.當我生病時，我仍然能維持我的飲食計畫	0	1	2	3	4	5	6	7	8	9	10
10.大部份的時間內,我都能確實遵守我的健康飲食計畫	0	1	2	3	4	5	6	7	8	9	10

我有信心	完全無法做到					也許可以也許不可以					完全可以做到
11.當醫師建議我多做一些身體活動，我有能力確實做到	0	1	2	3	4	5	6	7	8	9	10
12.當我身體活動量增加時，我有能力自行調整我的飲食計畫	0	1	2	3	4	5	6	7	8	9	10
13.當我外出時，我仍然能遵行健康的飲食計畫	0	1	2	3	4	5	6	7	8	9	10
14.當我外出時，我有能力選擇不同的食物種類，來維持我的飲食計畫	0	1	2	3	4	5	6	7	8	9	10
15.在特殊節日時，我仍然能遵守健康飲食計畫	0	1	2	3	4	5	6	7	8	9	10
16.當我在外用餐或參加聚會時，我有能力選擇不同種類的食物來維持我的健康飲食計畫	0	1	2	3	4	5	6	7	8	9	10
17. 當我面對壓力或焦慮時，我仍然能維持我的飲食計畫	0	1	2	3	4	5	6	7	8	9	10
18.我能每年至少去看醫生四次，以監測 我的糖尿病狀況	0	1	2	3	4	5	6	7	8	9	10
19.我能夠依醫師處方按時服藥	0	1	2	3	4	5	6	7	8	9	10
20.當我生病時，我仍然能維持我的糖尿病藥物治療	0	1	2	3	4	5	6	7	8	9	10

管理糖尿病的過程中，可能會遇上大大小小不同的問題與困擾。以下列舉了17項糖尿病患者可能遇上的困擾。請根據**過去一個月的經驗**， 評估每個問題對您的困擾或影響，並圈上合適的代表數字。

請注意：我們請您評估的是以下問題對您的困擾，不論它們發生與否。**如果你覺得某項對您來說不成困擾， 請圈上”1”；如果讓您非常困擾， 請圈上”6＂。**

困擾	完全沒有		有一些		經常	
	1	2	3	4	5	6
1.覺得糖尿病每天都消耗我大量心力和精力						
2.覺得我的醫生不夠了解糖尿病及糖尿照護						
3.當想到患有糖尿病,便覺得忿怒,恐懼/或憂慮						
4.覺得醫生沒有給我清楚的指引去管理我的糖尿病						
5.覺得自己不夠緊密測試我的血糖值						
6.覺得自己經常未能成功做到糖尿病的控制計劃						
7.覺得朋友或家人對我的自律不夠支持(例如團體活動與我的飲食時間相衝，鼓勵我吃”不該吃的食物)＂						
8.覺得糖尿病控制了我的人生						
9.覺得我的醫生沒有認真對待我的疑慮						
10.對自己日常管理糖尿病的能力沒有信心						
11.覺得我會有嚴重的長期糖尿病併發症，不管我何努力去防止它的發生						
12.覺得自己沒有依照良好的飲食指引						
13.覺得朋友或家人不明白糖尿病人生活的苦況						
14.對糖尿病在生活上的需求感到不勘負荷						
15.覺得我沒有一位醫生可定期照顧我的糖尿病						
16.覺得沒有動力去維持對糖尿病的自我控制						
17.覺得朋友或家人沒有提供我所需要的情緒支持						

以下句子描述一些自我感覺或行為。請圈出最接近您**過去一週**的狀況

過去一週	很少或 完 (少過 1 天)	有幾天 (1-2 天)	偶爾或 一半時間 (3-4 天)	經常或 (5-7 天)
1. 我被一些平時不會困擾我的事情困擾				
2. 我不想吃東西，我的胃口很差				
3. 即使有家人和朋友的幫忙，我仍然				
4. 我覺得我不比其他人差				
5. 我很難集中精神做事				
6. 我覺得情緒低落				
7. 我覺得我做每件事情都很吃力				
8. 我對將來抱有希望				
9. 我覺得自己一生很失敗				
10. 我覺得恐懼				
11. 我睡眠不安寧				
12. 我很開心				
13. 我比平時少說話				
14. 我覺得孤獨				
15. 我覺得其他人不友善				
16. 我很享受生活				
17. 我會經常無故哭泣				
18. 我覺得不開心				
19. 我覺得其他人不喜歡我				
20. 我提不起勁				

以下是問題想了解您在過去七天糖尿病自我照顧的狀況。如果您在過去七天有身體不適的情況（例如感冒），請以您平日未有不適的情況下作答。

1. 在過去 7 天裡，有幾天您是遵從處方服用口服藥物?

0	1	2	3	4	5	6	7

2. 在過去 7 天裡，有幾天您是遵從胰島素處方使用胰島素?

0	1	2	3	4	5	6	7

3 在過去 7 天裡，有幾天您是遵從糖尿病飲食建議進食的?

0	1	2	3	4	5	6	7

4. 在過去 7 天裡，有幾天您吃飯時間規律?

0	1	2	3	4	5	6	7

5. 在過去 7 天裡，有幾天您有至少半小時的健身活動（可累計活動時間，包括走路）?

0	1	2	3	4	5	6	7

6. 在過去 7 天裡，有幾天您除了家務或工作以外，還執行特定的運動（例如太極拳、爬山、跳舞、走路、騎腳踏車）?

0	1	2	3	4	5	6	7

7. 在過去 7 天裡，有幾天您測量您的血糖或尿糖?

0	1	2	3	4	5	6	7

8. 在過去 7 天裡，有幾天您遵從醫師所建議的血糖或尿糖檢測次數測量您的血糖或尿糖?

0	1	2	3	4	5	6	7

9.在過去 7 天裡，有幾天您檢查您的腳?

0	1	2	3	4	5	6	7

10.在過去 7 天裡，有幾天您曾在洗腳後擦乾腳趾縫?

0	1	2	3	4	5	6	7

11. 在過去 7 天裡，您有抽菸嗎?

____ 沒有　　____ 有。如果有，請問您平均一天抽幾根菸? _ _ _ _ _

Appendix L
Permission to Use Instruments

UT MAIL

Ya-Ching Huang <yaching.huang@utexas.edu>

The English version of Acculturation Inventory
7 messages

Ya-Ching Huang <yaching.huang@utexas.edu> Wed, Nov 16, 2016 at 5:52 AM
To: "Jang, Yuri" <yjang12@austin.utexas.edu>

Good morning Dr. Jang,

I would like to use the 12 items Acculturation Inventory that you developed for Korean elderly and published :A bidimensional model of acculturation for Korean American older adults. *Journal of Aging Studies*, *21*(3), 267-275.

I am wondering if I can have the original English version then I can have it in my Appendix in my proposal defense document.

Thank you so much!

Ya-Ching

--
Ya-Ching Huang, MSN, RN.
Ph.D. Candidate
| The University of Texas at Austin School of Nursing |

Jang, Yuri <yjang12@austin.utexas.edu> Wed, Nov 16, 2016 at 8:41 AM
To: "yaching.huang@utexas.edu" <yaching.huang@utexas.edu>

Sure! I am out of town and will get back to you right after Thanksgiving. Thanks!

Yuri

UT MAIL

Ya-Ching Huang <yaching.huang@utexas.edu>

sfwRe: Permission for using the Chinese version of DMSES (C-DMSES)
2 messages

吳淑芳 <shufangvivi@gmail.com> Sun, Feb 26, 2017 at 11:12 PM
To: Ya-Ching Huang <yaching.huang@utexas.edu>

Dear Ya-Ching ,

I am very pleased with your interest in using the Chinese version of the Diabetes Management Self-Efficacy Scale (C-DMSES). I am writing to give you permission to use the C-DMSES. I have attached the scale and several articles that related the scale. I have also attached an English version of the scale in case this may be of any use to you.

Don't hesitate to contact me if you have any queries. I would welcome any information from you to clear this instrument up.

Best regards,
Shu-Fang Vivienne Wu

2017-02-27 12:13 GMT+08:00 Ya-Ching Huang <yaching.huang@utexas.edu>:

> Dear Dr. Wu,
>
> I am Ya-Ching Huang, a doctoral candidate in the School of Nursing in the University of Texas at Austin. Currently, I am working on the preparation of my dissertation: "The impact of illness perception, diabetes distress and depressive symptoms on type 2 diabetes self-management among Chinese Americans".
>
> I am emailing to ask for your permission to use the Chinese version of the Diabetes Management Self-Efficacy Scale (C-DMSES) that you translated and published in the **International Journal of Nursing Studies in 2006-Development and *validation of the Chinese version of the Chinese Version Diabetes Management Self-Efficacy Scale.***
>
> If you are willing to share, please send me the Chinese version questionnaires and the scoring instruction.
>
> Thank you for your time and consideration.
>
> Ya-Ching

You have unread messages from **Yin**

Yin Xu

Hi Ya-ching, yes you have permission to use the scale. Feel free to contact me at sophieyxu@yahoo.com if you have any questions about the scale.

UT MAIL

Ya-Ching Huang <yaching.huang@utexas.edu>

questions for the Chinese SDSCA scale
3 messages

Ya-Ching Huang <yaching.huang@utexas.edu> Mon, Dec 26, 2016 at 12:44 PM
To: sophieyxu@yahoo.com

Dear Xu,

Thank you for your reply and your agreement to let me use the Chinese SDSCA scale.

I am a doctoral candidate in the School of Nursing in the University of Texas at Austin. Currently, I am working on the preparation of my dissertation: The impact of illness perception and depressive symptoms on type 2 diabetes self-management among Chinese Americans. I found out that you have translated and modified the SDSCA in your dissertation (attached), and I would like to know if you have any update since then?

I also have a question about the scoring method of this scale. Should I use the sum of this scale and have a passable score range from 0-70? If yes, how should I handle participants who are only prescribed oral medication to answer item 2, which is specific for participants who are using insulin? I imagine that participants who are not using insulin may skip the item 2 or answer 0 days, then their total sum score will be less than participants who are both taking oral medication and insulin.

Thank you for your help and your time.

Ya-Ching

Items

1. 在过去的7 天里, 有几天您是遵从处方服用口服药的?
2. 在过去的7 天里, 有几天您是遵从胰岛素处方使用胰岛素的?
3. 在过去的7 天里, 有几天您是遵从您的糖尿病饮食要求进食的?
4. 在过去的7 天里, 有几天您是每天都是在同一时间吃饭的?
5. 在过去的7 天里, 有几天您每天参加至少半小时的体育活动?
6. 在过去的7 天里, 有几天您除了家务或工作以外还参加某一专门的体育锻炼, 比如散步、打太极拳、爬山、跳舞?
7. 在过去的7 天里, 有几天您测量您的血糖或尿糖?
8. 在过去的7 天里, 有几天您遵从医生所建议的血糖或尿糖检测次数测量您的血糖或尿糖?
9. 在过去的7 天里, 有几天您检查您的脚?

10. 在过去的7 天里, 有几天您曾在洗脚后擦干脚趾缝?

--
Ya-Ching Huang, MSN, RN.
Ph.D. Candidate
| The University of Texas at Austin School of Nursing |

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yin xu <sophieyxu@yahoo.com> Tue, Dec 27, 2016 at 11:16 PM
Reply-To: yin xu <sophieyxu@yahoo.com>
To: Ya-Ching Huang <yaching.huang@utexas.edu>

Ya Ching,

The sum can be used for the scale score. In regards to medication items, if the patient takes only oral medication, then you use the oral medication item; if the patient takes only insulin, then you use the insulin item; if the patient takes both, you use the average score of the two items.

Here are some links of my published articles in which you could find more information about the scales:

Adaptation and testing of instruments to measure diabetes self-management in people with type 2 diabetes in mainland

Chinahttps://www.ncbi.nlm.nih.gov/pubmed/18579863

http://onlinelibrary.wiley.com/doi/10.1002/nur.20293/abstract

Factors influencing diabetes self-management in Chinese people with type 2 diabetes

UT MAIL

Ya-Ching Huang <yaching.huang@utexas.edu>

中文版IPQ-R 使用同意書

4 messages

Ya-Ching Huang <yaching.huang@utexas.edu> Mon, Jan 2, 2017 at 9:48 PM
To: shiah90@nutc.edu.tw

陳教授您好，

我是黃雅靖，目前是德州大學護理博士候選人，目前在準備我的博士論文：＂The impact of illness perception and depressive symptoms on type 2 diabetes self-management among Chinese Americans＂。因為我的研究將探討華語患者的illnesss perception，所以需要使用中文版的IPQ-R 量表。

知悉您的博士論文以高血壓患者為研究對象，除了翻譯此量表外，並依照華人的風俗做了修改。因此，希望能夠得到您的允許讓我使用您翻譯的量表，因為您的量表更適合用於特殊風俗的華人及其健康行為的研究。

謝謝！

學生　黃雅靖　敬上

Dear Dr. Chen,

I am Ya-Ching Huang, a doctoral candidate in the School of Nursing in the University of Texas at Austin. Currently, I am working on the preparation of my dissertation: "The impact of illness perception and depressive symptoms on type 2 diabetes self-management among Chinese Americans".

I am emailing to ask for your permission to use the Chinese version of the IPQ-R that you translated and published in the **Journal of Advanced Nursing in 2008- *Psychometric validation of the Chinese version of the Illness Perception Questionnaire-Revised for patients with hypertension.***

If you are willing to share, please send me the Chinese version questionnaires and the scoring instruction.

Thank you for your time and consideration.

Ya-Ching

--
Ya-Ching Huang, MSN, RN.
Ph.D. Candidate
| The University of Texas at Austin School of Nursing |

陳夏蓮 <shiah90@gmail.com> Wed, Jan 4, 2017 at 7:39 PM
To: Ya-Ching Huang <yaching.huang@utexas.edu>

Dear Ms. Huang

You are more than welcome to use the tool in your study.
However, the identity is designed for patients with hypertension. You may need to revise it. I am quit busy at this moment. I will send you information later.

Thanks for your interests in using the tool.

Best regards,

陳夏蓮 敬上
國立臺中科技大學 中護健康學院 護理系教授兼主任
403 台中市西區三民路一段193號R415-4室
TEL: 04-22196936 ; Fax:+886-4-22195881

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