AZUSA PACIFIC UNIVERSITY

SELF-EFFICACY, KNOWLEDGE, AND SOCIAL SUPPORT ON SELF-CARE AMONG SENIOR KOREAN IMMIGRANTS WITH DIABETES

by

Jung Eun Kim

A dissertation submitted to the

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DEDICATION

First and foremost, I would like to thank my Lord, God, for his countless love and blessings to me. Whenever I walk in darkness and anxiousness, he always gives me comfort, hope, and courage to pass a hard time. He listens to my quiet prayers, and he becomes my friend. He protects and guides me to arrive at the best destination wherever I go. I want to give special thanks to my mother, Kangnam Lee, who continually prays for me in South Korea. She sacrificed her whole life for her children and prayed with tears and love. I also wish to dedicate this dissertation to my husband, Yoon Hwan Chung, who encourages and loves me no matter what I do. Without his support, I could not complete my long academic journey. I would also like to thank my beloved three daughters, Hannah, Joyce, and Hyeram. Because of their beautiful smiles, doing multiple jobs as a mom, a doctoral student, and a Registered Nurse was joyful rather than painful. When I started the PhD nursing program, Hyeram was just 2 years old. Thank you Hannah, Joyce, and Hyeram for growing up healthily. I want to deeply thank my younger brothers, Jongmin and Jonghyuk, sisters-in-law, Jiwon and Ayeong, and my parents-in-law, who support me with prayers and encouragement.

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ABSTRACT

Diabetes is a prevalent chronic disease that significantly affects morbidity and mortality among senior people. There are diverse ethnic populations in the United States, and Korean immigrants are one of the minority immigrant groups. Many senior Korean immigrants report language inadequacy, lack of social support, discrimination, anxiousness in an unfamiliar environment, and poor economic status. These barriers limit them from accessing adequate health care services and resources. Although self-care is the most important key part in managing diabetes, senior Korean immigrants with diabetes face challenges to perform effective self-care activities related to various barriers. However, studies about related factors on self-care among senior Korean immigrants with diabetes are still lacking. The primary purpose of this study was to examine the relationships and effects among socio-demographics, self-efficacy, diabetes knowledge, social support, and self-care activities among senior Korean immigrants with diabetes in the United States. This study was guided by Orem's Self-Care Deficit Nursing Theory. The study aimed to (1) to identify the socio-demographic characteristics of senior Korean immigrants with diabetes in the United States; (2) examine the psychometric properties of the General Self-Efficacy (GSE) scale, the Simplified Diabetes Knowledge Test (S-DKT), the Lubben Social Network Scale-6 (LSNS-6), and the Summary of Diabetes Self-care activities (SDSCA) questionnaire; (3) determine the relationships among socio-demographics, self-efficacy, diabetes knowledge, social support, and self-care activities among senior Korean immigrants with diabetes; (4) investigate variables that predict self-care activities among senior Korean immigrants with diabetes; and (5) examine the relationship between 10 exogenous

variables (sex, age, years of residency in the US, education level, annual income, coping, confidence, diabetes knowledge, relatives support, and friends support) and five endogenous variables (healthy diet, exercise, blood glucose test, foot care, and unhealthy diet) among senior Korean immigrants with diabetes. A cross-sectional correlation study was conducted among N=190 senior Korean immigrants with diabetes. Exploratory Factor Analysis (EFA), Cronbach Alpha, and Confirmatory Factor Analysis (CFA) were used to examine reliability and validity of the GSE scale, S-DKT, LSNS-6, and SDSCA. Using path analysis, the direct and indirect effects among the exogenous and endogenous variables were analyzed. The GSE, S-DKT, LSNS-6, and SDSCA presented evidence of reliability and validity in this study. The results show positive correlations among socio-demographics, self-efficacy, diabetes knowledge, and social support. Particularly, diabetes knowledge is a predictor of health diet, exercise, and blood test that are self-care activities. In path analysis, there are direct and indirect effects among four endogenous variables (healthy diet, exercise, blood glucose test, and foot care) and eight exogenous variables (sex, age, years in the US, education level, diabetes knowledge, coping, and confidence).

The study results will be utilized for health care professionals to understand senior Korean immigrants with diabetes and develop culturally tailored strategies to improve self-care among them.

Keywords: Korean immigrants, diabetes, self-care, self-efficacy, knowledge, social support

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CHAPTER 1

INTRODUCTION

The average age of the world population has risen by 6 years from 64 years of age in 1990 to 70 years of age in 2014 (World Health Organization, 2014). Along with the increase of the older adult population, the declining health of seniors and the social and psychological effects of aging have become global issues (Yoo & Zippay, 2012). In growing older, older individuals are more likely to have chronic diseases and require adequate health care. Among chronic diseases, diabetes is a prevalent chronic health issue that significantly affects morbidity and mortality among senior people. Statistically, diabetes of all types affects about 500 million people worldwide and, among diabetes, Type 2 diabetes (T2DM) comprises the majority (International Diabetes Federation [IDF], 2017). In 2015, 23.1million individuals had been diagnosed with either Type 1 or Type 2 diabetes in the United States, while 7.2 million went undiagnosed (Centers for Disease Control and Prevention [CDC], 2017). Particularly, many Americans who are 65 and older are living with T2DM, with a prevalence rate of 25.2% (CDC, 2017).

There are diverse ethnic immigrant groups in the US, with Korean immigrants as one of the minority immigrant groups. Generally, *immigrants* are defined as foreign nationals lawfully entered to the United States for permanent residence (Congressional Research Service, 2021). However, in this study, Korean immigrants can be defined as all of Koreans who stay in the US regardless any kind of visa or immigration status. According to Migration Information Source (2014), Korean immigrants over 65 years old account for 16% of the total Korean immigrants, which is higher than the total percentage of the US population represented by immigrants (14%). Furthermore, the Korean

immigrant population in the US is aging more rapidly than any other ethnic group (Migration Policy Institute, 2014). Most senior Korean immigrants are monolingual, and more than 70% of them report experiencing difficulties of understanding medical terminology and using informative materials that have been translated into the Korean language (Han et al., 2011). Compared to young Korean immigrants, senior Korean immigrants face challenges for diabetes management related to aging, poor language proficiency, and limited access to health care services (Song et al., 2012). With limited access to insurance, lack of self-care, lack of routine check-ups, inadequate treatment, (Choi & Rush, 2012), and a lack of social support, senior Korean immigrants have more challenges in performing self-care activities in the management of their Type 2 Diabetes (T2DM).

Self-care in diabetes is critical in maintaining optimal health and preventing further complications (American Diabetes Association [ADA], 2018). However, self-care activities can be complex with multiple tasks including medication management, diet control, checking blood sugar, and continuous medical visits (Weinger et al., 2015). These multiple tasks can be challenging, especially for older adults (Weinger et al., 2015). Poor self-care can cause detrimental acute and long-term effects, such as skin and eye complications, neuropathy, functional disability, and potential death (ADA, 2018). In other words, senior patients are at a high risk for complications when compared with other age groups (ADA, 2018).

In summary, the goal of self-care activities in managing diabetes is to prevent the worsening of the disease and complications and to maintain optimal health status of patients (Kwon & Kim, 2011; Primozic et al., 2012). To achieve this goal, it is crucial for

senior patients with diabetes to not only receive adequate health care services from medical institutions, but also to perform effective self-care activities, including diet control, exercise, stress management, and taking medications to prevent or manage T2DM (Choi et al., 2008).

Statement of the Problem

Type 2 Diabetes Mellitus is a chronic illness that affects 26% of older adults age 65 and older in the United States (Centers for Disease Control and Prevention, 2017) with senior Korean immigrants as one of the fastest-growing older populations (Sohn, 2004). The rate of T2DM among them is higher than other ethnic minority older adults. Despite rising prevalence of the Korean immigrant older adults, studies about self-care activities and related factors in this group are lacking.

In contrast to young Korean immigrants, more than 20% of senior Korean immigrants live below the poverty line. Their poor economic status limits them from accessing health care services and resources. Furthermore, previous studies reported that most of the senior Korean immigrants experienced language inadequacy, lack of social support, discrimination, a feeling of not belonging in society, and anxiousness in an unfamiliar environment (Mui, 2001). Due to poor language proficiency and difficulty in gaining adequate health information, senior Korean immigrants strongly rely on family support (Choi, 2009). With general aging-related barriers, and as a minority ethnic immigrant group, senior Korean immigrants have more vulnerability in maintaining optimal health status. Although self-care activity is the cornerstone in maintaining optimal health, there are limited studies conducted in investigating self-care activities among senior Korean immigrants.

Consequently, it is essential to develop culturally tailored strategies to improve self-care among senior Korean immigrants with diabetes, explore related factors, and examine the relationships and effects among these factors that may impact self-care.

Purpose of the Study

The primary purpose of this study is to examine the relationships and effects among demographics, self-efficacy, diabetes knowledge, social support, and self-care activities among senior Korean immigrants with diabetes in the United States. This study was guided by Orem's Self-Care Deficit Nursing Theory.

Theoretical Framework for the Study

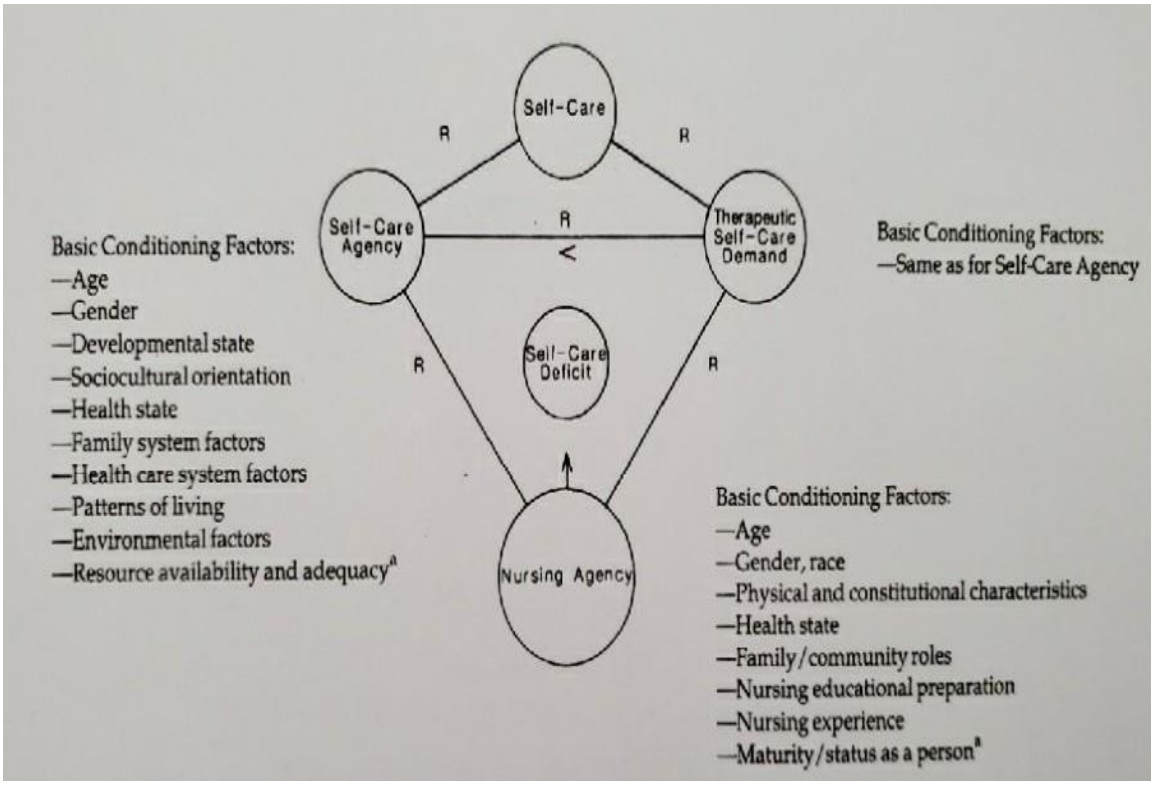
The major concepts of this study can be explained based on Orem's self-care deficit nursing theory (SCDNT), one of many nursing theories. Orem's SCDNT has been one of the most widely used theories that provide clinical guidelines for planning and implementing self-care. Orem believed that human beings have the requisites to take care of themselves, and when this ability is lacking, nurses can help the individuals to regain this ability by providing direct care and compensatory educational support (Orem, 1991).

Orem's self-care framework is composed of six basic concepts. The core basic concepts are self-care, self-care agency, therapeutic self-care demand, self-care deficit, nursing agency, and nursing system. The concepts of self-care, self-care agency, self-care demand, and self-care deficit are related to patients or the individual who needs nursing. On the other hand, nursing agency and nursing system are related to nurses and their practice. Within the set of patient concepts, basic conditioning factors influence self-care agency and self-care demand. The basic conditioning factors include age, gender, developmental state, health state, sociocultural orientation, health care system factors,

family system factors, a pattern of living, environmental factors, and resource availability and adequacy (Orem, 1987; see Figure 1).

Figure 1

Conceptual Structure of the Self-Care Deficit Nursing Theory



Note. Adapted from Orem, D. E. (1987). Orem's general theory of nursing. In R. Parse (Ed.), *Nursing science: Major paradigms, theories, and critiques* (pp. 67-89). W. B. Saunders. p. 70.

Major Concepts of SCDNT

Self-Care (Dependent Care)

Self-care can be defined in many ways. Orem (1991) defined self-care as "the practice of activities that individuals initiate and perform on their behalf in maintaining life, health, and well-being" (p. 117). This definition has been used since the earliest

descriptions of self-care by Orem in 1956. Basic assumptions of the concept "self-care" include the following: (a) self-care is an ego-processed activity, which is learned through the person's interpersonal relationships and communications; (b) each individual has both the right and responsibility to care for self; it may include responsibilities for others, such as children, infants, the senior, or an adolescent; and (c) an adult may need assistance occasionally to accomplish self-care (Nursing Development Conference Group [NDCG], 1973, p. 99).

Orem defines self-care activities as "deliberate actions." For example, a person with hypertension takes prescribed medications, knowing the importance of maintaining blood pressure within a normal range. Likewise, "knowing" and "deciding" are required to perform self-care. To perform a self-care activity, the person should know the action and how it relates to health, quality of life, and well-being (Hartweg, 1991). Also, the concept of dependent care is within definitions of self-care. Dependent care is activities performed by responsible individuals to meet the elements of their dependents' therapeutic self-care demands (Orem & Taylor, 1986).

Self-Care Agency (Dependent-Care Agency)

Self-care agency can be defined as the power of people to relate to self-care and capability for self-care (NDCG, 1973). The individual who uses the power and self-care ability is the self-care agent. Self-care agency is an acquired capability that is affected by conditioning factors in the environment. Self-care agency is an ability to perform self-care that develops from childhood to adulthood and declines with aging (Hartweg, 1991). Self-care agency is described as a complex and hierarchical structure that includes three parts: (a) foundational capabilities and dispositions, (b) power components, and (c)

capabilities for estimative, transitional, and productive operations (Orem & Taylor, 1986).

Foundational capabilities are necessary to deliberate self-care actions, such as the ability to work, to move, to regulate position, and to remember directions. In addition, awareness of one's ability to perform self-care actions, interest, and values of the individual are also required for dispositions.

Power components comprise the middle of the hierarchy in self-care agency. It includes 10 power components: (a) ability to maintain attention and exercise, (b) controlled use of physical energy, (c) ability to control body position, (d) ability to reason within self-care frame, (e) motivation, (f) ability to make decisions about self-care, (g) ability to acquire technical knowledge, (h) cognitive, perceptual communication, and interpersonal skills, (i) ability to order self-care actions, (j) ability to perform self-care activities consistently. Orem (1990) stated that the 10 power components can be summarized as knowledge, skills, and attitudes.

Estimative actions are associated with an individual's performance when determining what self-care requires. Transitional operations or actions are reflected on the actions to be taken. Productive operations are related to preparing the self to perform the new self-care activities to a daily routine. Orem (1987) refers to self-care agency as the "summation of all human capabilities needed to perform self-care" (p. 76).

Self-Care Demand

Self-care demand is the totality of required regulatory care measures (Orem, 1991). Therapeutic self-care demand is an integral part of each individual's life, because varying amounts and kinds of self-care requisites are present through the life cycle. Orem

considered the human life cycle to encompass the intrauterine stages of life and the process of birth. Particularly, the concept of self-care demand has three dimensions: (a) universal self-care requisites, (b) developmental self-care requisites, and (c) health deviation self-care requisites (Hartweg, 1991).

Universal self-care requisites are those for all human beings in the life cycle. There are eight universal self-care requisites: intake of air, intake of water, intake of food, the provision of care associated with elimination and excrements, a balance between activity and rest, a balance between solitude and social interaction, prevention of hazards, and promotion of human functioning and development.

Developmental self-care requisites include two types: maturational and situational. Maturational self-care development is adjusted for the age or development stage. For example, the need for food in adulthood is different from the need for food in a neonate. Situational self-care relates to life events or experiences that impact human development. The spouse's death, change of residence, and oppressive living condition are examples.

Health deviation self-care requisites exist for ill or injured individuals who are under medical diagnosis and treatment. To prevent further problems, individuals need actions and should overcome the effects of the existing deviations from normal.

Self-Care Deficit (Dependent-Care Deficit)

Self-care deficit refers to the relationship between self-care agency and therapeutic self-care demands of individuals. There are three possible relationships: less than, equal to, or greater than (Hartweg, 1991). Self-care deficit means the status of that self-care agency is less than their therapeutic self-care demands (Orem, 1991). Orem

clarified that the deficit itself does not mean a disorder or problem, but an expression of the relationship between the two concepts. If self-care deficit does not exist, there is no role for the nurse in the situation. In other words, complete self-care deficit means "no capability to meet a therapeutic self-care demand" (Orem, 1991, p. 173). A partial deficit can exist when the patient has some capabilities to meet part of the therapeutic self-care demand, but not all.

Nursing Agency

Nursing agency is defined as the complex property or attribute of nurses who enable therapeutic self-care (Orem, 1991). Nursing agency includes three structures similar to self-care agency: (a) foundational capabilities and dispositions, (b) power components, and (c) capabilities for estimative, transitional, and productive operations. Fundamental capabilities mean positive attitudes or willingness to act. Power components are similar to self-care agency but are specific to motivation to provide nursing care and ability to develop nursing skills. Capabilities include necessary steps such as nursing process, diagnosis, prescription, or development of patients' self-care agency.

Nursing agency varies according to nurses' educational background, practice situations, and clinical experiences. Nurses' age, gender, race, culture, status, and maturity can affect the relationship between a patient and a nurse. Nursing agency is developed and exercised for the well-being of others, and self-care agency is developed and exercised for the well-being of oneself (Orem, 1991). Orem described nursing agency as "activated or un-activated." The activated agency makes diagnosis, prescription, and regulation of self-care for individuals with self-care deficits (Hartweg, 1991).

Nursing System

Orem (1987) defined nursing system as all actions, activities, and interactions of nurses and patients in nursing practice. The nursing system is viewed as tridimensional, including social, interpersonal, and technological. The social and interpersonal dimensions are common to all helping services. The technological dimension is specific to nursing and gives direction to the form and substance of nursing. The social system is considered enabling of the interpersonal and technological system. The social system clarifies the role of the person as a patient and the role of the nurse as the provider of care. If there is a self-care deficit, the person becomes a patient of the nurse. If a person has nursing agency and a willingness to provide care, the person becomes the nurse of the patient. To be effective in the provision of nursing care, nursing knowledge in the patterns of knowing the patient will enhance the care of the patient.

There are three types of nursing systems: wholly compensatory, partly compensatory, and supportive-educative (Orem, 1991). These types can be considered by answering this question, “Who can or should perform the self-care actions?” If the patient is unable to perform actions, the system can be considered as wholly compensatory. If the nurse and patient share the self-care tasks, the system is partly compensatory. When a patient can perform all self-care requiring actions and the nurse provides supportive and educative actions, the system is supportive-educative.

Basic Conditioning Factors

Orem (1987) described the concept of basic conditioning factors related to two patient concepts (self-care agency and therapeutic self-care demand) and one nurse concept (nursing agency). The basic conditioning factors include age, gender,

developmental state, health state, sociocultural orientation, health care system factors, family system factors, a pattern of living, environmental factors, and resource availability and adequacy (Orem, 1991).

Application of Orem's SCDNT for this Study

Orem defined self-care as "the practice and activities that individuals initiate and perform on their behalf in maintaining life, health, and well-being" (Orem, 1991, p. 117). To achieve the status of optimal self-care, the level of self-care agency should be equal to the level of therapeutic self-care demand. Self-care agency is the power of individuals to relate to self-care; there are several basic conditioning factors that influence the self-care agency. Age, sex, developmental state, health state, sociocultural orientation, health care system factors, family system factors, a pattern of living, environmental factors, and resource availability and adequacy are examples of the basic conditioning factors.

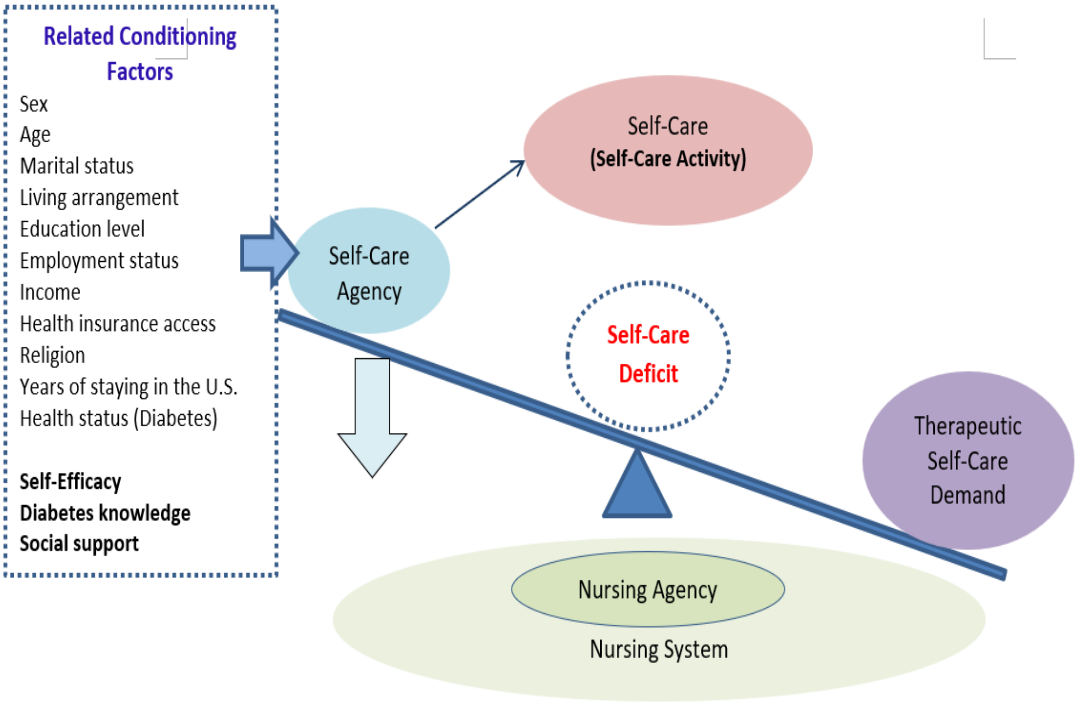
According to the previous studies about senior Americans with diabetes, self-efficacy, diabetes knowledge, and social support were identified as related factors in self-care. According to Orem's SCDNT, the factors can be considered conditioning factors that affect self-care agency. Depending on the conditioning factors, the level of self-care agency may increase or decrease. If the conditioning factors are identified, nurses can more effectively help individuals improve their self-care ability, which is self-care agency. At the same time, if the level of self-care agency increases, the status of "self-care deficit" will decrease or will disappear.

However, despite the importance of identifying the conditioning factors, there is a lack of studies about self-care among senior Korean immigrants with diabetes and related conditioning factors. This study identified the conditioning factors related to the self-care

agency of senior Korean immigrants and examined the relationships and effects among the factors. See Figure 2 for the description of the applicable concepts related to Orem's SCDNT.

Figure 2

Application of Orem's Self-Care Deficit Nursing Theory to Self-Care of Senior Korean Immigrants with Diabetes



Significance to Nursing

Nurses provide various types of care for individuals, including clinical practice, education, and advocacy. Especially in the United States, nurses provide care for diverse ethnic groups from different cultures with unique values and health traditions. Each ethnic group has different perspectives on health.

The findings gained from this study will enable further understanding of the Korean ethnic minority group, particularly the senior Korean immigrants with diabetes and their health issues. Also, the results of this study can be utilized to develop culturally tailored health strategies for senior Korean immigrants in the United States. Furthermore, based on the results of this study, preventive strategies and health care services can be developed. Overall, the findings will facilitate and enhance the performance of effective self-care among senior Korean immigrants with diabetes.

CHAPTER 2

LITERATURE REVIEW

Introduction

The purposes of this literature review are twofold: (a) to summarize the contextual elements related to self-efficacy, diabetes knowledge, social support, and self-care among senior Korean immigrants with diabetes and (b) to establish the gaps in studies focusing on self-efficacy, diabetes knowledge, social support, and self-care among senior Korean immigrants with diabetes.

Procedure of Literature Review

This literature review included both peer-reviewed and non-peer-reviewed resources from 2010 to 2020. It began with the broad search term of *diabetes* followed by utilization of more specific search terms, including *self-care/self-management*, *self-efficacy*, *knowledge*, *social support*, and *senior* or *elderly*. The literature review procedure included utilization of the following databases: Cumulative Index to Nursing and Allied Health (CINAHL Plus), Health Source Nursing Academic Edition, Medical Literature Analysis and Retrieval System Plus (Medline Plus), the American Psychological Association (PsycInfo), and Sociology Index (SOCIndex). After utilizing the six primary keywords, including diabetes, self-care/management, self-efficacy, knowledge, social support, and senior or elderly, 79 articles were retrieved. The studies' titles and retrieved abstracts were carefully reviewed.

However, no study was found that had all six keywords. Therefore, to find the most relevant studies, diabetes, self-care/self-management, and Korean immigrants were used as search terms through the five databases. The search was limited between 2010

and 2020 as published years. As a result, 25 studies were retrieved, including 11 studies from Nursing and Allied Health (CINAHL Plus), two from Health Source Nursing Academic Edition, seven from Medical Literature Analysis and Retrieval System Plus (Medline Plus), and five from the American Psychological Association (PsycInfo). After removing duplicated studies and careful review of the full text, five studies were considered relevant studies (see Figure 3).

The five studies included four qualitative studies and one quantitative study (Cha et al., 2012; Choi et al., 2014; Choi & Rush, 2012; Joo & Lee, 2016, Nam et al., 2013). However, among the five studies, only two studies (Choi et al., 2014; Joo & Lee, 2016) were about senior groups of Korean immigrants with diabetes. The other three studies included other age groups. Two studies (Choi et al., 2014; Joo & Lee, 2016) addressed self-care among senior Korean immigrants with diabetes.

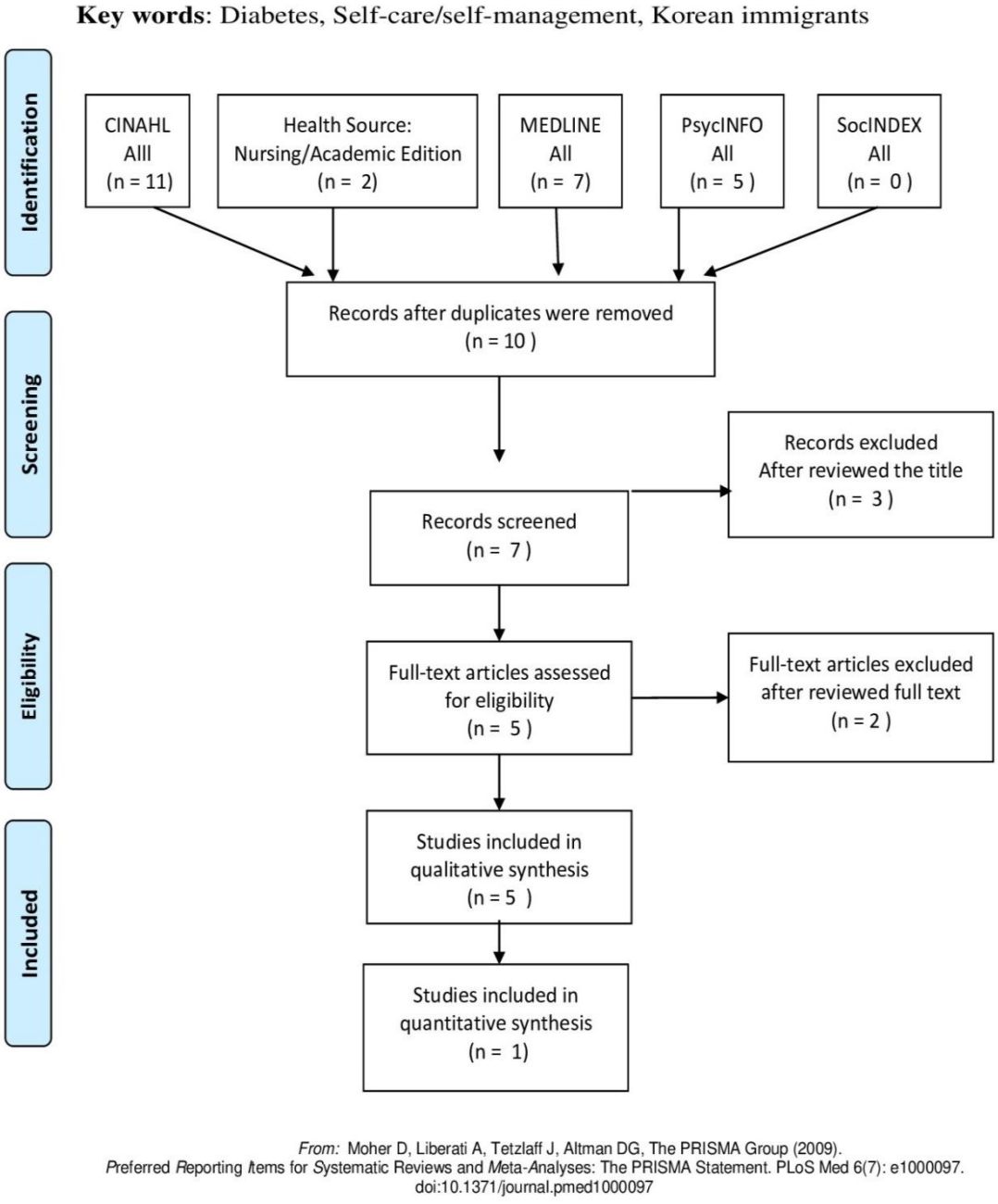
The systemic review of the literature was conducted using the Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) guidelines. See Figure 3.

Korean Immigrants in the United States

According to the 2010 United States Census Bureau, among Asian Americans, the largest group was Chinese (3.79 million), followed by Filipinos (3.41 million), Indian (3.18 million), Vietnamese (1.73 million), Korean (1.7 million), and Japanese (1.3 million). The total population of Asian Americans grew by 46% from 2000 to 2010 according to the Census Bureau, which constituted the largest increase of any major racial group during that period.

Figure 3

PRISMA Flow Diagram



From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). *P*referred *R*eporting *I*tems for *S*ystematic Reviews and *M*eta-*A*nalyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097

Migration Information Source (2014) reported that, since the 1960s, immigration from South Korea to the U.S. has increased dramatically, related to political, military, and economic relationships between the two countries. In 2017, approximately one million

Korean immigrants lived in the U.S.; that number represents 2.4% of the 44.5 million ethnic immigrants in the U.S. After the Immigration Act in 1965 removed restrictions on Asian immigration to the U.S., the number of Korean immigrants steadily grew from 11,000 in 1960 to 290,000 in 1980, which is a 2,500% increase. The population doubled to 568,000 in the following decade, and it reached up to 1.1 million immigrants in 2010. According to Migration Information Source (2014), almost half of all Korean immigrants live in three states: California (31%), New York (9%), and New Jersey (7%). The top four counties of Korean immigrants were Los Angeles County and Orange County in California, Queens County in New York, and Bergen County in New Jersey.

Ra et al. (2013) identified Korean immigrants' unique cultural and socioeconomic features in the United States. First, Korean immigrants have a relatively short immigration history. Despite the majority coming to the United States after the Immigration Reform Act in 1965, Korean immigration to the U.S. began in the 1880s (Hurh, 1998). Second, Korean immigrants have had economic success in a short period and yet share acculturation-related problems with other ethnic groups (Kim & Naughton, 1993). Third, most Korean immigrants reside in or near large cities with the Korean community and tend to maintain their ethnic identity and culture (Hurh, 1998). Lastly, many Korean immigrants (58%) are engaged in self-employed small businesses, more than Chinese (18%) and Mexican immigrants (9%; Lopez-Garza & Diaz, 2001). With these unique characteristics, it is clear that Korean immigrants should be studied separately from other immigrant groups to understand their health issues.

Korean immigrants who stay with temporary visa status are more likely to be highly educated and have high socioeconomic status compared to other immigrants.

South Korean international students have been among the top three most prominent groups of international students enrolled in U.S. higher education, along with Chinese and Indian. Most Korean immigrants in the U.S. are naturalized citizens after gaining lawful permanent resident cards through sponsorship from an employer or immediate relative. Overall, they have higher incomes and education status than the total of other foreign-born immigrants, and they are not likely to be in poverty or lack.

However, despite being considered a successful immigrant group, Korean immigrants are also considered one of the underserved minority populations in the U.S. They are at high risk of developing diabetes (Kim et al., 2015). For example, in 2015, about 52% of Korean immigrants reported limited English proficiency, compared to 49% of the overall foreign-born population. A lack of proficiency in speaking English is the most common stressor for Korean immigrants in the United States. The low proficiency in English and low health literacy contribute inevitably to their vulnerability and health disparities. Related to the language barrier and low health literacy, many Korean immigrants who have an asymptomatic chronic disease such as diabetes are not receiving a timely diagnosis and adequate treatment.

Following their relocation to the U.S., Korean immigrants face diverse challenges in their lives. These changes affect their lives, including diet, physical activities, social interactions, and economic status. Furthermore, more than 25% of Korean immigrants in the U.S. who are 65 years old or older have been diagnosed with T2DM (Yoo et al., 2015). This acculturation process causes them to have limited access to health care services and pertinent information (Kandula et al., 2004).

Generally, most Korean immigrants arrive with better health in the United States than the native-born U.S. population. However, the initial health advantage erodes with a more extended stay in the U.S. (Abraido-Lanza et al., 2016). This phenomenon can be related to unhealthy acculturation, such as adopting unhealthy lifestyles, dietary changes, acculturative stress related to negative socioeconomic conditions, and environmental factors such as racial discrimination (Akresh, 2007). Stress related to acculturation, political, cultural, socioeconomic, and language barriers influences immigrants' quality of life and overall health status in the U.S. (Edberg et al., 2011).

In summary, Korean immigrants are one of the fastest-growing ethnic groups in the United States. This tremendous growth has led to increased interest in their health (Roh et al., 2011). However, the population of Korean immigrants is just 2.4% of the 44.5 million immigrants in the U.S. as of 2017, and they are still one of the minority ethnic groups. Due to unique cultural and socioeconomic characteristics, Korean immigrants need to be studied separately from other ethnic groups. On the other hand, there is a lack of previous literature that focuses on their health, and thus more studies are required to understand their health and related factors.

Senior Korean Immigrants as a Vulnerable Population

In 2007, about 12.5 million or 25% of the older adults were minorities who are non-White (U.S. Census Bureau, 2008). Among the older ethnic groups, the number of senior Korean groups grew steadily from 34,350 persons in 1990 to 72,150 in 2000, a 110% increase. In 2010, the number was around 170,000, a 500% increase from 1990 (U.S. Census Bureau, 2020).

According to Zong and Batalova (2017), Korean immigrants are older than the overall U.S. immigrant population and the native-born population. The median age of Korean immigrants is 46 years, compared to 44 for the foreign-born population and 36 for the native-born population. In 2015, 17% of Korean immigrants were 65 and older, a slightly higher portion than the native-born population (15%). Senior Korean immigrants need community-based long-term care services due to economic insecurity and poor health. In contrast to young Korean immigrants, more than 20% of older Korean immigrants live below the poverty line, having twice the poverty level compared to the other older population in the U.S. (U.S. Census Bureau, 2020). Korean senior immigrants of poor economic status are more likely to suffer from health, resource, and acculturation problems (Kim et al., 2014). Lee et al. (1993) studied senior Korean immigrants born in Korea, and 36% of the participants reported a history of diabetes, which is about four times the rate of older Americans. Also, tuberculosis rates are 12 times greater than rates for older Whites (Shibusawa & Mui, 2010). Other health problems such as hepatitis B and liver cirrhosis are more prevalent than other senior ethnic groups (Shibusawa & Mui, 2010).

Furthermore, there are disparities in insurance coverage. Nearly 35% of senior Koreans in the U.S. were not insured compared with 21% of all senior Asians and 14% of non-Latino Whites. The rate is even higher in California, with almost half of all senior Koreans being uninsured (Shibusawa & Mui, 2010).

Jang et al. (2006) studied 230 senior Korean immigrants in Florida. The study showed that none of them participated in community health programs due to a lack of fluency in English and health information. Besides, many senior Korean immigrants

experienced discrimination, language inadequacy, lack of social support, lack of financial resources, frustration related to unemployment or low income, feeling of not belonging in society, and anxiousness in an unfamiliar environment (Mui, 2001). Related to the stressful experience, many senior Korean immigrants showed more depressive symptoms and higher suicide rates than other Asian immigrants' groups, including Japanese, Chinese, and Filipinos (Pang, 1998). Additionally, senior Koreans also experience cultural conflicts between losing their cultural identity and keeping their pride in their Korean heritage. They want to maintain their traditional family values in the U.S., but they face challenges in keeping those family values (Moon, 1996). In Korean traditional culture, caring for aged parents is not optional but a moral responsibility of adult children. However, the traditional family values among Koreans in the U.S. are challenged as families are acculturated, which may be a stressor for the senior population (Moon, 1996).

Lee (2007) described senior Korean immigrants' stressors, including perceptions of changes in family relationships related to immigration. As findings of the study, eight specific sources of stress were identified: (a) language barriers, (b) isolation and loneliness, (c) dependence upon their children, (d) fear of being a burden, (e) financial problem, (f) transportation problem, (g) discrimination, and (h) fear of death due to health problem. According to the findings of Lee (2007), senior Koreans expressed that the most challenging problem in living in the U.S. for them is language. They said they could not go out alone because they neither understand nor speak English. Especially if they immigrated at a later age, they could not have a chance to learn English. Therefore, they have difficulties understanding media, communicating with others, and getting adequate

health services. This language barrier reinforced their sense of loneliness and social isolation. Most senior Korean immigrants want to live on their own and be independent of their adult children. However, they need the children's help for transportation or financial support. At the same time, they worry about being a burden to their adult children. They do not want to bother their children, who are so busy. Thus, they avoid asking their children or showing their concerns to them. Even though they have health problems, they do not let their children know it. It causes them to be in worse health. They are more likely to lack community engagement due to the language barrier and different cultures. The senior Korean immigrants' poor access and poor attendance to health care cause them to be exposed to vulnerability.

In summary, the population of senior Korean immigrants has grown steadily for the last two decades. They are predominantly first-generation immigrants (U.S. Census Bureau, 2008). Although young Korean immigrants are considered one of the successful immigrant groups, senior Korean immigrants are one of the underserved and vulnerable groups related to language barriers, poor economic status, and limited resources. However, health issues specific to them have not been sufficiently studied and have resulted in a lack of culturally competent health care services available to senior Koreans. Therefore, it is required to identify their health status, health outcomes, and related factors.

Senior Population with Diabetes

Diabetes is one of the fastest-growing chronic diseases in the 21st century, and the population with diabetes has tripled over the last 20 years (International Diabetes Federation [IDF], 2019). Type 2 diabetes (T2DM) is the most common type of diabetes,

accounting for about 90% of all diabetes cases. Generally, T2DM is characterized by insulin resistance, which means that the body does not respond appropriately to insulin. Insulin cannot work effectively, and blood sugar levels keep rising. T2DM is commonly diagnosed in older adults, and it is also increasingly seen in young adults. According to the International Diabetes Federation (2019), around 463 million adults are living with diabetes globally, and the number will rise to 700 million by 2045. The proportion of people with T2DM is increasing in most countries, and 79% of adults with diabetes were living in low- and middle-income countries (IDF, 2019). Diabetes caused at least $760 billion in health expenditure in 2019, and it accounts for 10% of total spending on adults (IDF, 2019). In 2019, the estimated number of diabetic patients over 65 was 111 million. This means that one in five adults in this age group has diabetes. It is also projected that, by 2030, the number of senior diabetic patients over 65 years old will increase to 195 million, and, by 2045, it will reach 276 million worldwide (IDF, 2019). In terms of the socio-economic cost of the diabetic epidemic, senior patients with diabetes have a higher rate of diabetic-related hospitalizations. It comprises 65.1% of all diabetic-related health care costs, compared with 34.8% in patients younger than 65 years (Venkat Narayan et al., 2006). Also, the senior with diabetes has higher mortality and morbidity than the senior without diabetes.

In the clinical presentation of diabetes, it is not surprising that senior patients are different from younger patients. Health care providers need to be aware of this difference to assess adequately and provide effective treatment. Seniors are more likely to have multiple medical conditions, making them take multiple daily medications. Coexisting medical conditions such as cognitive dysfunction, functional disability, depression,

urinary incontinence, falls, and chronic pain interfere with senior patients' ability to perform self-care tasks. Self-care tasks include glucose monitoring, understanding of diet, exercise, and following a complex insulin regimen (Munshi et al., 2006). Difficulty with self-care activities may lead to non-adherence or treatment errors, including hypoglycemia, hyperglycemia, and complications.

As a result, ineffective self-care activities increase the risk of morbidity and mortality among senior patients. Therefore, health care professionals must conduct a careful and comprehensive assessment and build strategies for seniors with diabetes.

Self-Care on Diabetes Management

Self-care or self-management is simply taking care of oneself to remain healthy. However, in the context of chronic illnesses, self-care is more complex. Self-care has been applicable globally when discussing the health status of patients with chronic illnesses such as diabetes. Even though self-care has been considered an integral part of persons at risk for chronic illnesses, there is little agreement about the definition or meaning of self-care. Self-care can be defined as compliance or adherence to treatment (Chriss et al., 2004). Self-care can also be considered the belief that one can perform disease treatment (Yip et al., 2004) or handle the symptoms associated with a disease (Chriss et al., 2004). If one is dependent on others for assistance, then it can mean that self-care does not exist. Despite lack of agreement about the definitions of self-care, it cannot be denid that self-care is vital to an individual's health maintenance, prevention of disease, and health promotion. Mainly, self-care for diabetes is critical in maintaining optimal health and preventing further complications (American Diabetes Association, 2018).

However, performing self-care is not easy. Self-care is complex and challenging for seniors with diabetes due to the requirements of multiple tasks. For example, patients with diabetes should plan and eat a diabetic diet, manage medications, monitor glucose levels, be physically active, and visit medical doctors. If they do not perform the self-care activities properly, they might have acute or long-term effects, such as skin and eye complications, neuropathy, functional disability, hypertension, stroke, and potential for death (ADA, 2018). These self-care tasks can be challenging for older adults (Weinger et al., 2015). Vision and hearing impairment, persistent pain, and decreased mobility among older adults interfere with their self-care ability (Munshi et al., 2006). Older adults may also experience nutrition challenges in self-care, such as difficulty shopping for groceries and preparing healthy meals. Cognitive impairments, decreased gastrointestinal function, poor dentition, and swallowing problems also can lead to poor nutrition and skipping meals in the senior population (Kirkman et al., 2012).

Some unique obstacles and barriers influence self-care among senior groups at risk for diabetes. For example, self-care efficacy, social support, knowledge, outcome expectations, and self-regulation can affect the effectiveness of self-care (Borhaninejad et al., 2017). Aponte and Nokes (2017) found that many older patients had difficulty deciphering accurate from inaccurate information, especially from internet resources. Although technology is one of the self-management facilitators for diabetic patients, older people are not technologically savvy and have difficulty accessing the resources (Aponte & Nokes, 2017). Seniors are overwhelmed and confused with internet resources, and even if they find information, it is hard to understand (Aponte & Nokes, 2017). Lack of knowledge and understanding are the most common barriers to self-care among older

people. Another barrier in self-care among senior people at risk for diabetes is a lack of support from health care providers and educators (Beverly et al., 2008). Some senior patients with diabetes reported less proactive treatment related to their age (Beverly et al., 2008). Some older patients felt rushed or left early without listing concerns, and their health care providers were not interested in what the patients said (Shen et al., 2013).

Self-Care Among Senior Korean Immigrants with Diabetes Mellitus

As mentioned in the PRISMA diagram (see Figure 3), to explore the relevant literature about self-care among senior Korean immigrants at risk for diabetes, *self-care/self-management*, *diabetes*, and *Korean immigrants* were used as search terms in the databases including CINAHL Plus, Health Source Nursing Academic Edition, Medline Plus, PsycInfo, and SOCIndex. The publication year was limited between 2010 and 2020. As a result, five relevant studies were retrieved (Cha et al., 2012; Choi et al., 2014; Choi & Rush, 2012; Joo & Lee, 2016; Nam et al., 2013; see Appendix A: Table of Evidence). Among the five studies, only two studies (Joo & Lee, 2016; Choi et al., 2014) focused on the senior group of Korean immigrants with diabetes. The two studies are qualitative, and, in this section, the two studies are reviewed.

Joo and Lee (2016) explored the barriers and facilitators of diabetes self-care among senior Korean immigrants with T2DM in the U.S. Midwest. Twenty-three senior Korean immigrants with T2DM, including three focus groups (N=18) and five individuals, were interviewed. As a result, the researchers identified five perceived barriers and three perceived facilitators. The five barriers include the high cost of diabetes care, language issues, loss of self-control, memory loss, and limited access to community health care resources. The three perceived facilitators include time, seeking information,

and family and peer support. Most respondents in the study described economic difficulties because of the high cost of diabetes care. The majority of the participants were retired and lived on a limited and fixed income. Most of them were Medicare beneficiaries. Some of them received social security benefits and partial support from adult children. Despite these supports, they felt overwhelmed by diabetes-related expenses. Significantly, all participants reported difficulty communicating in English with health care providers.

Limited language fluency also causes limited access to community health services. The participants mentioned that the Korean community in the Midwest is not well established compared to California or New York, so they felt a lack of adequate health care services or educational services. They also identified three areas in which they had lost self-control: diet, weight control, and limited ability to exercise. Moreover, as they aged, memory loss became one of the barriers in self-care of diabetes, including experiencing skipping prescribed diabetic medications. In contrast to the five barriers, Joo and Lee (2016) identified three facilitators: time, seeking information, and family and peer support. The participants reported that they had time to perform self-care activities. They were willing to seek information related to diabetes self-care and expressed appreciation for their family and peers' support. Their family and peers' support reinforced them to promote self-care of diabetes and help them access health care.

Choi et al. (2014) investigated domains of spousal support among senior diabetic Korean immigrants regarding diabetes self-care. Two focus groups were conducted with people with diabetes from the Los Angeles Korean community, and three focus groups were conducted with their spouses. They were asked to describe the spousal support for

diabetic self-care. Each group included four to nine participants. As a result, the content analysis showed six domains: diet, exercise, emotional support, medical regimen, communication with clinicians, and information. Diet was the most frequently mentioned among the six domains across all groups. This result confirms previous research findings that adhering to a diabetic diet is one of the most difficult health behaviors for diabetic patients, and decisions for food are a prominent issue among diabetic patients and their spouses (Stephens et al., 2010). Family support, especially spousal support, has been associated with better diabetic self-care and outcomes among White, Chinese American, and Korean American older adults with diabetes (August & Sorkin, 2011; Beverly et al., 2008; Chesla et al., 2009; Choi, 2009; Iida et al., 2010; Stephens et al., 2010). Korean immigrant groups have smaller social support networks than other ethnic groups, so family support is the primary source of social support in Korean culture (Wong et al., 2007). Senior Korean immigrants are one of the most linguistically isolated senior groups, so when they access social support, they rely on family members, mainly the spouse (Choi, 2009; Sohn, 2004; Song et al., 2012). Therefore, due to the uniqueness of Korean culture, social support in self-care of diabetes for senior Korean immigrants should be more explored.

In summary, despite the vulnerability of senior Korean immigrants, just a few studies were conducted. According to the studies, senior Korean immigrants face several barriers in the self-care of diabetes. The barriers include language issues, high cost of diabetes care, loss of self-control, memory loss, and limited access to community health care resources. Specifically, diet control was the most difficult in self-care activities. On the other hand, a willingness to seek information, enough time, and family and friends

support were perceived as facilitators or mediators. Family, friends, and spousal support were mainly associated with self-care behavior among senior Koreans.

Self-Efficacy on Self-Care of Diabetes Mellitus

This section includes two parts: exploring a concept of self-efficacy and a literature review of articles that focus on self-efficacy related to self-care among senior patients with diabetes.

According to Bandura's (1977) social cognitive theory, self-efficacy is defined as an individual's judgments of their capabilities to organize or take actions required to attain designated performances. Bandura (1977) described self-efficacy based on two types of expectations: efficacy expectations and outcome expectations. Efficacy expectations are the belief that one can accomplish certain behaviors. On the other hand, outcome expectations refer to the possible consequences that specific behaviors produce (Bandura, 1986). Self-efficacy affects the efforts that people want to devote and determine the persistence of the efforts in the face of obstacles or failures (Bandura, 1986). People are more likely to avoid tasks they believe exceed their coping skills, whereas they tend to undertake tasks when they believe they are capable of handling them (Bandura, 1986). Bandura (1977) identified four principles of information for perceived self-efficacy: enactive attainment, verbal persuasion, vicarious experience, and physiological state. Enactive attainment is based on experience, and it is the most influential. Verbal persuasion means that verbal encouragement convinces people of their certain capabilities to achieve what they seek. Vicarious experience means the visual experience when one observes others successfully achieving similar tasks. Lastly, a physiological state can influence the level of self-efficacy when people have somatic

symptoms. Bandura (1977) maintained that self-efficacy is one of the most critical predictors of behavior change. The concept of self-efficacy has been widely used in many studies related to chronic illnesses, including diabetes. In one of the studies of patients with chronic illnesses, self-efficacy was defined as the confidence in one's capability to exert control over situations (Schnell et al., 2006).

To review the current studies related to self-efficacy on self-care among senior people with diabetes, *self-efficacy, diabetes, self-care*, and *senior* or *elderly* were used as search terms in the five databases. The articles were published between 2010 and 2020, peer-reviewed, and written in English. As a result, a total of 151 articles were retrieved. After carefully reviewing the abstract, titles, and full text, 11 articles were included for the literature review (Bohanny et al., 2013; Borhaninejad et al., 2017; Chang et al., 2013; Cherrington et al., 2010; DePalma et al., 2015; Hunt et al., 2012; Osborn et al., 2010; Liu, 2012; Malanda et al., 2016; Messina et al., 2018; Olson & McAuley, 2015; see Appendix A: Table of Evidence). Among the 11 articles, only four articles were about senior people with diabetes (Borhaninejad et al., 2017; Chang et al., 2014; Liu, 2012; Olson & McAuley, 2015). Among the 11 selected studies, seven studies were cross-sectional studies or systematic reviews regarding self-efficacy of patients with diabetes (Bohanny et al., 2013; Borhaninejad et al., 2017; Cherrington et al., 2010; DePalma et al., 2015; Hunt et al., 2012; Liu, 2012; Osborn et al., 2010). The seven studies showed that self-efficacy is significantly strongly correlated with self-care of patients with diabetes. Among the other four studies, two studies (Chang et al., 2012; Messina et al., 2018) were to validate reliability and validity for self-efficacy scales, and the purpose of the other two (Malanda et al., 2016; Oslon & McAuley, 2015) was to test the effectiveness of

intervention related to self-efficacy and self-care among patients with diabetes. Specifically, according to the results of Bohanny et al. (2013), self-efficacy and marital status together were associated with self-care; Borhaninejad et al. (2017) identified that there was a positive correlation of social support and self-efficacy on self-care. On the other hand, Bohanny et al. (2013) and Osborn et al. (2010) examined the relationship between health literacy and self-efficacy, and they found that health literacy was positively correlated with self-efficacy. Particularly, Bohanny et al. (2013) showed that diabetes education was positively associated with self-efficacy.

In summary, a number of studies showed that self-efficacy was one of the strong predictors or mediators of self-care of patients with diabetes. In addition, health literacy, diabetes education, and social support were correlated with self-efficacy and self-care. However, none of the studies was conducted for senior Korean immigrants with diabetes in the U.S. regarding self-efficacy on self-care. Therefore, further studies are required to explore or examine the effect of self-efficacy on self-care among senior Korean immigrants with diabetes.

Knowledge on Self-Care of Diabetes Mellitus

To explore the knowledge of diabetes self-care among senior patients with diabetes, *knowledge, diabetes, self-care*, and *senior* or *elderly* were used as search terms in the five databases. The retrieved studies were limited between 2010 and 2020 as the published year. After careful review of the title, abstracts, and full text, 11 studies were included as relevant studies (Bukhsh et al., 2019; Goncalves et al., 2017; Hartayu et al., 2012; Hu et al., 2012; Jackson et al., 2014; Kueh et al., 2015; Kueh et al., 2017; McCleary-Jones, 2011; Phillips et al., 2018; Van der Heide et al., 2014; Wang et al.,

2013; see Appendix A: Table of Evidence). All of the studies were cross-sectional studies, except for Hartayu et al. (2012), a quasi-experimental study with control groups.

Among the 11 studies, eight studies investigated the association between diabetes knowledge and outcomes such as self-care activities, glycemic control, or HbA1c (Bukhsh et al., 2019; Hu et al., 2012; Kueh et al., 2015; Kueh et al., 2017; McCleary-Jones, 2011; Phillips et al., 2018; Van der Heide et al., 2014; Wang et al., 2013). The other two studies (Goncalves et al., 2017; Jackson et al., 2014) analyzed the level of diabetes knowledge, and another study (Hartayu et al., 2012) measured the effectiveness of intervention for increasing diabetes knowledge.

Specifically, the eight studies showed mixed results. Bukhsh and colleagues (2019) found that diabetes knowledge was significantly associated with glycemic control. In the correlation matrix of the study, diabetes knowledge was also strongly positive with diabetes self-care activities (r=0.63, p<.001). Wang et al. (2013) also found that there was a significant association between diabetes knowledge and HbA1c value (p<.001). On the other hand, Van der Heide et al. (2014) identified that diabetes knowledge was a mediator between health literacy and glucose self-control. Kueh et al. (2015) showed that diabetes knowledge was a significant predictor of self-care and attitude in blood glucose testing. Kueh et al. (2017) also found that diabetes knowledge was a significant predictor of attitudes and self-care in blood sugar monitoring and foot care. In the study of McCleary-Jones (2011), diabetes knowledge was partially associated with dietary self-care activities positively (r=.299, p<.05).

Conversely, other studies (Hu et al., 2012; Phillips et al., 2018) identified that diabetes knowledge was not related to self-care activities or glucose level. Similarly, Hu

et al. (2012) explored the relationships of diabetes knowledge and clinical variables among a sample of older Chinese at least 50 years old. As a result, although participants who had a family history of diabetes or visited diabetes educational programs were more likely to have a high score on diabetes knowledge, diabetes knowledge was not related to diabetes self-care activities or glucose level. Furthermore, according to Phillips et al. (2018), there were no significant associations between diabetes knowledge scores and reported an HbA1c level of the participants. However, there was a significant association between the occurrence of retinopathy and diabetes knowledge score ($p<.05$).

Goncalves et al. (2017) analyzed the level of knowledge among individuals with T2DM in Brazil. They used the Diabetes Knowledge Test Questionnaire (DKN-A), an instrument that consists of 15 multiple-choice items on different aspects related to the general knowledge of diabetes. A high score indicates more excellent knowledge about diabetes, and 8 out of 15 means sufficient knowledge. Of the 222 participants with T2DM, 181 (81.5%) had scores greater than 8, indicating sufficient knowledge related to T2DM. However, although the overall scores of the participants showed satisfactory knowledge, the majority (73%) of the participants did not have knowledge regarding the conduct against high levels of blood sugar or urine. Evaluating the level of knowledge among individuals with diabetes is very important, because it is an essential source for a clinical professional to make decisions or strategies for treatments (Goncalves et al., 2017).

Jackson and colleagues (2014) assessed the level of diabetic knowledge regarding self-care practice among patients in Nigeria. The majority of the participants (79.5%) had 70% or more overall knowledge level about self-care of diabetes. However, in the items

of physical activities and medication-related items, the levels were relatively low. Factors affecting diabetes self-care knowledge, educational level, and duration of diabetes were significantly associated with self-care knowledge. In contrast to Adibe and colleagues (2009), Jackson and colleagues (2014) reported that patients' monthly income is associated with self-care of diabetes: the patients with higher income are more likely to afford their drugs and glucose meters and other devices necessary.

Compared to the previous descriptive studies, Hartayu et al. (2012) conducted a quasi-experimental study with control groups. They had three groups, including the intervention group, the DM group, and the normal control group. They implemented a community-based interactive intervention in Indonesia and measured the patients' knowledge, attitude, and self-care activities. As a result, the intervention group showed an increasing number of patients at a good level of knowledge from 40% (n=30) up to 80%. The intervention group received one education during the 6-month study period, while the DM group had Sunday meetings, which led frequently and intensively to sharing experiences among the participants. Despite a short education in the intervention group, the intervention group showed better results in knowledge, attitude, and self-care activities. Hartayu et al. (2012) revealed that developing effective interventions and strategies is essential and necessary for people with diabetes to increase diabetes knowledge.

This literature review revealed mixed results regarding the association between diabetes knowledge and self-care among persons with diabetes. Several studies showed that diabetes knowledge was also strongly positive with diabetes self-care activities. However, other studies identified that diabetes knowledge was not significantly related to

self-care activities or glucose levels. Furthermore, diabetes knowledge is different depending on health literacy, education level, economic status, duration of diabetes, and attitudes toward diabetes. Therefore, further study will be required to identify the factors that influence diabetes knowledge.

Social Support on Self-Care of Diabetes Mellitus

Social support can be defined as the perception of actual instrumental or expressive care provided by family, friends, and others in the community (Lin, 1986, p.18). Thoits (1982) argued that a major function of social support is to provide advice and information in times of problems. Social network members provide advice on coping with diseases, regulating stress, and helping individuals regulate their emotions. Social support is vital for physical and mental health throughout life, but it is imperative in late life.

To explore social support on self-care among senior patients with diabetes, *social support, diabetes, self-care,* and *senior* or *elderly* were used as search terms in the five databases. The retrieved studies were limited between 2010 and 2020 and then, after carefully screening the title, abstracts, and full text, 12 studies were included as relevant studies (Borhaninejad et al., 2017; Bouldin et al., 2017; Choi et al., 2014; Koetsenruijter et al., 2016; Kristianingrum et al., 2018; Nicklett et al., 2013; Rivera-Hernandez, 2016; Rosland et al., 2014; Shao et al., 2017; Shayeghian et al., 2015; Surucu et al., 2018; Werfalli et al., 2020; see Appendix A: Table of Evidence). Among the 12 studies, 10 were descriptive cross-sectional studies with quantitative methods, and the other two were qualitative studies. Most studies investigated the relationships between social support and self-care/self-management with diabetes-related outcomes.

The types of social support in the studies include family and friend support, spousal support, relative support, and support from health care providers or the community. Family and friend support is a typical variable in the studies. Nine studies showed that social support from family or friends was associated with self-care/self-management such as medication adherence, foot care, glycemic control, physical activity, diet, and testing blood sugar (Borhaninejad et al., 2017; Bouldin et al., 2017; Koetsenruijter et al., 2016; Kristianingrum et al., 2018; Nicklett et al., 2013; Shao et al., 2017; Shayeghian et al., 2015; Surucu et al., 2018; Werfalli et al., 2020). Among the nine studies, three focused on senior patients with diabetes (Borhaninejad et al., 2017; Kristianingrum et al., 2018; Werfalli et al., 2020).

Borhaninejad and colleagues (2017) examined the association between social support and self-care among senior with diabetes in Iran. The result showed a positive and significant correlation between social support and self-care (r=.456, p<.01). In particular, Kristianingrum and colleagues (2018) explored perceived family support in self-care among older persons with diabetes in Indonesia with a qualitative approach. They identified several family support areas. The family support areas include daily activity assistance, assistance for health services, food preparation, financial support, attention, guidance, and problem solving. Due to declining physical function, older persons with diabetes are more likely to be vulnerable to performing optimal self-care activities. Therefore, older persons with diabetes require family support, including information support, economic support, instrument support, and psychological support (Kristianingrum et al., 2018). Werfalli and colleagues (2020) studied 406 senior patients with T2DM in South Africa and found that family support was positively associated with

self-care scores regarding a diabetic meal plan, foot care, physical activity, handling feet, and testing blood sugar, but not for taking medications.

With family support, spousal support has been associated with better diabetes management and outcomes (Choi et al., 2014). Choi et al. (2014) interviewed older Korean immigrants with diabetes and their spouses regarding self-care of diabetes. Traditionally, a family is an essential source of support in Korean culture, and senior Korean immigrants have smaller social networks compared to other ethnic groups (Wong et al., 2007). Korean older adults rely on their family members to cope with chronic illness, and among the family members, a spouse is the most common and primary support resource (Choi et al., 2014). Rivera-Hernandez (2016) also examined the effect of spousal support in diabetic care among Mexicans with diabetes. The results showed that emotional support from spouses or partners affects diabetes care and control. On the other hand, emotional support from children and coworkers was not statistically related to self-care of diabetes.

Social support also plays the role of mediator or predictor in self-care of diabetes. Shayeghian and colleagues (2015) explored the roles of social support and coping styles in self-care activities among patients with T2DM in Iran. They identified that there were significant relationships among self-care activities, social support, and coping styles. Particularly, they found that social support had a moderating role in the relationship between self-care activities and HbA1c. Additionally, Surucu et al. (2018) investigated empowerment, social support, and diabetes-related characteristics as predictors of self-care behaviors in Turkey. The study showed that support from family, friends, and

special persons was a significant predictor of self-care activities such as diet, exercise, blood sugar monitoring, and foot care.

Unlikely previous studies, Nicklett and colleagues (2013) could not find a significant association between social support and health status among persons with diabetes. According to the result of the study, social support was positively associated with health status over time. However, this relationship was only marginally significant after controlling for socio-demographic and health-related characteristics (OR=1.03, p=.06). Moreover, participants who reported higher levels of social support as indicated by the Diabetes Care Profile tended to have lower odds of health declines. However, the result was not significant statistically at p<.05.

In summary, social support has a significant effect on the self-care/self-management of diabetes. Most studies demonstrated that social support was associated with self-care activities or diabetes-related health outcomes such as HbA1c. Several studies showed that social support was a mediator or predictor of self-care activities. Specifically, among the types of social support, family and friends support was the most common type among persons with diabetes, and spouse support was also one of the primary resources. However, since the types of social support are strongly connected to the population's culture, it is required to identify what kinds of social support (family, friends, caregivers, and health care providers) are the most effective for the population. In this literature review, only one study (Choi et al., 2014) was about Korean immigrants with diabetes, and the result focused on only spousal support, not others such as friends, caregivers, or health professionals. Therefore, further studies should explore and identify

the kinds of social support needed and determine which are the most effective for senior Korean immigrants with diabetes.

Summary

Despite the steady increase of the population, Korean immigrants are still considered one of the minority ethnic groups in the U.S. Compared to young Korean immigrants who are considered one of the successful immigrant groups, senior Korean immigrants are vulnerable when it comes to their poor economic status, high prevalence of chronic illnesses, language inadequacy, and lack of resources. Despite their vulnerability, just a few studies have been conducted for the group. According to the results of searching with five major databases between 2010 and 2010, only two qualitative studies were about self-care on senior Korean immigrants with diabetes in the United States. The studies discussed barriers, facilitators, and spousal support on self-care among senior Korean immigrants with diabetes. In terms of diverse factors on self-care of diabetes, further studies need to identify the related factors on self-care among senior Korean immigrants at risk for diabetes.

According to the literature review, self-efficacy was a strong predictor of the self-care of patients with diabetes. However, no study was conducted for senior Korean immigrants with diabetes regarding self-efficacy's effect on self-care. Social support was especially studied in many types of research, and it had a significant effect on self-care of diabetes. Social support played a role as a mediator or predictor of self-care activities of diabetes. The most common type of social support was family and friends.

In summary, self-efficacy, diabetes knowledge, and social support are considered mediators, predictors, or related factors to self-care among patients with diabetes.

However, those factors were not fully examined among senior Korean immigrants. Thus, further studies are required to understand the senior Korean minority group and develop culturally tailored health care services.

CHAPTER 3

METHODOLOGY

This section covers research questions, design, setting, target population, sample size, data collection, instruments, data analysis, and human subject protection procedure.

Research Questions

Research Q1: What are the socio-demographic characteristics, self-efficacy, diabetes knowledge, social support, and self-care activity among senior Korean immigrants with diabetes in the United States?

Research Q2: What are the psychometric properties of the General Self-Efficacy (GSE), the Simplified Diabetes Knowledge Test (S-DKT), the Lubben Social Network Scale-6 (LSNS-6), and the Summary of Diabetes Self-Care Activities (SDSCA) questionnaire?

Research Q3: What are the relationships among socio-demographics, self-efficacy, diabetes knowledge, social support, and self-care activities among senior Korean immigrants with diabetes?

Research Q4: Which variables predict self-care activities among senior Korean immigrants with diabetes?

Research Q5: What is the relationship between 10 exogenous variables (sex, age, years of residency in the U.S., education level, annual income, coping, confidence, diabetes knowledge, relatives support, and friends support) and five endogenous variables (healthy diet, exercise, blood glucose test, foot care, and unhealthy diet) among senior Korean immigrants with diabetes?

Study Design

This study used a cross-sectional, correlational design to examine the relationships and effects among socio-demographics, self-efficacy, diabetes knowledge, social support, and self-care among senior Korean immigrants with diabetes.

The strengths of using this design include the fact that it is efficient in collecting data for a problem (Polit & Beck, 2018), and it is effective in testing theoretical and empirical relationships among the variables (LoBiondo-Wood & Haber, 2006). Human characteristics cannot be manipulated experimentally (Polit & Beck, 2018). Correlational designs are appropriate to examine relationships between variables.

Setting

This study took place in Korean immigrants' community and social media websites. This study was conducted using paper survey and online survey. A paper survey was conducted at Korean immigrants' community-based agencies (i.e., churches and a shopping mall). For the online survey, the participants were at a comfortable place such as at home, office, and parks in the United States while this online survey was administered. The online survey was conducted using an online platform called Survey Monkey. The hyperlink of the Survey Monkey online survey was posted at social network websites such as Instagram, Facebook, Twitter, and Korean immigrants' internet community websites. Interested participants were able to participate in the survey at once at the websites, and they also shared the link with their friends to encourage participating in the survey.

Sample

Sampling Method

This study used a convenience sampling method using paper survey and online survey. Although a convenience sampling is a non-probability sampling method, it is the most applicable and widely used in research. In the convenience sampling method, investigators collect subjects according to their availability and accessibility. Thus, a convenience sampling method is fast, inexpensive, and convenient (Elfil & Negida, 2017).

Target and Accessible Population

Inclusion criteria for participants were as follows:

(a) age 55 or older Korean immigrants who stay in the U.S. and were born in Korea;

(b) diagnosed with diabetes;

(c) able to read and write in Korean or English;

(d) willing to sign a consent form to participate in the study.

The exclusion criteria included the following:

(a) Korean immigrants who are younger than 55 years old;

(b) not diagnosed with diabetes;

(c) unable to read and write in Korean and English;

(d) unwilling to sign a consent form in the survey.

Sample Size

Some statistics researchers have recommended using the ratio of observations to estimate sample size. Kline (2015) suggested that the best ratio should be 20 to 1, or 20

participants for each variable in the path analysis. Others have recommended that the ratio can be as low as 10 to 1 (Schreiber et al., 2006) or 5 to 1 (Bentler & Chou, 1987).

This study had 15 major variables, including 10 variables from socio-demographics, two variables from self-efficacy, one variable from diabetes knowledge, two variables from social support, and five variables from self-care activities. Based on the recommendation of Kline (2015), this study's sample size for path analysis is 200 (20 variables x 10).

Operational Definitions

The operational definitions of variables in this study are shown in Table 1.

Table 1

Operational Definitions

Variables	Operational Definitions	Measured by
Independent Variables		
Socio-demographic variables	Participants' personal factors such as biological (sex, age), socio-cultural (marital status, living arrangement, education, religion, years of living in the US), economic (income, employment), and health related factors (diabetes, insurance)	Demographic Questionnaire (Appendix B)
Self-efficacy	Self-efficacy is the belief in one's capabilities to organize and execute the courses of actions required to manage prospective situation. In this study, self-efficacy is measured by GSE scale and the average score of the GSE means the level of self-efficacy.	The General Self-Efficacy (Appendix C)
Diabetes knowledge	Diabetes knowledge can be defined as 'awareness or understanding of information about diabetes through one's experience or education". In this study, diabetes knowledge is measured by the S-DKT and the level of diabetes knowledge means the average score of the S-DKT.	The Simplified Diabetes Knowledge Test (S-DKT) (Appendix D)
Social support	Social support can be defined as the perception of actual instrumental or expressive care provided by family, friends, others in the community. In this study, social support is measured by the LSNS-6 which includes relatives and friends supports.	The LSNS-6 (Appendix E)
Dependent variable		
Self-care	Self-care can be defined as compliance or adherence with treatment. In this study, self-care is measured by the SDSCA.	Summary of Diabetes Self-Care Activities questionnaire (SDSCA) (Appendix F)

Measurement

Demographic Questionnaire

The demographic questionnaire includes sex, age, marital status, living arrangement, education level, employment, annual income, health insurance status, religion, years of staying in the U.S., and presence of diabetes (see Appendix B).

The General Self-Efficacy (GSE) Scale

Self-efficacy was measured by the General Self-Efficacy Scale (GSE; see Appendix C). The GSE scale was designed to assess the general sense of self-efficacy and self-beliefs to cope with daily hassles as well as adaptation to all kinds of stressful life events. The tool was originally developed in the German language by Matthias Jerusalem and Ralf Schwarzer in 1981.

The GSE is a 10-item scale, and each item is a four-choice response. A typical question is, “I can always manage to solve difficult problems if I try hard enough.” Possible responses are “not at all” (1 point), “hardly true” (2 points), “moderately true” (3 points), and “exactly true” (4 points). The total score is calculated by the sum of all items. The total score ranges between 10 and 40, indicating a higher score is more self-efficacy.

Reliability

The internal reliability in the study of Schwarzer and Jerusalem (1993) was Cronbach’s alpha .75. In the study of Luszczynska and Schwarzer (2005), the Cronbach alpha were obtained for the GSE: .94 (patients with heart diseases in Germany), .89 (patients with cancer in Germany), .90 (students in Poland), .87 (patients with gastrointestinal disease in Poland), .87 (swimmers in Poland), and .86 (participants in South Korea).

Validity

High construct validity of the GSE scale was confirmed in many studies (Leganger et al., 2000; Schwarzer et al., 1999). The GSE scale was found to be configurable equivalent across 28 countries, and it formed only one dimension (Scholz et al., 2002). Criterion-related validity was measured in numerous correlation studies, and the studies have shown positive coefficients with favorable emotions, dispositional optimism, and work satisfaction. On the other hand, negative correlation coefficients were found with depression, burnout, anxiety, stress, and health complaints.

The Simplified Diabetes Knowledge Test (S-DKT)

Diabetes knowledge of senior Korean immigrants was measured by the Simplified Diabetes Knowledge Test (S-DKT; see Appendix D). The Michigan Diabetes Research Center (MDRC) developed several instruments for patients with diabetes and health providers. Among the instruments, the DKT was developed by Fitzgerald et al. (1998). The DKT was revised and renamed the Revised Diabetes Knowledge Test (DKT2) including 23 multiple-choice questions. However, the use of the 23 multiple-choice questions was difficult due to the complexity. Therefore, the Simplified Diabetes Knowledge Test (S-DKT) was developed in consultation with the Diabetes Specialist Nurse Team, the Asian Link Workers based in the Diabetes Care Service Users group, and the authors of the original Michigan Diabetes Knowledge Test. The S-DKT consists of 20 “true or false” questions and is easier for respondents to complete with more correct responses compared with the Revised DKT2.

Reliability

The internal reliability of the S-DKT, as measured by Cronbach's alpha, was .71 (Collins et al., 2010).

Validity

In the validation between the simplified version and revised version (Collins et al., 2010), the construct validity of the S-DKT was assessed. Item 9 on the revised version was the only question with a very low item-total correlation. Corrected item-total correlations were > 0.2 for all items on the Revised version. For the S-DKT, all corrected item-total correlations were > 0.2, except for items 7, 8, and 20. Item discrimination was calculated by the point-biserial coefficient, and the values exceeding 0.4 are considered good and > 0.3 fair (Streiner & Norman, 1998).

The Lubben Social Network Scale-6 (LSNS-6)

Social support was measured by the Lubben Social Network Scale-6 (LSNS-6; see Appendix E). Lubben (1988) recognized that social relationships change with aging. Lubben (1988) developed the original version of the 10-item LSNS to assess social networks among the senior based on the Berkman-Syme Social Network Index (Berkman & Syme, 1979). Later, the 12-item LSNS-R was developed and consisted of two domains: friends and family networks. However, many researchers used various abbreviated versions of the LSNS-R, so Lubben and Gironda (2003) developed a standardized abbreviated version of the LSNS-R, the LSNS-6, using the six items.

LSNS-6 uses the same Likert scale as the LSNS-R, and the possible total scores range from 0 to 30, a high score indicating a large network. The total scale score is an equally weighted sum of the six items. A LSNS-6 Family subscale is constructed from

the three LSNS-6 items that ask about relatives. An LSNS-6 Friends subscale is also constructed from the three items that ask about friends. In clinical cut points for the LSNS-6, Lubben and colleagues (2006) would consider individuals with a score of less than 12 as socially isolated.

Reliability

The LSNS-6 had good internal consistency (α=.83) with a European sample (Germany, Switzerland, and the United Kingdom; Lubben et al., 2006). The subscales also showed quite consistent Cronbach alpha scores across in three European countries. The Family subscale ranged from .84 to .89 whereas, the Friends subscale ranged from .80 to .82 (Lubben et al., 2006).

Validity

The discriminant validity of the LSNS-6, the LSNS-6 Family subscale, and the LSNS-6 Friends subscale were examined by comparing means of persons living with a partner or living alone. The data were consistent across the three European countries and in the direction anticipated. The LSNS-6 Family subscale and the LSNS-6 Friends subscale similarly showed strong discriminant validity (Lubben et al., 2006).

Hong et al. (2011) developed the Korean version of the LSNS-R, K-LSNS-R. The six items of the K-LSNS-6 were taken for the K-LSNS-R without any modification. Cronbach alpha coefficients of the K-LSNS-6 was .81 and the CFA of the K-LSNS-6 yielded a very good model fit (χ^2=14.82, df=8, CFI=.98, TLI=.96, RMSEA=.08).

Summary of Diabetes Self-Care Activities (SDSCA) Questionnaire

Self-care activity was measured by the Summary of Diabetes Self-Care Activities questionnaire (SDSCA; see Appendix F). The SDSCA questionnaire was developed by

senior scientists Deborah Toobert, Ph.D., Sarah Hampson, Ph.D., and Russell E. Glasgow of Oregon Research Institute (ORI) from the University of Colorado School of Medicine and offers researchers a brief self-report survey to assess diabetes self-care or self-management. The SDSCA measures adherence and compares the respondent's behavior with medical or health advice. The research for the SDSCA was supported from 1983 to 2009 by the National Institutes of Health.

The original SDSCA assessed five aspects of the diabetes regimen with 11 items: general diet, specific diet, physical activity, medication taking, and blood-glucose testing (Toobert & Glasgow, 1994). Scores are calculated for each of the five regimens assessed by the SDSCA. For the items from 1 to 10, use the number of days per week on a scale of 0 to 7. This response scale does not allow for direct comparison with the percentages. General diet regimen is from item 1 to 2, special diet is from item 3 to 4, exercise from item 5 to 6, blood glucose testing from item 7 to 8, foot care from item 9 to 10, and smoking status is item 11. For scoring of the general diet, mean number of days for items 1 and 2 need to be calculated. In the same way, special diet, exercise, blood glucose testing can be calculated by the mean number of days. For item 4 only, reversing is required. Smoking status, item 11, is scored with the number of cigarettes smoked per day.

Choi et al. (2011) examined the psychometric properties of a Korean version of the SDSCA questionnaire. They translated the 11-item English version of the SDSCA into Korean based on the standard translation methodology. The questionnaire was administered to 208 Korean patients with type 2 diabetes in South Korea.

Reliability

The internal consistency of SDSCA-K was moderate (Cronbach alpha=.69).

Validity

Exploratory and confirmatory factor analyses were conducted to measure construct validity. Content validity index (CVI) and internal consistency were also assessed. As a result, the CVI of a Korean version of the SDSCA was .83, and the EFA yielded nine items with a four-factor solution with the same labels for the original scales. The results of CFA showed the goodness of fit in the nine-item Korean SDSCA version.

Permissions for Using Instruments

The General Self-Efficacy Scale

The General Self Efficacy (GSE) scale has been used in many studies, and the original developers granted other researchers permission to use or reproduce the GSE scale for further studies (see Appendix G). The GSE scale is currently available in 32 languages, and the original developers posted the diverse language versions on their website (http://www.ralfschwarzer.de/), including the Korean version. This study used the Korean version.

The Lubben Social Network Scale

The author of this study contacted Dr. Lubben and Dr. Hong and received permission to use the LSNS-6 and K-LSNS-6 (see Appendix G). Therefore, this study used the K-LSNS-6 and LSNS-6 to assess social support among senior Korean immigrants with diabetes.

The Summary of Diabetes Self-Care Activities Questionnaire

The author of this study contacted Dr. Toobert, who is a developer of the SDSCA at the Oregon Research Institute, and received permission to use the Korean and English versions of the SDSCA (see Appendix G). This study used the 11 items as the original SDSCA questionnaire based on the results of Choi et al. (2011).

Translation of the Simplified Diabetes Knowledge Test

The author of this study contacted to the Michigan Diabetes Research Center and received permission to use the S-DKT (see Appendix G). The development of the S-DKT was supported by Grant Number P30DK092926 Michigan Center for Diabetes Translational Research (MCDTR) from the National Institute of Diabetes and Digestive and Kidney Diseases. However, there was no Korean translated version of the S-DKT. Thus, the author made the Korean version of the S-DKT based on the guideline of WHO for translation and adaptation of instruments.

According to the guidelines of the WHO, to achieve different language versions from the English instrument that conceptually fits to the target culture, the instrument should be equally acceptable and natural. The process should focus on cross-cultural and conceptual, rather than linguistic or literal, equivalence. The WHO process includes forward-translation and back-translation.

Based on the WHO guideline, as the step of forward-translation, one registered nurse (RN) who has a BSN degree and diverse clinical experiences, translated the English version of the S-DKT to Korean. The registered nurse is knowledgeable of the English-speaking culture, but her mother tongue is Korean. The forward translation focuses on conceptual rather than word-to-word translations (see Appendix H). After the forward-

translation was completed, a bilingual (in Korean and English) expert who is a professor of nursing at the University of Nevada, Las Vegas, identified if there were inadequate expressions or any discrepancies between the forward-translated version and the original version. After that, as the step of back-translation, the translated Korean version was translated back to English by an independent translator (see Appendix I). The independent translator's mother tongue is English, and she did not have knowledge of the questionnaire. Finally, the primary researcher, forward-translator (RN), back-translator (an independent translator), and the expert (a professor of nursing program) discussed until a satisfactory version was reached. As a result, the Korean version of the S-DKT was established, and it was used for this study.

The expert, forward translator, and back translators' CV and credentials were documented in Appendix J.

Human Subjects Protection Procedure

The proposal was submitted for approval to the Institutional Review Board (IRB) of Azusa Pacific University (see Appendix K). The study's purpose, risks, benefits, and rights to confidentiality and withdrawal from the study were explained to all of participants. The content of the consent form was showed in the paper survey (Appendix L) and electronic survey (Appendix M), and then consent for participation was obtained. Participation in the study was completely voluntary, and withdrawal from the study was permitted at any time without penalty. Confidentiality was maintained through the assignment of code numbers. These code numbers were used instead of participants' names in SPSS.

Data Collection

Recruitment of Participants

After receiving the IRB approval from APU, data collection commenced. This study took place in the Korean immigrants' community and social media websites. This study included paper survey and online survey.

For the paper survey, the primary researcher contacted responsible persons at community-based Korean churches. The researcher received written approvals to conduct the study in the sites. The Korean churches were Lord's Light Community Church located in Cypress, California, and True Light Christian Church located in Buena Park, California. After obtaining approvals from the agencies, for data collection, recruitment flyers (see Appendix N) were displayed in the agencies' buildings and on the websites of the agencies. The recruitment flyers for the paper survey were in Korean and English and included contact information of the PI, the purpose of the study, benefits and risks of participation, and the length of the survey. The flyers indicated that the primary researcher is a doctoral student, and the research was for a dissertation study. Interested participants were screened for eligibility to participate in the study by the PI. Eligible participants were able to participate in the survey.

In addition to the traditional data collection strategy, the study participants were invited to respond to the online survey as well. The online survey minimized participant barriers such as time limitation, schedule conflicts, and transportation costs. An invitation script (Appendix O) for participation in the study was posted on popular social media websites such as Facebook, Instagram, Twitter, and Korean immigrants' internet community websites. The invitation script included information about the primary

investigator, purpose of the study, data collection procedure, benefits, and risks of participation with the hyperlink to the Survey Monkey survey. Interested participants clicked the hyperlink to participate in the survey and could share the online link with their friends and other potential target groups.

Procedure of Data Collection

For the paper survey, the primary investigator distributed the questionnaires to interested participants. A consent form was attached to the questionnaire. The PI explained the purpose of this study, benefits and risks of participation, and the overall procedure of the survey to the participants. Participants who agreed upon the details of the consent signed the consent, and then it was signed by the PI. Then, it was detached from the questionnaire package, and participants proceeded to complete the survey and returned it. The PI met participants at community places, as designated room and tables were utilized, to ensure privacy and confidentiality. The survey took approximately 15 minutes to complete. In the middle of the survey, the participants could have a break any time as requested.

For the online survey, interested participants clicked the hyperlink of Survey Monkey to participate in the study. The first page of the internet survey was an informed consent form. The consent form included the purpose of the study, procedure of the study, benefits, risks, confidentiality, and contact information of the PI. Interested participants gave consent by clicking the option on the informed consent form. After the consent form was agreed to, the participants were able to start the online survey. The survey did not collect any personal information from the participants. It took approximately 15 minutes to complete. During the online survey, the participants could

have a break any time and stop without any penalty. The responses from the participants were saved in the Survey Monkey system automatically. Once the participants finished the survey, the responses were submitted to the primary investigator as well. The participants were able to call or email the PI any time if they had questions regarding the survey questions.

Data Management

All data from the participants were treated with utmost confidentiality. No identification was collected. The only identification that was used was coded by the Survey Monkey application. All data were stored in an encrypted online repository without public access. All information will be destroyed after 3 years of study termination and based on the confidentiality policy of the Survey Monkey company.

Data Analysis

The data analysis procedure is described in Table 2.

Table 2

Data Analysis

Research Question	Analysis Performed
Research Question #1 What are socio-demographic characteristics, self-efficacy, diabetes knowledge, social support, and self-care activity among senior Korean immigrants with diabetes in Southern California?	Univariate analysis
Research Question #2 What are the psychometric properties of the General Self-Efficacy, the Simplified Diabetes Knowledge Test, the Lubben Social Network Scale-6, and Summary of Diabetes Self-Care Activities questionnaire?	Cronbach alpha, Exploratory Factor analysis (EFA), Confirmatory Factor Analysis [CFA]

Research Question	Analysis Performed
Research Question #3 What are the relationships among socio-demographics, self-efficacy, diabetes knowledge, social support, and self-care activities?	Bivariate Correlation
Research Question #4 Which variables predict self-care activities among senior Korean immigrants with diabetes?	Multiple Linear Regression
Research Question #5 What is the relationship between 10 exogenous variables (sex, age, years in the U.S., annual income, coping, confidence, diabetes knowledge, relatives support, friends support) and five endogenous variables (health diet, exercise, blood test, foot care, and unhealthy diet) among senior Korean immigrants with diabetes?	Path Analysis

Detailed Plan for Data Analysis

The Statistical Package for the Social Sciences (SPSS) 26 version software was used for data analysis.

First, general characteristics were analyzed with percentage, frequencies, and descriptive statistics. The level of self-efficacy, diabetes knowledge, social support, and self-care activities were calculated by descriptive statistics including means and standard deviations.

Secondly, the psychometric properties of the self-efficacy, diabetes knowledge, social support, and self-care activities scales were described using (a) exploratory factor analysis, (b) Cronbach alpha, and (c) confirmatory factor analysis. The results were also compared to the previous published studies.

Thirdly, the relationships among self-efficacy, diabetes knowledge, social support, and self-care activities were measured by Pearson's correlation coefficients.

Lastly, a path analysis was conducted to assess the direct and indirect effects among 10 exogenous and five endogenous variables including five socio-demographics (sex, age, years in the U.S., annual income, educational level), two self-efficacy variables (relatives and friends), diabetes knowledge, two social support variables (relatives and friends), and five self-care activities (healthy diet, exercise, blood test, foot care, and unhealthy lifestyle) among senior Korean immigrants with diabetes.

CHAPTER 4

RESULTS

In this chapter, the main findings from this study are described. The data collection was conducted from October 3, 2020, to June 30, 2021. The primary purpose of this study was to examine the relationships and effects among socio-demographics, self-efficacy, diabetes knowledge, social support, and self-care activities among senior Korean immigrants with diabetes in the U.S. This chapter presents data analysis that was conducted to answer the five major research questions.

Research Question 1

What are socio-demographic characteristics, self-efficacy, diabetes knowledge, social support, and self-care activity among senior Korean immigrants with diabetes in the U.S.?

The total number of the participants in this study was 306. After deletion of missing or incomplete data, the total number of participants who met the inclusion criteria is *N*=190. The participants were age 55 or older Korean immigrants, living in the U.S., diagnosed with diabetes, able to read and write in Korean or English, and willing to give a consent to participate in the study. In total, 184 participants responded via the online survey "SurveyMonkey" web link, while six participants returned hand-written paper survey copies (see Table 3).

Table 3

Source of Data Collection

	Frequency	Percentage (%)
Hard Copy	6	3.2
Web Link (SurveyMonkey)	184	96.8
Total	190	100

Nineteen participants (10%) used English version instruments to respond to the survey through SurveyMonkey, while 171 participants (90%) responded via Korean translated instruments. Among the 171 participants, six participants responded by hand-written paper survey, and 165 participants responded by SurveyMonkey.

In the gender distribution of all study participants, the number of female participants (n=101, 53.2%) was slightly higher than male participants (n=89, 46.8%; see Table 4). Of the 190 participants, 94 (49.4%) participants were between 55 and 64 years old, while 96 (50.6%) participants were 65 years or older. The mean age of the participants was 67.2 (SD=9.9, range 58–93). Most of the participants (n=133, 70.0%) were married, while divorced and widowed participants were 26 (13.7%) and 26 (13.7%), respectively. Of the 190 participants, 144 (75.8%) were living with family or relatives, while 42 (22.1%) were living alone, and three participants (1.6%) lived with non-family or friends.

The majority of the participants (n=139, 73.1%) had college or a higher degree than a bachelor's degree. Just 16 (8.4%) participants were less than high school graduate. Regarding employment status, 101 (53.2%) participants were unemployed, while 89 (46.8%) participants were employed. In addition, 113 (59.5%) participants reported that annual income was lower than $50,000, while 48 (25.2%) participants reported annual income between $50,000 and $99,999. Twenty-nine (15.3%) participants reported making more than $100,000.

Of the 190 participants, 103 (54.2%) participants had Medicare or Medi-Cal health insurance, while 17 (8.9%) participants were uninsured. Most of the participants were Christian (n=158, 83.2%). The majority of the participants (n=184, 96.8%) resided

in the U.S. more than 10 years, and just six (3.2%) participants resided less than 10 years in the U.S.

Table 4

Socio-Demographic Characteristics

Variables	Response	*N*=190	Percentage (%)
Gender	Male	89	46.8
	Female	101	53.2
Age in years	55-59	47	24.7
	60-64	47	24.7
	65-69	33	27.4
	70-74	17	8.9
	75-79	15	7.9
	80-84	17	8.9
	85+	14	7.4
Marital status	Never married	1	0.5
	Married	133	70.0
	Separated	4	2.1
	Divorced	26	13.7
	Widow	26	13.7
Living arrangement	Living in facilities	1	0.5
	Living alone	42	22.1
	Living with family/relatives	144	75.8
	Living with non-family/friends	3	1.6
Education level	Less than high school graduate	16	8.4
	High school graduate	35	18.4
	College or associate's degree	50	26.3
	Bachelor degree or higher	89	46.8
Employment status	Employed	89	46.8
	Unemployed	101	53.2
Annual income	Less than 10k	23	12.1
	10k-19999	44	23.2
	20k-29999	14	7.4
	30k-39999	18	9.5
	40k-49999	14	7.4
	50k-59999	17	8.9
	60k-69999	10	5.3

Variables	Response	*N*=190	Percentage (%)
	70k-79999	10	5.3
	80k-89999	6	3.2
	90k-99999	5	2.6
	More than 100k	29	15.3
Health insurance status	Medicare	49	25.8
	Medi-Cal	54	28.4
	Private insurance	70	36.8
	Uninsured	17	8.9
Religion	Christianity	158	83.2
	Buddhist	2	1.1
	Islam	0	0.0
	Hinduism	0	0.0
	Other	2	1.1
	None	28	14.7
Years of residency in the US	Less than 10 years	6	3.2
	10-19	27	14.2
	20-29	53	27.9
	30-39	52	27.4
	40-49	39	20.5
	50-59	12	6.3
	More than 60 years	1	.5
Diagnosis of Diabetes	Yes	190	100.0
	No	0	0

Self-efficacy was measured by the General Self-Efficacy (GSE) scale in this study. The measurement includes 10 items, ranging from 0 to 40. The mean score of self-efficacy, which was measured by the GSE in this study, is 29.7 out of 40 (SD=3.7, range 19–40; see Table 5).

Diabetes knowledge was measured by the Simplified Diabetes Knowledge Test (S-DKT). The mean score is 59 out of 100 (SD=16.3, range 10–95).

Social support was measured by the LSNS-6, and the mean score is 13.8 out of 30 (SD=5.6, range 0–29).

Self-care activity was measured by the Summary of Diabetes Self-Care Activity (SDSCA) questionnaire in this study. The SDSCA includes five sub-categorized self-care activities: general diet; special diet; exercise; blood glucose test; and foot care according to the original article that examined the psychometric property of the SDSCA. Each of the items uses the number of days for self-care per week on a scale of 0 to 7. The "special diet" includes item 3 and 4, and item 4 should be calculated as reversed. The mean score of general diet, special diet, exercise, blood glucose test, and foot care was 3.9, 3.2, 3.2, 3.1, 1.8 out of 7 days.

Table 5

Mean Score of Self-Efficacy, Diabetes Knowledge, Social Support, and Self-Care Activity

Variable	Measurement	Mean / Total	SD	Range
Self-Efficacy	The GSE scale	29.7/40	3.7	19 - 40
Diabetes Knowledge	S-DKT	59/100	16.3	10 - 95
Social Support	The LSNS-6	13.8/30	5.6	0 - 29
Self-Care Activity	SDSCA: General diet	3.9/7 days	1.9	0 - 7
	SDSCA: Special diet	3.2/7 days	1.4	0 - 7
	SDSCA: Exercise	3.2/7 days	2.2	0 - 7
	SDSCA: Blood glucose test	3.1/7 days	2.8	0 – 7
	SDSCA: Foot care	1.8/7 days	2.2	0 – 7

Research Question 2

What are the psychometric properties of the General Self-Efficacy (GSE) scale, the Simplified Diabetes Knowledge Test (S-DKT), the Lubben Social Network Scale-6 (LSNS-6), and Summary of Diabetes Self-Care Activities (SDSCA) questionnaire?

To determine the underlying dimensions of the four instruments, exploratory factor analysis (EFA) was performed, and then, to confirm the factors determined by EFA, confirmatory factor analysis (CFA) was conducted.

Research Question 2A

What are the underlying dimensions of the General Self-Efficacy scale?

Exploratory Factor Analysis for General Self-Efficacy Scale

The GSE is composed of 10 item scales, and each item is a four-choice response. The GSE scale was developed to assess the general sense of self-efficacy to cope with all types of stressful life events. The EFA was used to determine the underlying dimension of the General Self-Efficacy scale.

According to the EFA outcomes, the initial Eigenvalues indicate that the two factors (coping and confidence) explained 40.9% and 11.3% of the variance, respectively.

Varimax rotation procedure was used to rotate these two factors. The rotated solution shows two interpretable factors: Component 1 (coping) and Component 2 (confidence). The component 1 (coping) includes six items (Q5, Q6, Q7, Q8, Q9, Q10), accounting for 32.62% of the item variance with factor loading from .60 to .79 (see Tables 6 and 7). On the other hand, component 2 (confidence) includes four items (Q1, Q2, Q3, Q4), accounting for 19.53% of the item variance with factor loadings from .40 to .83.

Overall, the coping and confidence accounted for 52.15% of the variable variance. The Cronbach alpha for the entire measure of General Self-Efficacy is .82, while the Cronbach alpha for the coping and confidence is .84 and .56, respectively.

Table 6

Factor Loadings for Varimax Orthogonal Two-Factor Solution for the Items of the General Self-Efficacy Scale

Item	Factor loading
Factor 1: Coping (α=.84)	
10. I can usually handle whatever comes my way.	.79
9. If I am in trouble, I can usually think of a solution.	.75
8. When I am confronted with a problem, I can usually find several solutions.	.75
7. I can remain calm when facing difficulties because I can rely on my coping abilities	.66
6. I can solve most problems if I invest the necessary effort.	.65
5. Thanks to my resourcefulness, I know how to handle unforeseen situations.	.60
Factor 2: Confidence (α=.56)	
2. If someone opposes me, I can find the means and ways to get what I want.	.83
3. It is easy for me to stick to my aims and accomplish my goals.	.63
4. I am confident that I could deal efficiently with unexpected events.	.52
1. I can always manage to solve difficult problems if I try hard enough	.40

Note. N=190 and α=.82 for the entire measure.

Table 7

Eigenvalues, Percentages of Variance, and Cumulative Percentage for Factors of the 10-Item General Self-Efficacy Scale

Factor	Eigenvalue	% Variance	Cumulative %
1. coping	3.262	32.617	32.617
2. confidence	1.953	19.531	52.147

Confirmatory Factor Analysis for General Self-Efficacy Scale

A confirmatory factor analysis using LISREL® (version 11; Jöreskog & Sörbom, 2018) was conducted to determine the relationship between the manifest and latent variables of the General Self-Efficacy scale. The CFA was also used to test the goodness-

of-fit of the hypothesized model for the General Self-Efficacy scale. Model A is the hypothesized model composed of 10 manifest variables and two latent variables. The two latent variables are coping and confidence (Figure 4).

The first latent variable, confidence includes four items, Q1 (I can always manage to solve difficult problems if I try hard enough), Q2 (If someone opposes me, I can find the means and ways to get what I want), Q3 (It is easy for me to stick to my aims and accomplish my goals), and Q4 (I am confident that I could deal efficiently with unexpected events). The second latent variable, coping includes six items, Q5 (Thanks to my resourcefulness, I know how to handle unforeseen situations), Q6 (I can solve most problems if I invest the necessary effort), Q7 (I can remain calm when facing difficulties because I can rely on my coping abilities), Q8 (When I am confronted with a problem, I can usually find several solutions), Q9 (If I am in trouble, I can usually think of a solution), and Q10 (I can usually handle whatever comes my way).

Figure 4

Model A: Hypothesized General Self-Efficacy Scale with Two-Factor

The result of CFA presents that Model A does not show goodness-of-fit to the data ($\chi^2(34)=368.06$, $p<.01$), χ^2/df ratio=10.82, AGFI=0.67, GFI=0.80, ECVI=2.17, CFI=0.74, IFI=0.74, and RMSEA=0.23. The modification indices were examined to re-estimate the model.

Based on the modification indices, the χ^2 value was decreased by freeing the paths from the latent variable confidence to the indicators Q5, Q7, and Q9; the latent variable coping to the indicator Q2. The paths were freed, which resulted in the competing model, Model B. Despite a significant change on the goodness-of-fit statistics, Model B also does not present overall goodness-of-fit to the data ($\chi^2(30)=238.76$, $p<.01$), χ^2/df ratio=7.93, AGFI=0.72, GFI=0.85, ECVI=1.53, CFI=0.84, IFI=0.84, and RMSEA=0.19.

To determine the best-fitting model, the paths from the latent variable confidence to the indicators Q5, Q6, Q7, Q8, and Q9 were freed, and the paths from the latent variable coping to the indicators Q1 and Q2 were freed. The modification indices resulted to the competing model, Model C (Figure 5).

Model C shows the better goodness-of-fit statistics than Model B to the data ($\chi^2(27)=189.27$, $p<.01$), χ^2/df ratio=7.01, AGFI=0.75, GFI=0.88, ECVI=1.30, CFI=0.87, IFI=0.87, and RMSEA=0.18. The goodness-of-fit indicators for the General Self-Efficacy scale are shown in Table 8.

Figure 5

Model C: Confirmatory Factor Analysis with Standardized Solutions for Two-Factor Model and Multidimensional Items for General Self-Efficacy Scale

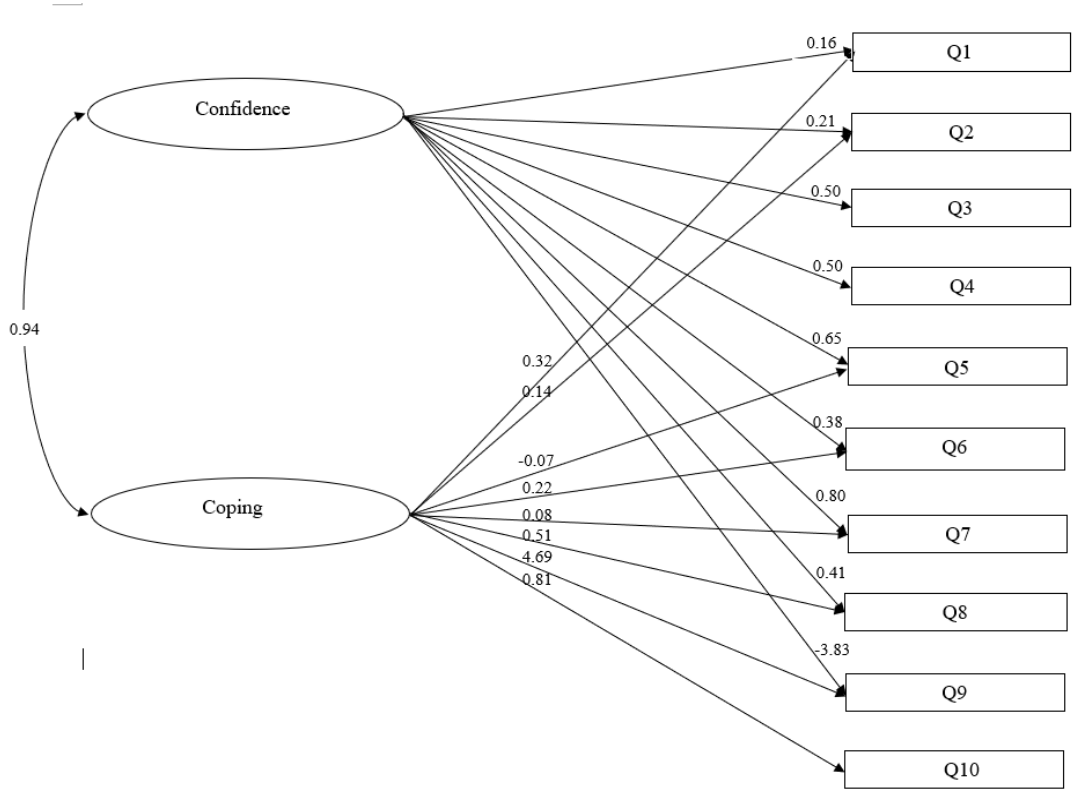


Table 8

Goodness-of-Fit Indicators of the General Self-Efficacy Scale (N=190)

Model	*df*	χ^2	χ^2/df	AGFI	GFI	ECVI	CFI	IFI	RMSEA
Model A	34	368.06	10.82	.67	.80	2.17	.74	.74	.23
Model B	30	238.76	7.93	.72	.85	1.53	.84	.84	.19
Model C	27	189.27	7.01	.75	.88	1.30	.87	.87	.18

Note. AGFI=adjusted goodness of fit index; GFI=goodness of fit index; ECVI=expected cross validation index; CFI=comparative fit index; IFI=incremental fit index; RMSEA=root mean error of approximation. *p<.001.

Research Question 2B

What are the underlying dimensions of the Simplified Diabetes Knowledge Test?

Exploratory Factor Analysis for the Simplified Diabetes Knowledge Test

The S-DKT is composed of 20 items. To explore the factors underlying the S-DKT, the principal components analysis was performed. The initial Eigenvalues indicate that seven factors (blood sugar, basic DM knowledge A, complications, cholesterol-neurologic, cardio, basic DM knowledge B, basic DM knowledge C) explained 16.9%, 9.9%, 7.5%, 6.2%, 5.9%, 5.7%, and 5.0%, respectively.

Varimax rotation procedure was used to rotate the seven factors. Component 1 (blood sugar) comprises five items (Q2, Q5, Q7, Q17, Q18), explaining 11.7% of the item variance with factor loading from .36 to .74 (Tables 8 and 9). Component 2 (basic DM knowledge A) comprises five items (Q3, Q4, Q10, Q15, Q19), explaining 10.5% of the item variance with factor loadings from .45 to .70. Component 3 (complications) comprises two items (Q11, Q16), explaining 8.1% of the item variance with factor loadings from .69 to .79. Component 4 (cholesterol-neurologic) comprises three items (Q8, Q14, Q20), explaining 7.1% of the item variance with factor loadings from .19 to .67. Component 5 (cardio) comprises two items (Q9, Q13), explaining 6.9% of the item variance with factor loading from .67 to .71. Component 6 (basic DM knowledge B) comprises two items (Q6, Q12), explaining 6.5% of the item variance with factor loadings from .61 to .70. Lastly, component 7 (basic DM knowledge C) comprises just one item (Q1), explaining 6.2% of the item variance with factor loading .85 (see Tables 9 and 10).

The Cronbach alpha for the entire measure is .70, while the Cronbach alpha for blood sugar, basic DM knowledge A, complications, cholesterol-neurologic, cardio, and basic DM knowledge B is .67, .57, .57, .09, .30, and .26, respectively. Cronbach alpha for Basic DM knowledge C is not measured because it has only one item.

Table 9

Factor Loading for Varimax Orthogonal Seven-Factor Solution for the Items of the Simplified Diabetes Knowledge Test

Item	Factor loading
Factor 1: Blood Sugar (α=.67)	
Q2. HbA1c is a test that measures your average blood glucose level in the past week	.74
Q17. Excessive insulin can result in high blood sugar levels	.73
Q5. Urine testing and blood testing are both equally as good for testing the level of blood glucose	.61
Q18. If you took insulin in the morning, but skipped breakfast, your blood sugar level will generally go down.	.50
Q7. A Can of diet soft drink can be used for treating low blood glucose levels	.36
Factor 2: Basic DM knowledge A (α=.57)	
Q19. Seeing your physician regularly can help detect early symptoms of diabetes complications.	.70
Q10. For a person in good control, exercising has no effect on blood sugar levels.	.65
Q4. Orange juice has more fat in it than low fat milk.	.60
Q3. A pound of chicken has more carbohydrate in it than a pound of potatoes.	.47
Q15. Lung conditions are usually associated with diabetes.	.45
Factor 3: Complications (α=.57)	
Q16. When you have the flu, you must take blood sugar tests more frequently.	.79
Q11. Infection will lead to increased blood sugar levels.	.69
Factor 4: Cholesterol & Neurologic (α=.09)	
Q8. Using olive oil in cooking can help lower the cholesterol in your blood.	.67
Q14. Stupor or tingling may be a symptom of neurological disease.	.62
Q20. Attending diabetes related to appointments will prevent complications from diabetes	.19
Factor 5: Cardio (α=.30)	
Q13. Eating low fat foods lowers the risk for heart disease.	.71

Item	Factor loading
Q9. Exercising regularly can help reduce high blood pressure.	.67
Factor 6: Basic DM knowledge B (α=.26)	
Q6. Unsweetened fruit juice raises blood glucose levels.	.70
Q12. Wearing shoes that are one size larger helps prevent foot ulcers.	.61
Factor 7: Basic DM knowledge C	
Q2. The diabetes diet is a healthy diet for most people.	.85

Note. N=190 and α=.70 for entire measure.

Table 10

Eigenvalues, Percentages of Variance, and Cumulative Percentages for Factors of the Simplified Diabetes Knowledge Test

Factor	Eigenvalue	%Variance	Cumulative %
1. Blood Sugar	2.35	11.73	11.73
2. Basic DM knowledge A	2.11	10.53	22.26
3. Complications	1.63	8.15	30.41
4. Cholesterol & Neurologic	1.42	7.09	37.50
5. Cardio	1.39	6.95	44.44
6. Basic DM knowledge B	1.30	6.48	50.92
7. Basic DM knowledge C	1.24	6.22	57.14

Confirmatory Factor Analysis for the Simplified Diabetes Knowledge Test

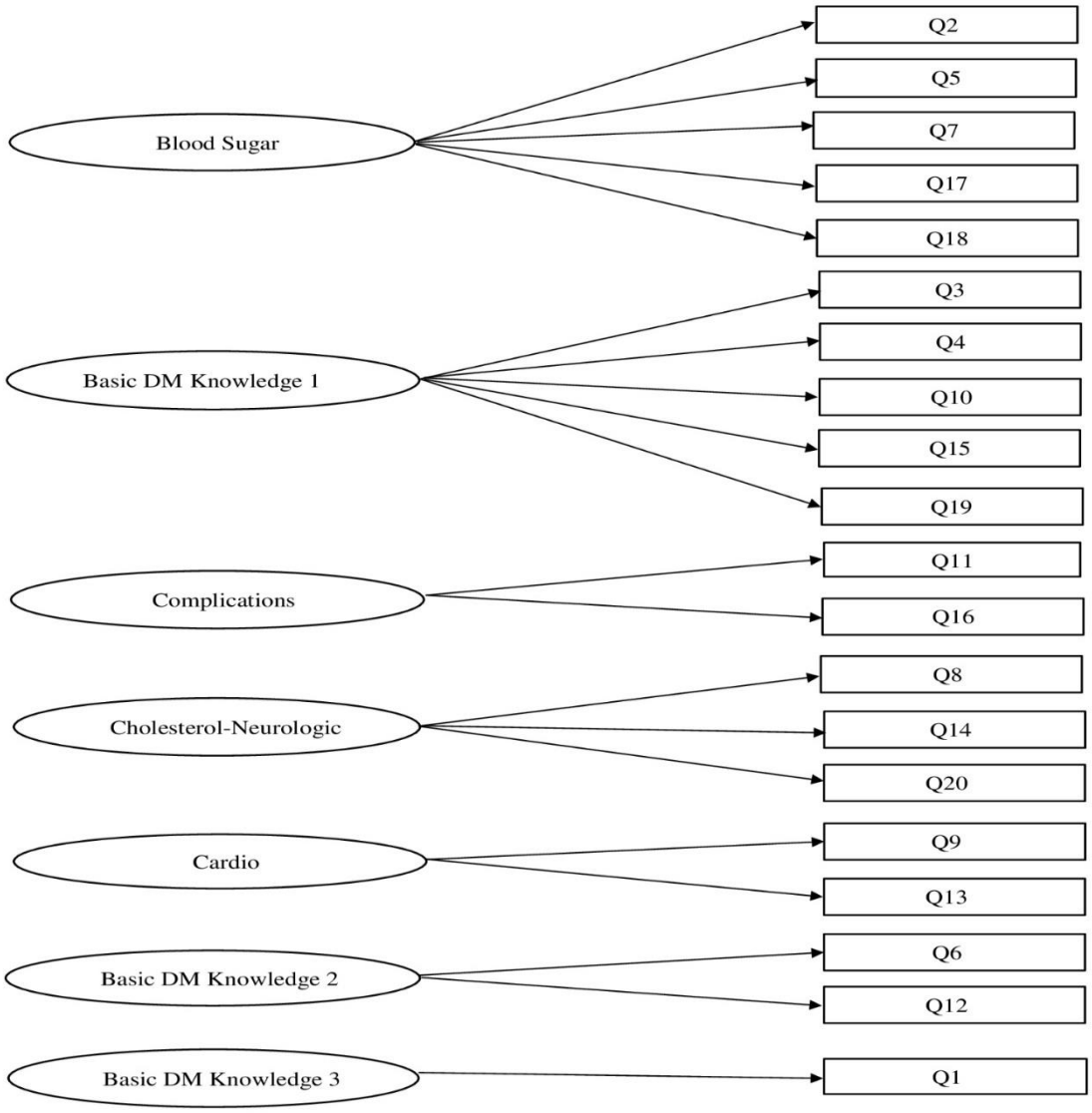
A confirmatory factor analysis using LISREL® (version 11; Jöreskog & Sörbom, 2018) was conducted to determine the relationship between the observable variables and latent variables of the S-DKT. The CFA was also used to test the goodness-of-fit of the hypothesized model for the S-DKT. Model A is the hypothesized model composed of 20 manifest variables and seven latent variables (Figure 6).

However, because the S-DKT is composed with false and true answer format, which is a dichotomous question, it was not applicable to conduct CFA. Moreover, the Cronbach alphas for factors 4, 5, 6, and 7 were lower than the acceptable range (α=0.7).

Therefore, it was recommended to use the entire measurement rather than using separated subscales.

Figure 6

Model A: Hypothesized Simplified Diabetes Knowledge Test with Seven-Factor



Research Question 2C

What are the underlying dimensions of the Lubben Social Network Scale-6?

Exploratory Factor Analysis for the Lubben Social Network Scale-6

The LSNS-6 is composed of six items including two subscales: family (relative) and friends. The EFA was used to determine the underlying dimensions of the LSNS-6.

According to the EFA outcomes, the initial Eigenvalues indicate that the two factors (friends and family) explained 55.01% and 22.67% of the variance, respectively.

Varimax rotation procedure was used to rotate these two factors. The rotated solution shows two interpretable factors: Component 1 (friends) and Component 2 (family). Component 1 (friends) includes three items (Q4, Q5, Q6), accounting for 39.59% of the item variance with factor loading from .81 to .90, while component 2 (family) includes three items (Q1, Q2, Q3), accounting for 38.09% of the item variance with factor loadings from .84 to .87 (see Tables 11 and 12).

Overall, friends and relatives accounted for 77.68% of the variable variance. The Cronbach alpha for the entire measure of the LSNS-6 is .83, while the Cronbach alpha for the friends and family is .86 and .83, respectively.

Table 11

Factor Loadings for Varimax Orthogonal Two-Factor Solution for the Items of the Lubben Social Network Scale-6

Item	Factor loading
Factor 1: Family/Relatives (α=.83)	
Q1. How many Family/Relatives do you see or hear from at least once a month?	.84
Q2. How many Family/Relatives do you feel at ease with that you can talk about private matters?	.85

Q3. How many Family/Relatives do you feel close to such that you could call on them for help?	.87
Factor 2: Friends (α=.86)	
Q4. How many of your friends do you see or hear from at least once a month?	.81
Q5. How many friends do you feel at ease with that you can talk about private matters?	.89
Q6. How many friends do you feel close to such that you could call on them for help?	.90

Note. N=190 and α=.83 for entire measure.

Table 12

Eigenvalues, Percentages of Variance, and Cumulative Percentages for Factors of the Lubben Social Network Scale-6

Factor	Eigenvalue	%Variance	Cumulative %
1. Friends support	2.38	39.59	39.59
2. Family support	2.29	38.09	77.68

Confirmatory Factor Analysis for the Korean Version of LSNS-6

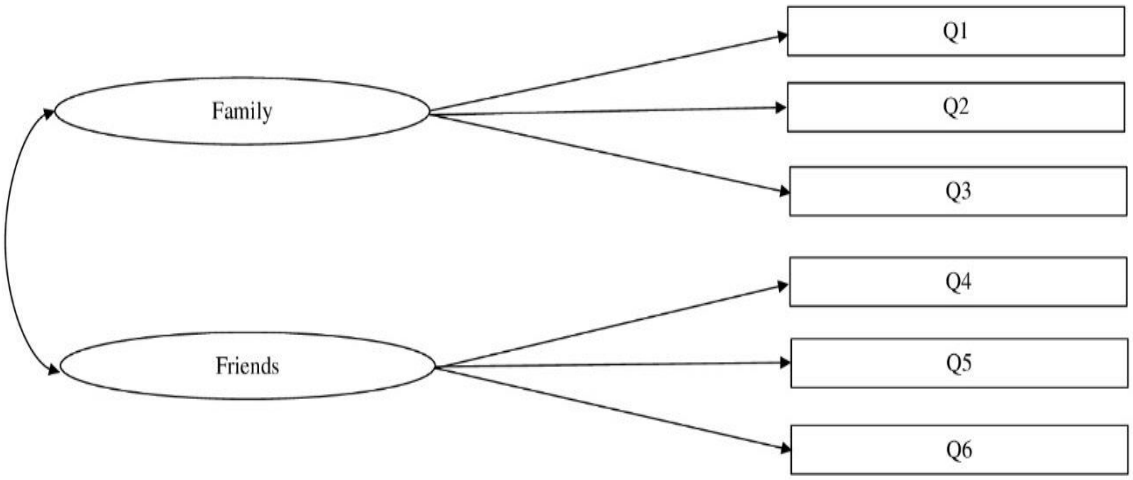
A confirmatory factor analysis using LISREL® (version 11; Jöreskog & Sörbom, 2018) was conducted to determine the relationship between the observable variables and latent variables of the LSNS-6. The CFA was also used to test the goodness-of-fit of the hypothesized model for the LSNS-6. Model A is the hypothesized model composed of six manifest variables and two latent variables. The two latent variables are friends and family (relative). See Figure 7.

The first latent variable, family support, includes three items, Q1 (How many Family/Relatives do you see or hear from at least once a month?), Q2 (How many Family/Relatives do you feel at ease with that you can talk about private matters?), and Q3 (How many Family/Relatives do you feel close to such that you could call on them

for help?). The second latent variable, friends support, includes three items, Q4 (How many of your friends do you see or hear from at least once a month?), Q5 (How many friends do you feel at ease with that you can talk about private matters?), and Q6 (How many friends do you feel close to such that you could call on them for help?).

Figure 7

Model A: Hypothesized Lubben Social Network Scale-6 Subscales with Two-Factor



The result of CFA indicates that Model A shows goodness-of-fit to the data ($\chi^2(8)=66.15$, $p<.01$), χ^2/df ratio=8.27, AGFI=0.76, GFI=0.91, ECVI=0.49, CFI=0.93, IFI=0.93, and RMSEA=0.20.

To make a competing model, the χ^2 value was decreased by freeing the paths from the latent variable family to the indicator Q1. The freed paths resulted in the competing model, Model B (Figure 8). Model B shows better goodness-of-fit to the data ($\chi^2(7)=56.69$, $p<.01$), χ^2/df ratio=8.10, AGFI=0.75, GFI=0.92, ECVI=0.45, CFI=0.94, IFI=0.94, and RMSEA=0.19. See Table 13.

Figure 8

Model B: Confirmatory Factor Analysis with Standardized Solutions for Two-Factor Model and Multidimensional Items for the Lubben Social Network Scale-6

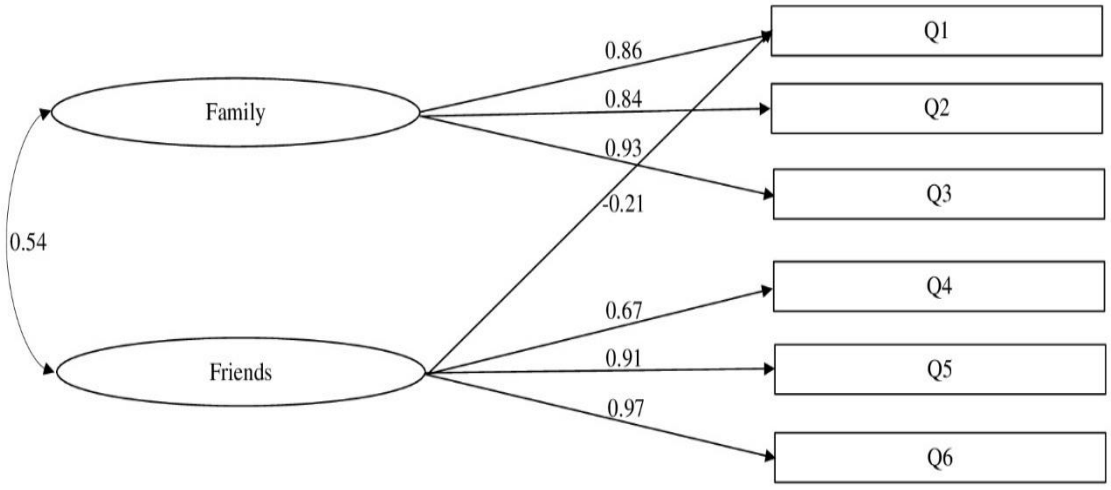


Table 13

Goodness-of-Fit Indicators of the Lubben Social Network Scale-6 (N=190)

Model	*df*	χ^2	χ^2/df	AGFI	GFI	ECVI	CFI	IFI	RMSEA
Model A	8	66.15	8.27	.76	.91	.49	.93	.93	.20
Model B	7	56.69	8.10	.75	.92	.45	.94	.94	.19

Note. AGFI=adjusted goodness of fit index; GFI=goodness of fit index; ECVI=expected cross validation index; CFI=comparative fit index; IFI=incremental fit index; RMSEA=root mean error of approximation. *p<.001.

Research Question 2D

What are the underlying dimensions of the Summary of Diabetes Self-Care Activities questionnaire?

Exploratory Factor Analysis for the Summary of Diabetes Self-Care Activities Questionnaire

The SDSCA questionnaire is composed of 11 items. The EFA was used to determine the underlying dimensions of the SDSCA questionnaire.

According to the EFA outcomes, the initial Eigenvalues indicate that the four factors (daily monitor, healthy diet, exercise, unhealthy lifestyle) explained 32.87%, 15.44%, 10.58%, and 9.84%, respectively.

Varimax rotation procedure was used to rotate these four factors. The rotated solution shows four interpretable factors: Component 1 (daily monitor), Component 2 (healthy diet), Component 3 (exercise), and Component 4 (unhealthy lifestyle). Component 1 (daily monitor) includes four items (Q7, Q8, Q9, Q10), accounting for 22.91% of the item variance with factor loading from .61 to .89 (see Tables 14 and 15). Component 2 (healthy diet) includes three items (Q1, Q2, Q3), accounting for 20.71% of the item variance with factor loadings from .78 to .85. Component 3 (exercise) includes two items (Q5, Q6), accounting for 14.82% of the item variance with factor loading from .83 to .87. Lastly, component 4 (unhealthy lifestyle) includes two items (Q4, Q11), accounting for 10.29% of the item variance with factor loading from .52 to .74. The Cronbach alpha for the entire measure of the SDSCA is .77, while the Cronbach alpha for each subscale, daily monitor, healthy diet, exercise, and unhealthy lifestyle is .79, .81, .73, and .06, respectively.

Table 14

Factor Loading for Varimax Orthogonal Four-Factor Solution for the Items of Summary of Diabetes Self-Care Activities Questionnaire

Item	Factor loading
Factor 1: Daily Monitor (α=.79)	
Q7. On how many of the last seven days did you test your blood sugar?	.90
Q8. On how many of the last seven days did you test your blood sugar the number of times recommended by your doctor?	.89
Q9. On how many of the last seven days did you check your feet?	.62
Q10. On how many of the last seven days did you inspect the inside of your shoes?	.61
Factor 2: Healthy Diet (α=81)	
Q1. How many of the last seven days have you followed a healthful diet plan?	.85
Q3. On how many of the last seven days did you eat 3 small plates amount of vegetables and fruits per meal?	.83
Q2. On average, during the past month, how many days per week have you followed your diabetic eating plan?	.78
Factor 3: Exercise (α=.73)	
Q6. On how many of the last seven days did you participate in a specific exercise program?	.87
Q5. On how many of the last seven days did you do at least 30 minutes of physical activity?	.83
Factor 4: Unhealthy lifestyle (α=.06)	
Q4. On how many of the last seven days did you eat high fat foods such as Korean Gal-bi?	.74
Q11. During the past seven days, have you smoked a cigarette even one puff?	.52

Note. N=190 and *α*=.77 for entire measure.

Table 15

Eigenvalues, Percentages of Variance, and Cumulative Percentages for Factors of the Summary of Diabetes Self-Care Activities Questionnaire

Factor	Eigenvalue	%Variance	Cumulative %
1. Daily monitor	2.52	22.91	22.91
2. Healthy diet	2.28	20.71	43.62
3. Exercise	1.63	14.82	58.44
4. Unhealthy lifestyle	1.13	10.29	68.73

Confirmatory Factor Analysis for the Summary of Diabetes Self-Care Activities Questionnaire

A confirmatory factor analysis using LISREL® (version 11; Jöreskog & Sörbom, 2018) was conducted to determine the relationship between the observable variables and latent variables of the SDSCA questionnaire. The CFA was also used to test the goodness-of-fit of the hypothesized model for SDSCA questionnaire.

Model A is the hypothesized model composed of 11 manifest variables and four latent variables. The four latent variables are daily monitor, healthy diet, exercise, and unhealthy lifestyle. See Figure 9.

The first latent variable, healthy diet, includes three items, Q1 (How many of the last seven days have you followed a healthful diet plan?), Q2 (On average, during the past month, how many days per week have you followed your diabetic eating plan?), and Q3 (On how many of the last seven days did you eat three small plates amount of vegetables and fruits per meal?).

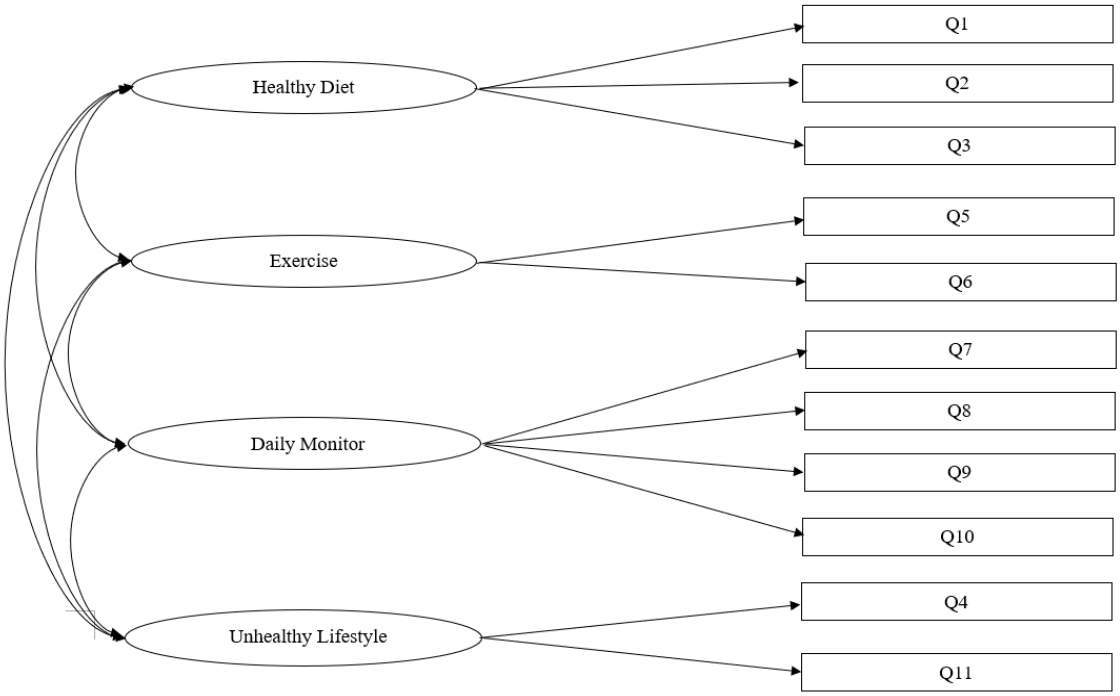
The second latent variable, exercise, includes two items, Q5 (On how many of the last seven days did you do at least 30 minutes of physical activity?) and Q6 (On how many of the last seven days did you participate in a specific exercise program?).

The third latent variable, daily monitor, includes four items, Q7 (On how many of the last seven days did you test your blood sugar?), Q8 (On how many of the last seven days did you test your blood sugar the number of times recommended by your doctor?), Q9 (On how many of the last seven days did you check your feet?), and Q10 (On how many of the last seven days did you inspect the inside of your shoes?).

The fourth latent variable, unhealthy lifestyle, includes two items, Q4 (On how many of the last seven days did you eat high fat foods such as Korean Gal-bi?) and Q11 (During the past seven days, have you smoked a cigarette even one puff?).

Figure 9

Model A: Hypothesized Summary of Diabetes Self-Care Activities Questionnaire with Four-Factor and 11 Items



The result of CFA indicates that Model A does not show goodness-of-fit to the data ($\chi^2(38)=337.79$, $p<.01$), χ^2/df ratio=8.88, AGFI=0.63, GFI=0.79, ECVI=2.08, CFI=0.76, IFI=0.77, and RMSEA=0.20.

To make a competing model, the χ^2 value was decreased by freeing the paths from the latent variable healthy diet to the indicators Q7, Q8, Q10, from the latent variable exercise to the indicators Q9, Q11, from the latent variable daily monitor to the indicators

Q2, Q3, from the latent variable unhealthy lifestyle to the indicators Q5, Q6. The freed paths resulted in the competing model, Model B.

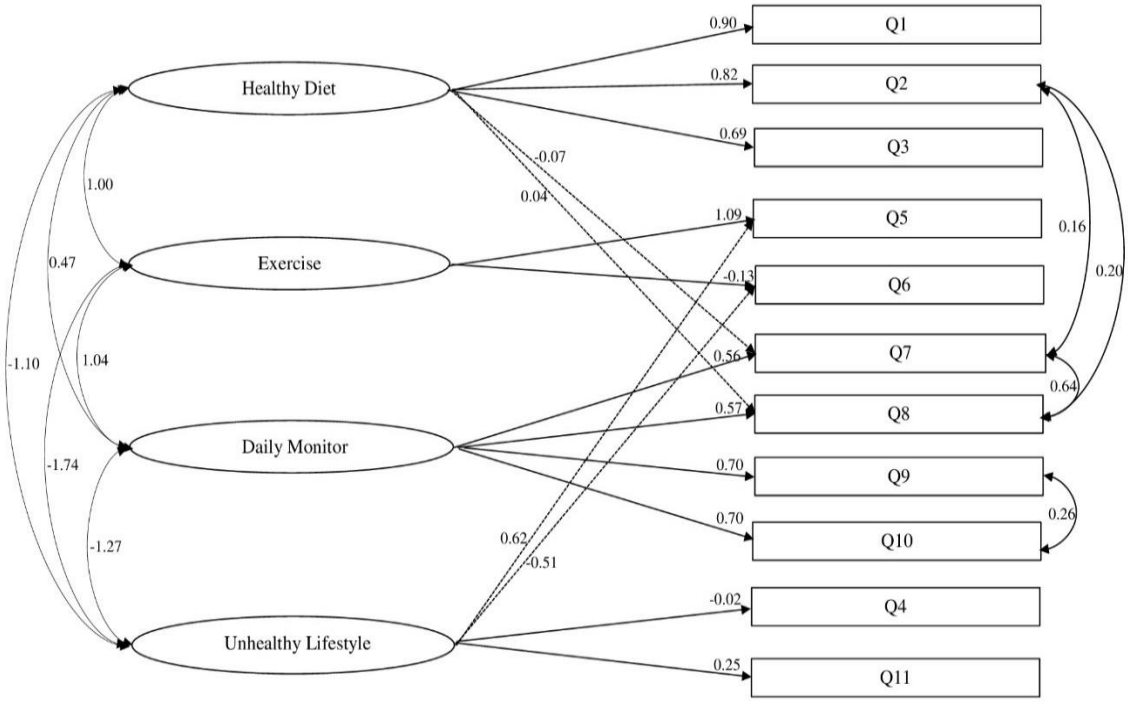
However, Model B also did not show goodness-of-fit to the data (χ^2 (29)=224.85, $p<.01$), χ^2/df ratio=7.75, AGFI=0.65, GFI=0.85, ECVI=1.58, CFI=0.84, IFI=0.85, and RMSEA=0.19.

To find a better competing model, the χ^2 value was decreased by freeing the paths from the latent variable healthy diet to the indicators Q7, Q8, from the latent variable unhealthy lifestyle to the indicators Q5, Q6. With the modification index, the correlation of errors was allowed by freeing the correlation between observable variables. The correlation of errors was allowed between Q2 and Q7; Q2 and Q8; Q7 and Q8; Q9 and Q10. This modification provided a competing model, Model C. See Figure 10.

Model C shows the better-fitting model for the Summary of Diabetes Self-Care Activities questionnaire with 11 observed variables and four latent variables. Model C shows goodness-of-fit to the data (χ^2 (30)=159.99, $p<.01$), χ^2/df ratio=5.33, AGFI=0.71, GFI=0.87, ECVI=1.23, CFI=0.90, IFI=0.90, and RMSEA=0.15.

Figure 10

Model C: Confirmatory Factor Analysis with Standardized Solutions for Four-Factor Model with Eleven Items and Multidimensional Items for the Summary of Diabetes Self-Care Activities Questionnaire



The goodness-of-fit indicators for the SDSCA questionnaire are shown in Table 16.

Table 16

The Goodness-of-Fit Indicators for the Summary of Diabetes Self-Care Activities

Model	*df*	χ^2	χ^2/df	AGFI	GFI	ECVI	CFI	IFI	RMSEA
Model A	38	337.79	8.88	.63	.79	2.08	.76	.77	.20
Model B	29	224.85	7.75	.65	.85	1.58	.84	.85	.19
Model C	30	159.99	5.33	.71	.87	1.23	.90	.90	.15

Choi et al. (2011) examined the psychometric properties of a Korean version of the SDSCA questionnaire with a Korean sample. They conducted EFA, and the EFA

showed four factors with an Eigenvalue > 1, explaining 64% of total variance. According to the EFA results of Choi et al. (2011), Q4 and Q11 were not loaded on any factor. Therefore, they excluded the two items, Q4 and Q11, and they included only nine items, Q1, Q2, Q3, Q5, Q6, Q7, Q8, Q9, and Q10. This study's target population is also Koreans, so to find a better-fitting model for this sample, the model of Choi et al. (2011) was examined with the Korean sample of this study.

Exploratory Factor Analysis for the Summary of Diabetes Self-Care Activities Questionnaire Based on the Choi et al. (2011) Model

According to EFA based on Choi et al.'s (2011) model, the Cronbach alpha of Factor 1 (Diet), Factor 2 (Blood Glucose Test), Factor 3 (Foot Care), Factor 4 (Exercise) was .81, .95, .71, and .73, respectively, and the Cronbach alpha for the entire measure was .84. See Table 17.

Table 17

Factor Loading for Varimax Orthogonal Four-Factor Solution with Nine Items for the Summary of Diabetes Self-Care Activities Questionnaire Based on Choi et al. (2011)

Item	Factor loading
Factor 1: Diet (α=*.81*)	
1. How many of the last seven days have you followed a healthful diet plan?	.85
3. On how many of the last seven days did you eat 3 small plates amount of vegetables and fruits per meal?	.83
2. On average, during the past month, how many days per week have you followed your diabetic eating plan?	.78
Factor 2: Blood Glucose Test (α=*.95*)	
7. On how many of the last seven days did you test your blood sugar?	.90
8. On how many of the last seven days did you test your blood sugar the number of times recommended by your doctor?	.89
Factor 3: Foot Care (α=*.71*)	
9. On how many of the last seven days did you check your feet?	.62
10. On how many of the last seven days did you inspect the inside of your shoes?	.61

Item	Factor loading
Factor 4: Exercise (α=*.73*)	
6. On how many of the last seven days did you participate in a specific exercise program?	.87
5. On how many of the last seven days did you do at least 30 minutes of physical activity?	.83

Note. N=190 and α=.84 for entire measure.

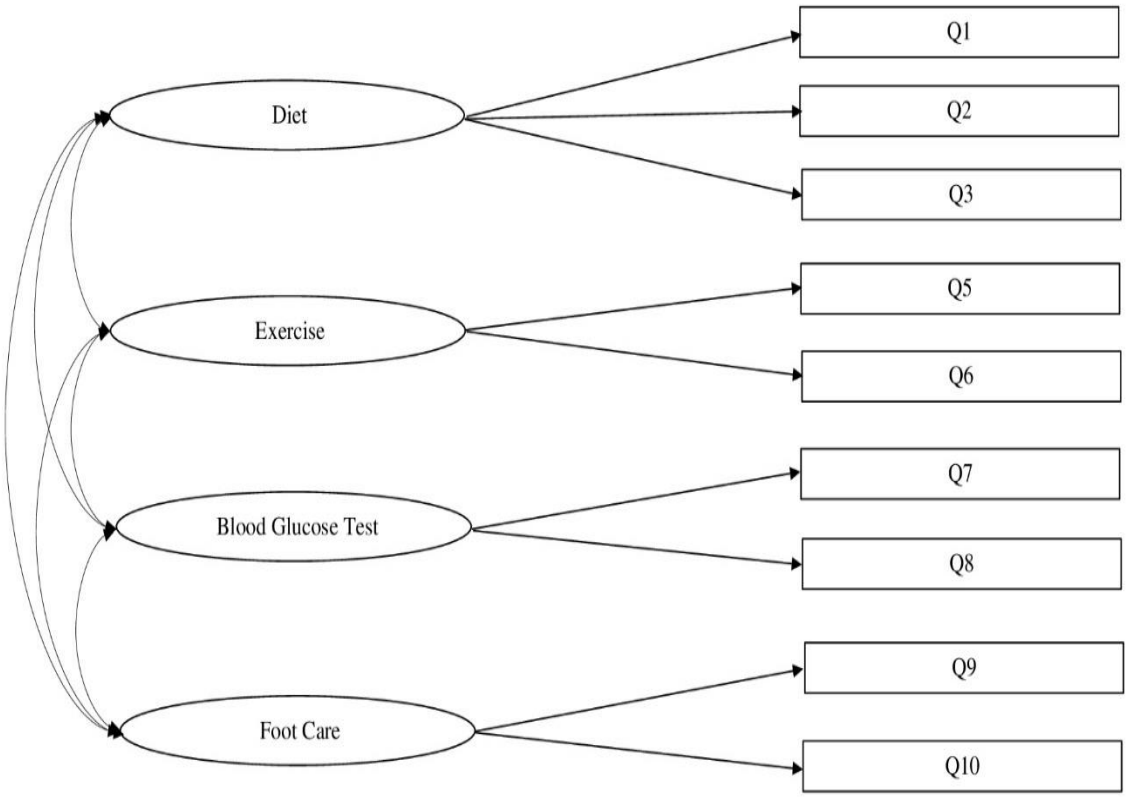
Confirmatory Factor Analysis for the Summary of Diabetes Self-Care Activities Questionnaire Based on Choi et al. (2011)

Choi et al. (2011) excluded the two items, Q4 (On how many of the last seven days did you eat high fat foods such as Korean Gal-bi?) and Q11 (During the past seven days, have you smoked a cigarette even one puff?), and then conducted CFA. The results of CFA showed excellent goodness-of-fit.

To find a better competing model for this study, the primary investigator applied the model of Choi et al. (2011) into this study. The hypothesized model is Model A-Choi et al. (2011). The new hypothesized Model A-Choi et al. (2011) is a four-factor model with nine items excluding items 4 and 11. See Figure 11.

Figure 11

Model A-Choi et al. (2011): Hypothesized Summary of Diabetes Self-Care Activities Questionnaire Subscales with Four-Factor and Nine Items



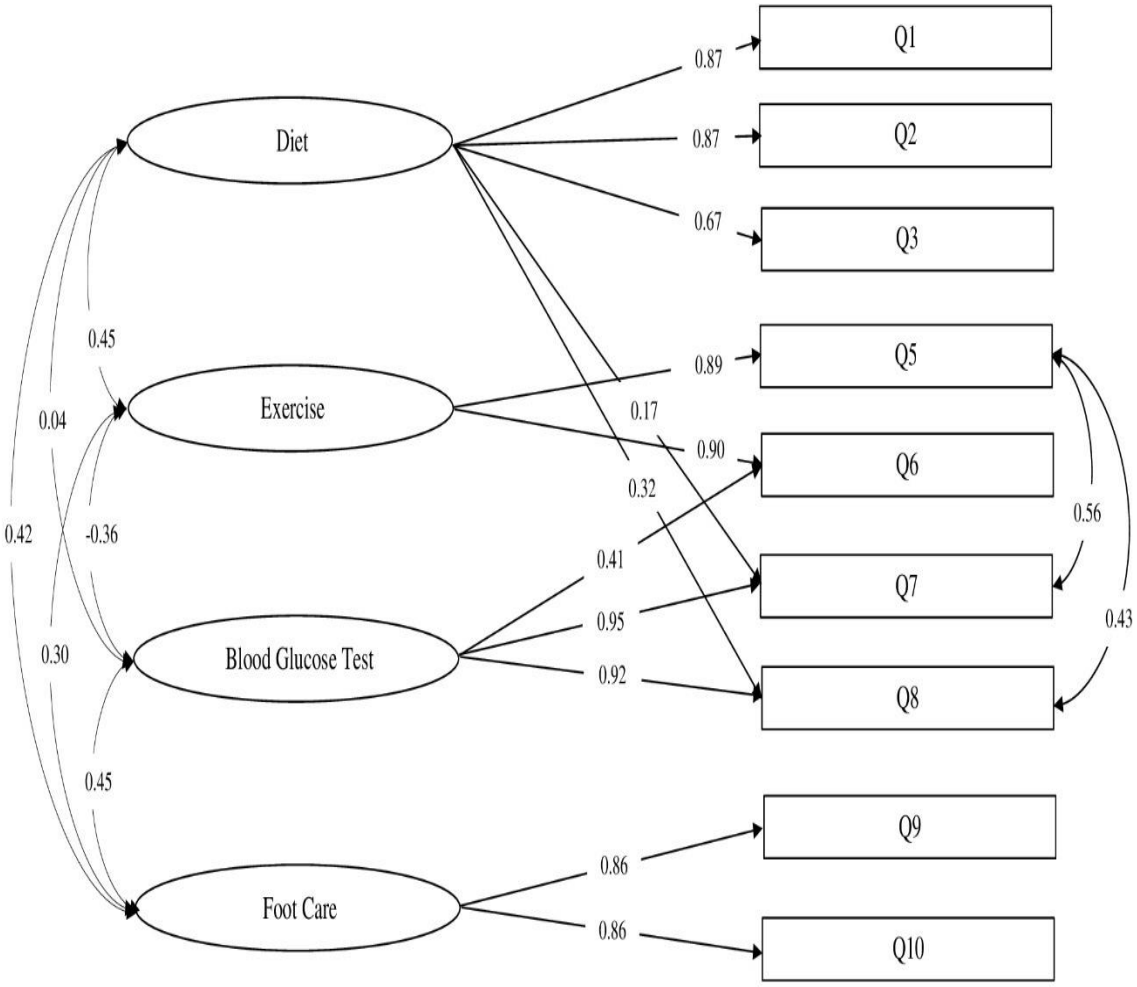
According to the result of CFA, the Model A-Choi et al. (2011) does not show goodness-of-fit to the data ($\chi^2(21)=156.35$, $p<.01$), χ^2/df ratio=7.44, AGFI=0.73, GFI=0.87, ECVI=1.08, CFI=0.89, IFI=0.89, and RMSEA=0.19.

To make a competing model, the χ^2 value was decreased by freeing the paths from the latent variable diet to the indicators Q7, Q8, from the latent variable blood glucose test to the indicators Q6. With the modification index, the correlation of errors was allowed by freeing the correlation between observable variables. The correlation of errors was allowed between Q7 and Q5; Q8 and Q5. This modification provided a competing model, Model B-Choi et al. (2011). See Figure 12.

Model B-Choi et al. (2011) shows a best-fitting model for the SDSCA questionnaire to the data ($\chi^2(16)=61.48$, $p<.01$), χ^2/df ratio=3.84, AGFI=0.85, GFI=0.95, ECVI=0.63, CFI=0.96, IFI=0.96, and RMSEA=0.12. See Table 17.

Figure 12

Model B-Choi et al. (2011): Confirmatory Factor Analysis with Standardized Solutions for Four-Factor and Nine Items and Multidimensional Items for the Summary of Diabetes Self-Care Activities Questionnaire



The goodness-of-fit indicators for the SDSCA questionnaire for Four-Factor with Eleven Items and Four-Factor with Nine Items are shown in Table 18.

Table 18

The Goodness-of-Fit Indicators for the Summary of Diabetes Self-Care Activities

Model	*# items*	*df*	χ^2	χ^2/df	AGFI	GFI	ECVI	CFI	IFI	RMSEA
Model A	11 items	38	337.79	8.88	.63	.79	2.08	.76	.77	.20
Model B	11 items	29	224.85	7.75	.65	.85	1.58	.84	.85	.19
Model C	11 items	30	159.99	5.33	.71	.87	1.23	.90	.90	.15
Model A-Choi (2011)	9 items	21	156.35	7.44	.73	.87	1.08	.89	.89	.19
Model B-Choi (2011)	9 items	16	61.48	3.84	.85	.95	0.63	.96	.96	.12

Research Question 3

What are the relationships among socio-demographics, self-efficacy, diabetes knowledge, social support, and self-care activities?

To answer research question 3, bivariate correlation was performed. The intercorrelation for the research variables is presented in Table 19.

Relationship between Sex (Male) and Other Variables

According to the correlation matrix, being male is more likely to have a higher annual income (r=.21, p<.0) and higher education level (r=.16, p<.05). Moreover, the male participants are more likely to be younger than female participants, showing a negative relationship with age (r=-.20, p<.01).

Relationship between Age and Other Variables

The correlation matrix shows that aged participants are more likely to reside in the U.S. longer (r=.25, p<.01) and perform blood glucose test more often (r=.19, p<.01), while aged participants are likely to be in lower annual income (r=-.47, p<.01), lower education level (r=-.34, p<.01), lower coping (r=-.16, p<.05), lower diabetes knowledge (r=-.28, p<.01), and lower friends support (r=-.17, p<.05).

Relationship between Years of Residency in the U.S. and Other Variables

The correlation matrix shows that participants who reside in the U.S. longer are more likely to have higher coping level (r=.23, p<.01), confidence (r=.26, p<.01) and perform healthy diet more (r=.17, p<.05).

Relationship between Annual Income and Other Variables

The correlation matrix shows that participants who have higher annual income are more likely to have higher education level (r=.34, p<.01), higher coping level, (r=.24, p<.01), higher confidence (r=.16, p<.05), higher diabetes knowledge (r=.33, p<.01), higher family support (r=.21, p<.01), and higher friends support, (r=.23, p<.01).

Relationship between Education Level and Other Variables

According to the correlation matrix, participants who have higher education level are more likely to have higher coping level (r=.16, p<.05), higher confidence (r=.16, p<.05), and higher diabetes knowledge (r=.26, p<.01).

Relationship between Coping, Confidence, and Other Variables

The correlation matrix shows that participants who have higher coping level are more likely to have higher confidence (r=.52, p<.01), higher diabetes knowledge (r=.17, p<.05), higher family support (r=.34, p<.01), and higher friends support (r=.17, p<.05).

Relationship between Confidence and Other Variables

According to the correlation matrix, participants who have higher confidence are more likely to have higher family support (r=.22, p<.01) and perform exercise more often (r=.14, p<.05).

Relationship between Diabetes Knowledge and Other Variables

The correlation matrix shows that participants who have higher diabetes knowledge are likely to perform healthy diet (r=.21, p<.01) and exercise (r=.19, p<.01) more often.

Relationship between Family (Relative) Support and Other Variables

The correlation matrix shows that participants who have higher family support are likely to have higher friends support as well (r=.40, p<.01) and more often have a healthy diet (r=.17, p<.05).

Relationship between Healthy Diet and Other Variables

The correlation matrix shows that participants who have a healthy diet often are likely to perform exercise (r=.37, p<.01), blood glucose test (r=.22, p<.01), and foot care (r=.29, p<.01) as well.

Relationship between Exercise and Other Variables

According to the correlation matrix, participants who exercise more are likely to perform blood glucose test (r=.27, p<.01) and foot care (r=.32, p<.01).

Relationship between Blood Test and Other Variables

Participants who are more likely to perform blood glucose tests are likely to perform foot care as well (r=.42, p<.01).

Relationship between Unhealthy Lifestyle and Other Variables

An unhealthy lifestyle does not show any significant relationship with other variables in the correlation matrix.

Table 19

Intercorrelations, Means, and Standard Deviations for All Variables

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	M	SD
1. Sex (Male)																.46	.50
2. Age	**-.20****															3.06	1.90
3. Years in the US	-.05	**.25****														3.70	1.28
4. Annual Income	**.21****	**-.47****	.03													5.10	3.44
5. Education Level	**.16***	**-.34****	.04	**.34****												3.11	.99
6. Coping	.11	**-.16***	**.23****	**.24****	**.16***											3.03	.41
7. Confidence	.03	-.03	**.26****	**.16***	**.16***	**.52****										2.87	.42
8. Diabetes Knowledge	.04	**-.28****	.02	**.33****	**.26****	**.17***	.10									.58	.16
9. Family Support	-.10	-.03	.12	**.21****	.07	**.34****	**.22****	.04								3.47	1.08
10. Friends Support	-.03	**-.17***	.06	**.23****	.07	**.17***	.04	.03	**.40****							3.12	1.12
11. Health Diet	-.05	.05	**.17***	.09	-.02	.11	.11	**.21****	**.17***	.04						4.89	1.80
12. Exercise	.10	-.01	.02	.07	.11	.07	**.14***	**.19****	.09	-.04	**.37****					4.17	2.17
13. Blood Glucose Test	.00	**.19****	.12	-.06	-.00	-.11	-.08	.13	.00	-.04	**.22****	**.27****				4.12	2.81
14. Foot Care	-.09	.13	.09	.00	.09	.02	.04	.07	-.06	-.10	**.29****	**.32****	**.42****			2.80	2.24
15. Unhealthy Lifestyle	-.01	-.05	.00	-.02	-.03	.02	.04	-.01	.01	.12	-.04	-.00	-.01	.03		2.13	.80

Note. ** Correlation is significant at the $p<0.01$ level (2-tailed). * Correlation is significant at the $p<0.05$ level (2-tailed).

Research Question 4

Which variables predict self-care activities among senior Korean immigrants with diabetes? Specifically, (4a) which variables predict the Healthy Diet self-care activity? (4b) Which variables predict the Exercise self-care activity? (4c) Which variables predict the Blood Glucose Test self-care activity? (4d) Which variables predict the Foot Care self-care activity? (4e) Which variables predict Unhealthy Lifestyle?

Multiple regression analysis was performed to determine which variables predict the five dependent variables Healthy Diet, Exercise, Blood Glucose Test, Foot Care, and Unhealthy Lifestyle.

Predicting Healthy Diet

The regression model for Healthy Diet explained 11% of the variance (R^2=.11, F (10, 179)=2.24, p=.017). Diabetes Knowledge is a significant predictor of Healthy Diet (b=2.492, t (179)=2.917, p<.01, β=.225). See Table 20.

Table 20

Regression Analysis Summary for Healthy Diet

Variable	B	SE B	β	*t*	*p*
Sex	-.110	.269	-.031	-.411	.682
Age	.080	.084	.085	.955	.341
Years in the US	.167	.110	.119	1.518	.131
Annual Income	.034	.046	.066	.750	.454
Education Level	-.165	.143	-.091	-1.150	.252
Coping (Self-Efficacy)	.045	.389	.010	.116	.908
Confidence (Self-Efficacy)	.103	.359	.024	.287	.774
Diabetes Knowledge	2.492	.854	.225	2.917**	.004
Family (Social Support)	.247	.138	.149	1.795	.074
Friends (Social Support)	-.053	.127	-.033	-.416	.678

Note. R^2=.11 (N=190, p<.05). ** p<.01.

Predicting Exercise

The regression model for Exercise explained 8% of the variance (R^2=.08, *F* (10, 179)=1.60, *p*=.10). Diabetes Knowledge is a significant predictor of Exercise (b=2.622, t (179)=2.499, *p*<.05, *β*=.196). See Table 21.

Table 21

Regression Analysis Summary for Exercise

Variable	B	SE B	β	*t*	*p*
Sex	.475	.330	.109	1.441	.151
Age	.084	.103	.074	.816	.416
Years in the US	-.054	.135	-.032	-.403	.687
Annual Income	-.008	.056	-.012	-.135	.892
Education Level	.131	.176	.059	.741	.459
Coping (Self-Efficacy)	-.262	.478	-.050	-.547	.585
Confidence (Self-Efficacy)	.626	.441	.123	1.420	.157
Diabetes Knowledge	2.622	1.049	.196	2.499*	.013
Family (Social Support)	.243	.169	.122	1.439	.152
Friends (Social Support)	-.145	.157	-.075	-.925	.356

Note. R^2=.08 (*N*=190, *p*=.109). * *p*<.05.

Predicting Blood Glucose Test

As shown in Table 21, the regression model for Blood Glucose Test explained 11% of the variance (R^2=.11, *F* (10, 179)=2.26, *p*<.05). Age (b=.329, t (179)=2.504, *p*<.05, *β*=.223) and Diabetes Knowledge (b=3.885, t (179)=2.908, *p*<.01, *β*=.224) are significant predictors of Blood Glucose Test. See Table 22.

Table 22

Regression Analysis Summary for Blood Glucose Test

Variable	B	SE B	β	*t*	*p*
Sex	.369	.420	.065	.878	.381
Age	.329	.132	.223	2.504*	.013
Years in the US	.238	.172	.108	1.385	.168
Annual Income	-.029	.072	-.035	-.399	.690

Variable	B	SE B	β	*t*	*p*
Education Level	.120	.224	.042	.534	.594
Coping (Self-Efficacy)	-.786	.609	-.116	-1.292	.198
Confidence (Self-Efficacy)	-.589	.561	-.089	-1.049	.296
Diabetes Knowledge	3.885	1.336	.224	2.908**	.004
Family (Social Support)	.155	.215	.060	.722	.471
Friends (Social Support)	-.037	.199	-.015	-.183	.855

Note. R^2=.11 (*N*=190, *p*=.017). ** *p*<.01, * *p*<.05.

Predicting Foot Care

The regression model for Foot Care explained 7% of the variance (R^2=.07, *F* (10, 179)=1.423, *p*=.173). It indicates that Age is a predictor of the Foot Care self-care activity (b=.229, t (179)=2.137, *p*<.05, *β*=.195). See Table 23.

Table 23

Regression Analysis Summary for Foot Care

Variable	B	SE B	β	*t*	*p*
Sex	-.504	.342	-.112	-1.474	.142
Age	.229	.107	.195	2.137*	.034
Years in the US	.052	.140	.030	.374	.708
Annual Income	.043	.058	.066	.736	.463
Education Level	.330	.182	.146	1.808	.072
Coping (Self-Efficacy)	.308	.495	.057	.621	.535
Confidence (Self-Efficacy)	-.001	.457	.000	-.003	.997
Diabetes Knowledge	.950	1.087	.069	.874	.383
Family (Social Support)	-.179	.175	-.087	-1.020	.309
Friends (Social Support)	-.159	.162	-.080	-.979	.329

Note. R^2=.07 (*N*=190, *p*=.173). * *p*<.05.

Predicting Unhealthy Lifestyle

The regression model for Unhealthy Lifestyle explained 3% of the variance (R^2=.029, *F* (10, 179)=.543, *p*=.858). It indicates that there is no independent variable that predicts Unhealthy Lifestyle. See Table 24.

Table 24

Regression Analysis Summary for Unhealthy Lifestyle

Variable	B	SE B	β	*t*	*p*
Sex	-.021	.126	-.013	-.164	.870
Age	-.039	.039	-.092	-.989	.324
Years in the US	.005	.051	.007	.089	.929
Annual Income	-.018	.022	-.075	-.815	.416
Education Level	-.046	.067	-.056	-.680	.497
Coping (Self-Efficacy)	-.020	.182	-.010	-.108	.914
Confidence (Self-Efficacy)	.135	.168	.072	.804	.422
Diabetes Knowledge	-.037	.400	-.007	-.093	.926
Family (Social Support)	-.034	.064	-.046	-.532	.595
Friends (Social Support)	.104	.060	.145	1.743	.083

Note. R^2=.029 (N=190, p=.858).

Research Question 5

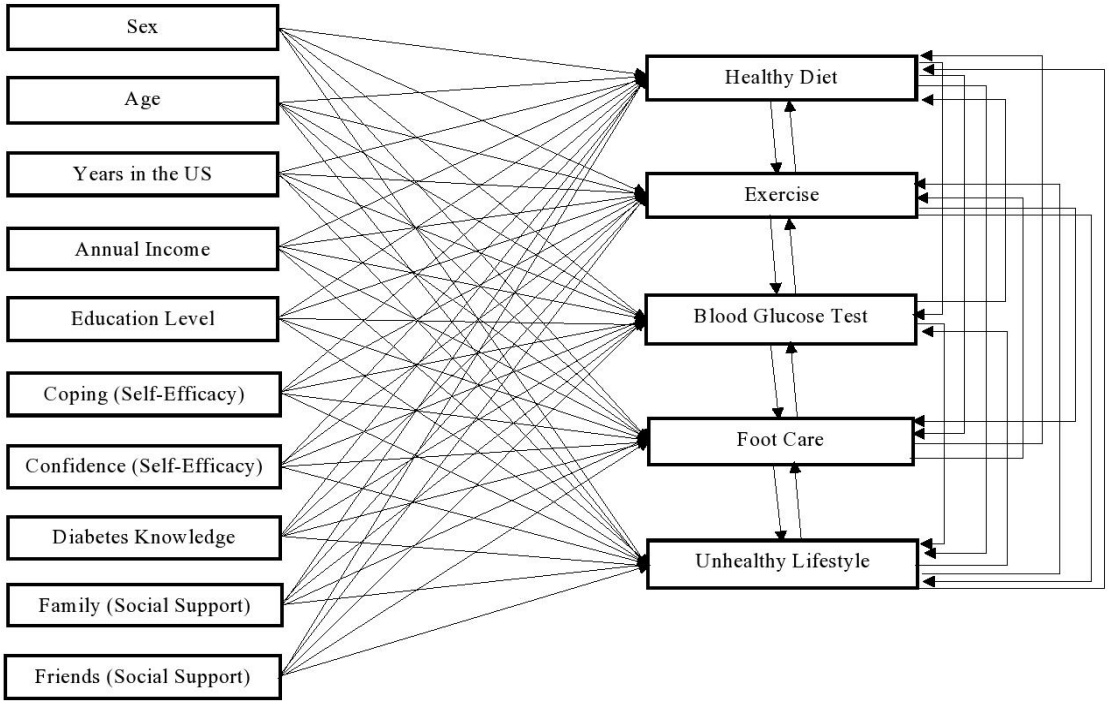
What is the relationship between 10 exogenous variables and five endogenous variables among senior Korean immigrants with diabetes?

Path analysis was conducted to answer research question 5. Based on the covariance, the model used maximum likelihood estimation using LISREL® (version 11; Jöreskog & Sörbom, 2018). The hypothesized path model is presented in Figure 13.

The hypothesized path model presents all paths related to 10 exogenous and five endogenous variables. The 10 exogenous variables include sex, age, years of residency in the U.S., education level, annual income, coping, confidence, diabetes knowledge, family support, and friends' support. The five endogenous variables include healthy diet, exercise, blood glucose test, foot care, and unhealthy lifestyle. The path model is a saturated model. After conducting the statistical analysis, non-significant path coefficients were determined based on the critical t value of -1.96 to 1.96, and, then, the paths with non-significant coefficients were fixed.

Figure 13

Hypothesized Path Model for Self-Care Activities



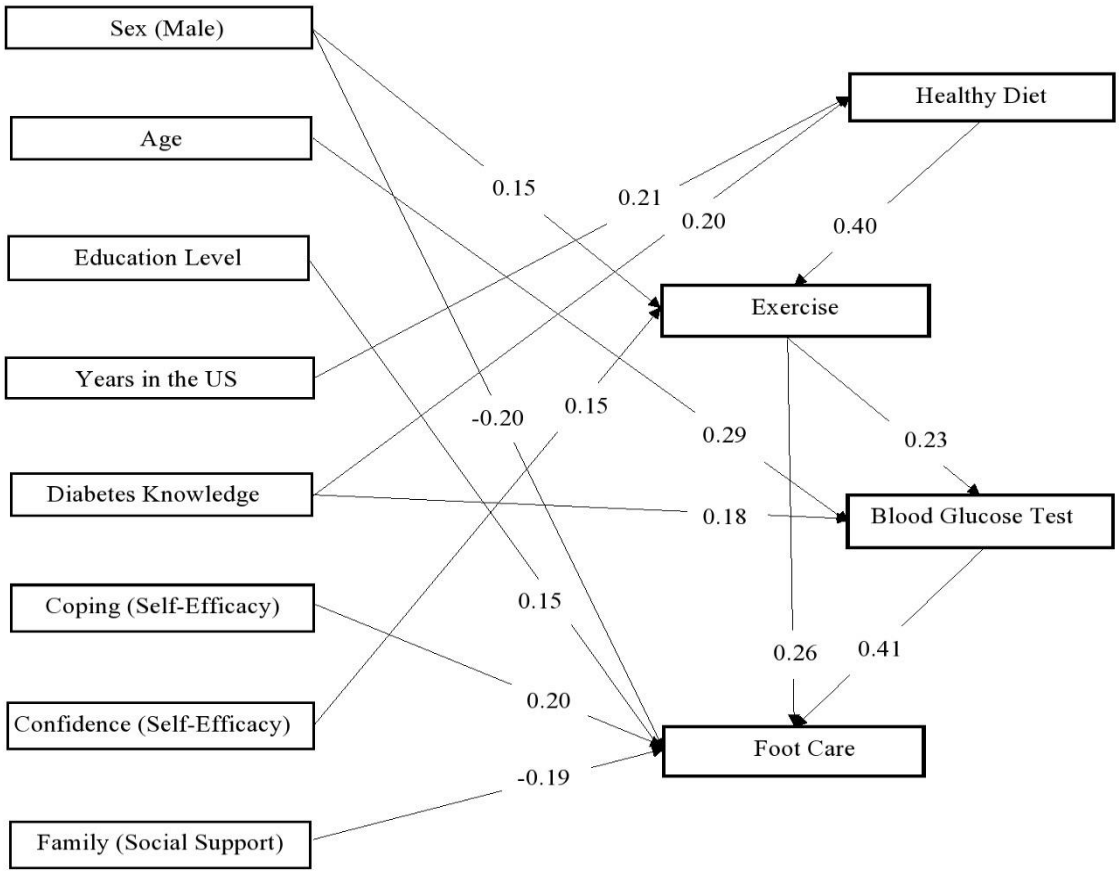
The final path model provided an excellent fit to the data (χ^2 (46)=57.26, p=.12), χ^2/df ratio=1.24, AGFI=0.90, GFI=0.96, ECVI=1.09, CFI=0.98, IFI=0.98, and RMSEA=0.04. The model explains 9% of the variance in healthy diet, 22% of the variance in exercise, 14% of the variance in blood glucose test, and 37% of the variance in foot care.

Standardized parameter estimates for the final path model are presented in Figure 14. As shown, healthy diet was predicted by years of residency in the U.S. (β=.21, p<.05) and diabetes knowledge (β=.20, p<.05). Exercise was predicted by sex (β=.15, p<.05), confidence (β=.15, p<.05), and healthy diet (β=.40, p<.05). Blood glucose test was predicted by age (β=.29, p<.05), diabetes knowledge (β=.18, p<.05), and exercise (β=.23, p<.05). Foot care was predicted by sex (β=-.20, p<.05), education level (β=.15, p<.05),

coping (β=.20, p<.05), family support (β=-.19, p<.05), exercise (β=.26, p<.05), and blood glucose test (β=.41, p<.05).

Figure 14

Path Model for Self-Care Activities Among Senior Korean Immigrants with Diabetes



Note. All paths are significant at p<.05 level.

Specifically, the final path model shows the direct and indirect effects between exogenous and endogenous variables. The sex (male) shows direct effect on exercise (0.15) and foot care (-0.20) and indirect effect on blood glucose test (0.035) and foot care (0.053) through exercise. Age shows direct effect on blood glucose test (0.29) and indirect effect on foot care (0.12) through blood glucose test. Years of residency in the

U.S. shows direct effect on healthy diet (0.21) and indirect effect on exercise (0.084), blood glucose test (0.019), and foot care (0.029). Education level (0.15), coping (0.20), and family support (-0.19) show direct effect on foot care. Confidence (self-efficacy) has direct effect on exercise (0.15) and indirect effect on blood glucose test (0.035) and foot care (0.053) through exercise. Diabetes knowledge shows direct effect on healthy diet (0.20) and blood glucose test (0.18) and indirect effect on exercise (0.081), blood glucose test (0.019), and foot care (0.103).

The final path model also shows the direct and indirect effects among endogenous variables. Healthy diet shows direct effect on exercise (0.40) and indirect effect on blood glucose test (0.093) and foot care (0.141) through exercise. Exercise has direct effect on blood glucose test (0.23) and foot care (0.26) and indirect effect on foot care (0.095) through blood glucose test. Blood glucose test has direct effect on foot care (0.41).

Summary of Results

Overall, the results of this study demonstrate the demographic characteristics of senior Korean immigrants with diabetes in the U.S. and the relationships and effects among related variables including demographics, self-efficacy, diabetes knowledge, social support, and self-care activities.

According to the EFA and CFA, the GSE scale, S-DKT, the LSNS-6, and SDSCA questionnaire are reliable for senior Korean immigrants with diabetes. The Cronbach's alpha of the GSE scale, S-DKT, the LSNS-6, and SDSCA questionnaire is .82, .70, .83, and .77, respectively. In the CFA, all the models show acceptable goodness-of-fit.

The multiple regression shows that diabetes knowledge is a predictor of healthy diet, exercise, and blood glucose test that belong to self-care activities. Additionally, age is a predictor of blood glucose test and foot care.

The path analysis examines the effects among 10 exogenous and five endogenous variables. The path analysis shows that there are direct and indirect effects among eight exogenous variables (sex, age, years in the U.S., education level, coping, confidence, diabetes knowledge, and family support) and four endogenous variables (healthy diet, exercise, blood glucose test, and foot care). However, annual income, friends support, and unhealthy lifestyle do not have significant relationship among the variables.

CHAPTER 5

DISCUSSION

This chapter provides (a) a summary of the study; (b) the interpretation and discussion of study results; (c) implications to research, practice, education, and policy; (d) strengths and limitations; (e) recommendations; and (f) conclusions.

This cross-sectional descriptive study explored self-care activities among Korean immigrants with diabetes living in the U.S. The integrated theoretical model, Orem's self-care deficit nursing theory, provided an organized and theoretically based approach for testing the relationships between the variables among this minority immigrant group. Moreover, this study examined socio-demographic factors related to self-care activities, including age, years of residency in the U.S., annual income, and education level. This study furthers our understanding of senior Korean immigrants' self-care activities and related factors, including self-efficacy, social support, and diabetes knowledge.

Reliability and Validity of Instruments

To assess the reliability and validity of the four instruments that were used in this study, Exploratory Factor Analysis (EFA), Cronbach alpha, and Confirmatory Factor Analysis (CFA) were conducted.

Reliability and Validity of the General Self-Efficacy (GSE) Scale

In this study, the reliability of the GSE was .82. It is higher than the Cronbach alpha of .75 in the original study of Schwarzer and Jerusalem (1993). However, the Cronbach alpha of .82 in this study is lower than the Cronbach alpha of .94 in the study of Luszczynska and Schwarzer (2005), which was conducted for patients with heart

diseases in Germany. Overall, the Cronbach alpha of .82 indicates that the GSE is reliable and valid for senior Korean immigrants with diabetes.

According to the original study of Schwarzer and Jerusalem (1993), the GSE has only one construct. However, the EFA of this study showed two constructs, confidence and coping. The Cronbach alpha of the subscales for confidence and coping was .56 and .84, respectively. Therefore, in future studies, it is recommended that the reliability and dimensions of the GSE are assessed with other samples.

The construct validity of the GSE was measured in many studies (Leganger et al., 2000; Schwarzer et al., 1999), and the GSE showed only one dimension (Scholz et al., 2002). However, the EFA in this study showed two constructs: confidence and coping. The confidence subscale included Q1, Q2, Q3, and Q4, while the coping subscale included Q5, Q6, Q7, Q8, Q9, and Q10. To examine the relationship between the manifest and latent variables of the GSE, CFA was used to test the goodness-of-fit of the hypothesized model that included the two constructs. The best goodness-of-fit was presented in Model C. According to Model C, the confidence construct is related to Q1 thru Q9, while the coping construct is related to Q1 thru Q10 except for Q3 and Q4.

Reliability and Validity of the Simplified Diabetes Knowledge Test (S-DKT)

This study translated the S-DKT from English to Korean based on WHO guidelines and validated the reliability and validity. In terms of whether this validation will be used in future studies for Koreans, this study has implications. The Cronbach alpha of the SDK in this study was .70, and it is similar to the Cronbach alpha of .71 in the validation study of Collins et al. (2010). The Cronbach alpha of .70 means that the S-DKT is reliable and valid for senior Korean immigrants with diabetes in the U.S.

In the study of Collins et al. (2010), construct validity was assessed by presenting corrected item-total correlations. They presented that corrected item-total correlations were > 0.2 for all items on the S-DKT and showed that the S-DKT was valid to measure diabetes knowledge. However, in the study of Collins et al. (2010), the dimensions of the S-DKT were not discussed.

However, this study conducted EFA to examine the constructs of the S-DKT and identified seven constructs. The primary investigator in this study named the seven constructs and measured the reliability of each construct. Among the seven constructs, the Cronbach alpha of the construct, "Blood Sugar" was .67, and the other six constructs' Cronbach alpha was lower than .60. Therefore, it is recommended to use the whole items of the S-DKT rather than dividing the items of the S-DKT. This study was not able to conduct the CFA, because the S-DKT is composed with a true-or-false answer format, which is a dichotomous question. The dichotomous answer format was not applicable to conduct CFA. This could be a limitation in conducting CFA with LISREL program.

Additionally, in the study of Collins et al. (2010), items 1, 13, 19, and 9 were the easiest items to answer, while items 5, 2, 6, and 20 were the most difficult to answer. On the other hand, in this study, items 4, 10, 6, 1, and 16 were the easiest, while items 20, 17, and 8 were the most difficult items for senior Korean immigrants in the U.S. It may mean that the difficulty among the items could be different depending on the sample's cultural and social backgrounds.

Reliability and Validity of the Lubben Social Network Scale-6 (LSNS-6)

The Cronbach alpha of the LSNS-6 in this study was .83, the same as the internal consistency in the study of Lubben et al. (2006) with a European sample. Additionally,

the Cronbach alpha of the Family (relative) subscale and Friends subscale was .83 and .86, respectively. It is also consistent with the Cronbach alpha of the subscales in the study by Lubben et al. (2006). In the study of Lubben et al. (2006), the Cronbach alpha of the Family (relative) subscale ranged from .84 to .89, whereas the Friends subscale ranged from .80 to .82. Overall, the LSNS-6 is reliable and valid for senior Korean immigrants.

Hong et al. (2011) developed the Korean version of the LSNS-6 and conducted CFA to examine the factor structures. The CFA of LSNS-6 Korean version yielded a very good model fit (χ^2=14.82, df=8, CFI=0.98, TLI=0.96, RMSEA=0.08).

This study also conducted CFA and found best goodness-of-fit in Model B (χ^2 (7)=56.69, p<.01), χ^2/df ratio=8.10, AGFI=0.75, GFI=0.92, ECVI=0.45, CFI=0.94, IFI=0.94, and RMSEA=0.19).

Reliability and Validity of the Summary of Diabetes Self-Care Activities (SDSCA) Questionnaire

The Cronbach alpha of the SDSCA was .77, higher than the Cronbach alpha of .66 in the study of Choi et al. (2011). Choi et al. (2011) examined the psychometric properties of a Korean version of the SDSCA questionnaire, and the EFA yielded nine items with a four-factor solution with the same labels for the original scales. In other words, Choi et al. (2011) excluded two items, item 4 and item 11, after conducting EFA, and, then, they conducted CFA to test goodness-of-fit. In the CFA of Choi et al. (2011), nine variables with a four-factor model showed the best goodness-of-fit.

EFA in this study yielded 11 items with four factors solution. It is not consistent with the original scales and the validation study of Choi et al. (2011). However, the CFA

in this study showed the best goodness-of-fit in Model E, which included nine items. The Cronbach alpha of the entire measure with nine items was .84, and the Cronbach alpha was higher than the Cronbach alpha of .77 for the 11 items.

Overall, Cronbach alpha in the 11 items and nine items measure was higher than .70, the acceptable range. SDSCA is reliable and valid for senior Korean immigrants with diabetes.

This study conducted CFA with 11 items and nine items. Finally, it showed best goodness-of-fit in the four-factor model with nine items as in the study of Choi et al. (2011). The four-factor model with nine items was Model E (χ^2 (16)=61.48, p<.01), χ^2/df ratio=3.84, AGFI=0.85, GFI=0.95, ECVI=0.63, CFI=0.96, IFI=0.96, and RMSEA=0.12).

Relationships Among Variables

Sex, Age, and Years of Residency in the U.S.

As shown in the correlation matrix, sex (male) has a significant positive relationship with annual income and education level, while it has a negative relationship with age. Consistent with previous literature, male participants are more likely to have higher annual income and higher education levels than female participants. Kim and Harris (2013) investigated determinants of self-rated health among older Korean immigrants and found that more female older Korean immigrants were in low monthly income than male immigrants. Mui (2001) examined social support on depressive symptoms among older Korean immigrants and also identified that male participants had higher education levels and monthly income than female participants. These study results

show that older female Korean immigrants are in more vulnerable socio-economic status than male Korean immigrants.

Age shows a significant negative relationship with annual income, education level, coping, diabetes knowledge, and friend support while showing a significant positive relationship with years of residency in the U.S. and blood glucose tests. It may mean that the older senior Korean immigrants are, the more likely they are to be in lower annual income, have lower educational level, lower coping, lack of diabetes knowledge, and lower friends' support. In other words, the older Korean immigrants are, the more vulnerable they are in performing self-care activities related to low socio-economic status. Notably, compared with immigrants who came to the U.S. at younger ages, late-age immigrants have lower incomes, higher supplemental security income (SSI), and lower rates of Social Security (O'Neil & Tienda, 2014).

Unlike other countries such as Australia and Canada, the United States does not consider age when determining eligibility for immigrants' admission. This policy allows many immigrants to come to the U.S. at a later age. Furthermore, older immigrants are highly susceptible to poverty, because they rely on their sponsoring family members rather than public assistance. Camarota and Zeinger (2019) reported that both legal and illegal immigrants come to the U.S. at older ages compared to the past. Over the last 2 decades, the average age of immigrants increased dramatically, and their old age is related to their lifetime fiscal impact. In terms of this trend, health care providers need to know the socio-demographic characteristics of their aged immigrant patients and provide adequate health care services.

Years of residency in the U.S. have a significant positive correlation with age, coping, confidence, and a healthy diet. It shows that the longer the participants reside in the U.S., the more they tend to have the coping ability with confidence and perform a healthy diet better. It is expected that, as the participants stay in the U.S. longer, they might receive health care information from their family, health care providers, or friends, and it affects their coping ability. Even if they are getting older, as they stay longer in the U.S., they are more likely to be confident and cope in their daily lives.

Annual Income and Education Level

Annual income shows a significant positive relationship with sex (male), education level, coping, confidence, diabetes knowledge, family support, and friend support, while annual income has a negative relationship with age. Economic status has been considered as one of the key health factors. For example, according to Kim and Harris (2013), older Korean immigrants with higher monthly income reported 4.7 times better self-rated health status than those with a low monthly income in the sample. Those with higher income and higher education levels are more likely to be independent and participate in more social activities. Furthermore, the correlation matrix demonstrates that higher economic status is associated with higher coping ability, confidence, and social support. In terms of female participants being in lower-income status than male participants, it should be considered that female older Korean immigrants have more vulnerability in coping with health issues.

Education level shows a positive relationship with sex (male), annual income, coping, confidence, and diabetes knowledge. Consistent with the relationship between annual income and other variables, education level also shows a similar relationship with

sex (male), coping, and confidence. Male older Korean immigrants have higher education levels, higher income, and higher self-efficacy (coping and confidence) than female older Korean immigrants. Those with higher education levels are more likely to gain health information than those with lower education levels. It is also related to self-efficacy, such as coping and confidence. Supporting this finding, Mawani and Gilmor (2010) reported that individuals with low education were the most likely to show fair or poor mental and general health.

Self-Efficacy

In this study, self-efficacy is explained by two manifest variables, coping and confidence. As the correlation matrix demonstrates, coping correlates with family support, confidence, years of residency in the U.S., annual income, diabetes knowledge, and friend support, while negatively correlated with age. At the same time, the other self-efficacy's manifest, confidence, is correlated with family support, exercise, years of residency in the U.S., annual income, education level, and coping. In summary, both coping and confidence are positively correlated with years in the U.S., annual income, and family support. In other words, the longer the senior Korean immigrants reside in the U.S., the more they have annual income and relative support, and they are confident and cope in their daily lives.

Mainly, in terms of the relationship between self-efficacy and family support, the result is consistent with the study of previous literature. Borhaninejad et al. (2017) identified a positive correlation between social support and self-efficacy on self-care. Specifically, Borhaninejad et al. (2017) reported that self-efficacy is correlated with self-

care and social support. The more family support senior Korean immigrants have with diabetes, the more they can cope and are confident performing self-care.

The positive correlation between coping (self-efficacy) and diabetes knowledge is also consistent with Qiu et al. (2020). In their study, Spearman correlation analysis showed that the self-efficacy score displayed a significantly positive correlation with diabetes knowledge score ($r=0.172$, $p<0.001$).

At the same time, confidence indicates a correlation with exercise. This result is coherent with Bandura's (1977) social cognitive theory, in which self-efficacy is a core construct to take actions such as self-care activities. As already mentioned in the literature review, none of the studies has been conducted for senior Korean immigrants with diabetes in the U.S. related to self-efficacy on self-care. Therefore, this result is worthy for understanding the senior Korean minority group's self-care activity with their self-efficacy.

There is no suggested cut-point score in the GSE scale to decide low and high self-efficacy. The total score just indicates that a higher score is more self-efficacy, ranging from 10 to 40. In this study, the mean score of the GSE is 29.74 (SD=3.68, range 19-40). The mean score of 29.74 is higher than 24.2 in the study of Qiu et al. (2020), which examines the association between diabetes knowledge and self-efficacy among adults with diabetes in China. It is also higher than the 25.6 of Long et al. (2021) that explored the mediating role of self-efficacy on perceived stress and quality of life among rural women with previous gestational diabetes in China.

Diabetes Knowledge

Diabetes knowledge is positively correlated with annual income, education level, coping, and healthy diet. Significantly, the relationship between diabetes knowledge and education level is consistent with previous studies (Abdo & Mohamed, 2010; Bukhsh et al., 2019; Jackson et al., 2014). In Bukhsh et al.'s (2019) study, diabetes knowledge was higher among university-level participants. Jackson et al. (2014) also identified that educational level was associated with disease knowledge. Therefore, for effective learning outcomes, health care professionals need to identify the senior minority group's educational level and provide appropriate health education. In addition, when health care professionals develop health care interventions, the intervention should be patient centered and outcome oriented.

It is noteworthy that this study identifies the positive correlation between diabetes knowledge and healthy diet self-care activity. The relationship between diabetes knowledge and self-care has been discussed in many previous studies (Bukhsh et al., 2019; Hartayu et al., 2012; Van der Heide et al., 2014; Kueh et al., 2015; McCleary-Jones, 2011; Wang et al., 2013). For example, Wang et al. (2013) found the statistical significance of diabetes knowledge to the HbA1c value, an indicator of effective self-care among Asian Pacific Islanders with Type 2 Diabetes. As Wang et al. (2013) mentioned, underserved populations face more challenges to perform self-care related to language barriers, cultural, and social barriers. If they do not have proper diabetes knowledge, they cannot perform self-care activities effectively.

Additionally, the average score of diabetes knowledge measured by the S-DKT was 59 out of 100. The score was lower than 66 in the Collins et al. (2010) study that surveyed adult patients with diabetes in England.

Social Support

Social support was measured by two manifest variables, family (relative) support and friends' support. According to the correlation matrix, family support is positively correlated with annual income, coping, confidence, friends' support, and a healthy diet. In contrast, friends support is positively correlated with annual income, coping, and family support and negatively correlated with age. According to previous studies, there are various types of social support, including family, friends, relatives, and support from health care providers or the community. However, most previous studies examine family and friend support as the primary social support.

Particularly, the present study identifies that family support and friends' support are correlated to each other. It may mean that the more family support senior Korean immigrants receive, the more friends support they might receive. Furthermore, family support is correlated with a healthy diet self-care activity in this study. This positive relationship between social support and a healthy diet is consistent with previous literature (Rosland et al., 2014; Surucu et al., 2018; Werfalli et al., 2020). Rosland et al. (2014) examined social support's association with self-care among racial/ethnic minority groups in the U.S. They identified that high social support was significantly associated with a healthy eating lifestyle. Culturally, a family is an essential resource for the Korean immigrant group. Senior Korean immigrants rely on their families. Generally, family support plays a crucial role in managing chronic illness. Supporting this, Kristianingrum

et al. (2018) also reported that family support was the principal support source for older adults, and the support included daily activity assistance, food preparation, financial support, attention, guidance, assistance with obtaining health services, and problem solving.

The LSNS-6 total scores range from 0 to 30, a high score meaning an extensive social network. The total scale score is an equally weighted sum of the six items. In clinical cut points for the LSNS-6, Lubben and colleagues (2006) consider individuals with a score of less than 12 as socially isolated. In this study, the mean of the LSNS-6 total score is 13.81 out of 30 (SD=5.57, range 0–29). The mean score of 13.81 is slightly lower than 14.91 in the study of Hong et al. (2011), who conducted surveys with caregivers of older Korean immigrants in the U.S.

Only family and friends' support were examined as social support in this study. However, there are various types of social support, such as economic support, information support, and psychological support. Moreover, the relative (family) support also can be further specified, such as support from sons, daughters, spouses, cousins, or nephews. Therefore, the specified support needs to be examined on self-care activities for senior immigrant groups in future studies.

Self-Care Activities

There are various types of self-care activities in managing diabetes. Among the various self-care activities, a healthy diet, exercise, regular blood glucose test, and foot care are crucial. This study used the SDSCA questionnaire to examine self-care activities among senior Korean immigrants with diabetes. The instrument includes the four major self-care activities. According to the correlation matrix, the four types of self-care

activities are correlated with each other. In other words, individuals who engage in a healthy diet are more likely to perform other types of self-care activities such as exercise, blood glucose tests, and foot care.

Especially among independent variables, diabetes knowledge was correlated with a healthy diet and exercise. The more diabetes knowledge the participants have, the more effectively they perform healthy diets and exercise. If they perform a healthy diet and exercise, it will positively affect glucose levels. Phillips et al. (2018) identified that participants with higher diabetes knowledge had lower A1C levels. Particularly, they found a significant association between diabetes knowledge and the presence of retinopathy. Regarding the association between diabetes knowledge and self-care activity, health care professionals are responsible for providing health education for them to have adequate diabetes knowledge.

Many previous studies have reported that lack of diabetes knowledge is one of the barriers in self-care among older adults (Aponte & Nokes, 2017; Grzywacz et al., 2011; Joo & Lee, 2016; Laursen et al., 2017; Shen et al., 2013). Older ethnic minority immigrants are marginalized in receiving adequate diabetes knowledge. As they age, they have difficulty reading materials, finding accurate information, and understanding information. Furthermore, ethnic immigrants who have another mother language experience more challenges in receiving diabetes knowledge. In terms of that, diabetes knowledge is one of the key facilitators in self-care activities. Health care professionals need to develop health education and culturally tailored interventions for older ethnic immigrants with diabetes.

Predictors of Self-Care Activities

This study examined self-care activities with five manifest variables: healthy diet, exercise, blood glucose test, foot care, and unhealthy diet. Among the five dependent variables, healthy diet, exercise, and blood tests were predicted by diabetes knowledge. This result is consistent with the previous literature (Kueh et al., 2017; Wang et al., 2013). Kueh et al. (2017) examined self-care activities using the same instrument, the Summary of Diabetes Self-Care Activities questionnaire. They found that diabetes knowledge was a significant predictor of blood tests and foot care. Wang et al. (2013) also used the Summary of Diabetes Self-Care Activities questionnaire to determine the relationship between diabetes knowledge and self-care activities. The study reported a significant relationship between diabetes knowledge and general diet.

Because healthy diet, exercise, and blood tests are the essential parts of diabetes self-care, the result that diabetes knowledge is a predictor of those kinds of self-care activities is a significant implication in this study. Specifically, the Simplified Diabetes Knowledge Test includes primary diabetes-related knowledge such as blood tests, complications prevention, cholesterol, neurological symptoms, and cardiovascular health. If patients are knowledgeable about this information, they are likely to perform practical self-care activities.

In addition, age is a predictor of blood glucose test (β=0.223, t=2.504, p=0.013) and foot care (β=0.195, t=2.137, p=0.034). In other words, the older senior Korean immigrants with diabetes are, the more they monitor blood glucose levels daily as self-care activities. This study cannot answer the reasons or factors why the older Korean immigrants monitor glucose levels more often as they age. Additionally, in terms of age

being a predictor of foot care, it can be assumed that the older a person is, the greater the need for foot care. Future studies need to examine the related factors and causes regarding the prediction of age on blood glucose test and foot care.

Path Analysis

The path model demonstrates the overall relationships and effects among the exogenous and endogenous variables. The path diagram shows the effects of three demographics, coping, confidence, diabetes knowledge, family support, on four kinds of self-care activities, including a healthy diet, exercise, blood glucose test, and foot care among senior Korean immigrants with diabetes in the U.S.

According to previous literature, there are various types of self-care activities to manage diabetes. However, it is undeniable that blood glucose tests, exercise, a healthy diet, and foot care are essential in optimal self-care. The path model includes the major self-care activities. It is a meaningful implication that this study generates the path model to explain the direct and indirect effects on the related variables.

First, a healthy diet is affected by diabetes knowledge and years of residency in the U.S. directly. This study's correlation matrix has also demonstrated a positive relationship between diabetes knowledge and a healthy diet. A healthy diet might mean changes from the previous diet to a new diabetic diet for people with diabetes. They must have a strong willingness, patience, and strategy to change their diet pattern. Especially for ethnic immigrants, the diet changes might be more stressful in foreign countries. While they want to keep their cultural identity with traditional dishes, they might give up or adjust their traditional diet to control sugar levels. Ethnic immigrants with diabetes have more challenges to perform healthily. In terms of that diabetes knowledge affects a

healthy diet, health care providers should develop and provide culturally sensitive diet education programs to ethnic minority immigrants. The effect of years in the U.S. on a healthy diet needs to be examined in future studies.

Secondly, the path model shows exercise is directly affected by confidence (self-efficacy subscale), sex (male), and healthy diet. The positive relationship between self-efficacy and exercise has been discussed in much previous literature (Heiss & Petosa, 2016; Rachmah et al., 2019; Vanden Bosch et al., 2015). “Self-efficacy” was often defined based on Bandura’s (1977) social cognitive theory. Self-efficacy is an individual’s capabilities to take actions required to attain designated performance such as an exercise. To actively participate in specific behaviors such as exercise, confidence, coping abilities, and a positive attitude are needed. The effect of confidence on exercise in the path model is consistent with previous studies. On the other hand, the effect of sex on exercise needs to be examined more in future studies. Vanden Bosch et al. (2015) reported that specific demographics such as age, race, marital status, educational level, income, and employment status influence exercise for adults with diabetes. However, the effect of sex on exercise is understudied. Future studies need to examine the effect of gender differences on exercise for senior ethnic immigrants.

Thirdly, diabetes knowledge, age, and exercise directly affect blood glucose tests in the path model. Among diverse types of self-care activities for diabetes, regular monitoring of glucose levels is one of the critical activities. Uncontrolled glucose levels can lead to kidney failure and vascular and heart disease complications. Regular glucose test prevents complications resulting from hypo or hyperglycemia. According to the path model, diabetes knowledge and exercise affect the blood glucose test, and the glucose test

directly affects foot care. It can be assumed that the more diabetes knowledge they have, the more they check their glucose levels. At the same time, they are more likely to perform foot care. The linkage between diabetes knowledge, blood glucose tests, and foot care helps health care providers to understand and develop effective diabetes education and health care plans.

Fourth, foot care is directly affected by sex, education level, coping, family support, blood glucose test, and exercise. Like the effect of confidence (self-efficacy subscale) on exercise, coping (self-efficacy subscale) directly affects foot care. One of the most severe complications in diabetes with a high mortality rate, prevalence, and cost is the diabetic foot (Gökdeniz & Akgün Şahin, 2022). However, despite the importance of foot care, it has been determined that individuals with diabetes have a lower rate in daily foot examination, hygiene of the foot, protection from traumas, correct selection of footwear, and referrals to foot experts (Gökdeniz & Akgün Şahin, 2022). Previous literature reported that lower diabetes knowledge is related to severe foot problems. However, in this path model, instead of diabetes knowledge, education level directly affects foot care. Interestingly, family support and sex (male) have a negative effect on foot care. It can be assumed that participants who have more family support are less likely to perform foot care. Also, male participants are less likely to perform foot care. The negative effects of family support and sex (male) on foot care need to be examined in future studies.

Overall, the path model provides reciprocal effects among the exogenous and endogenous variables and helps health care providers identify related factors on self-care

activities among senior Korean immigrants with diabetes. Also, the path model may be utilized for other ethnic groups with diabetes.

Study Implications

Education

This study has significance in nursing education in providing important information about the relationship between socio-demographic, self-efficacy, knowledge, and social support on self-care activities among senior Korean immigrants with diabetes. For the past 2 decades, the number of aged immigrants has increased in the U.S., continuing the trend. Thus, nursing educators must be knowledgeable about the unique characteristics of older ethnic immigrants and the related self-care factors among minority groups. Nursing students also need to be educated about distinct cultures, values, and health beliefs that affect the health of aged minority immigrants to provide adequate health service. This study's results help nursing educators and students better understand vulnerability and related factors on self-care among senior Korean immigrants with diabetes. Additionally, this study applied Orem's self-care deficit nursing theory as a theoretical framework. The application can be used in nursing classes as an example of the utilization of nursing theories.

Research

The findings of this study provide a basis for further understanding self-care activities and related factors among senior Korean immigrants with diabetes in the U.S. The GSE scale, S-DKT, the LSNS-6, and the SDSCA questionnaire were validated and may be used for future research. Notably, this study has contributed to the translation of the Simplified Diabetes Knowledge Test (S-DKT) that could be used by other nurse

researchers who have an interest in the diabetes knowledge of Koreans. Based on the findings of this study, nurse professionals and nurse researchers can develop culturally sensitive and patient-centered health care plans.

At the same time, this study supports the need for further research related to unique factors on self-care activities among senior Korean immigrants. The majority of the sample in this study had a college or higher degree than bachelor's degree (n=139, 73.1%). However, despite the high educational level, the average score of diabetes knowledge was 59 out of 100, lower than the 66 in Collins et al.'s (2010) study. Future research needs to examine diabetes among senior Korean immigrants again with other instruments measuring diabetes knowledge.

Furthermore, this study generated a path model that describes direct and indirect effects among demographics, self-efficacy, diabetes knowledge, social support, and self-care activities. The path analysis may be used to evaluate how well the model fits and determine if the model can be employed in other populations.

Practice

This study provides evidence to health care professionals in terms of evidence-based practices. EBP in nursing includes three essential parts: best evidence, patient preference and values, and clinical expertise (Polit & Beck, 2018). This study's results can be utilized as best evidence and guide health care professionals to decide courses of care for senior Korean immigrants with diabetes. This study found that diabetes healthy diet, exercise, and blood test were predicted by diabetes knowledge among senior Korean immigrants with diabetes. At the same time, according to the correlation matrix, diabetes knowledge has a significant positive relationship with a healthy diet and exercise. The

impact of diabetes knowledge on self-care activities should be concerned when health care professionals build and develop care plans for ethnic minority immigrants.

While individuals need to be responsible for their self-care, health professionals should also offer advice, provide sufficient knowledge, and suggest effective strategies for maintaining optimal health conditions. Conducting self-care activities is not easy for people, especially older adults with different languages and cultural backgrounds. Thus, health care professionals need to be knowledgeable about socio-demographic characteristics of ethnic minority immigrants in education, support, and developing interventions. Health care professionals should recognize the unique needs of ethnic minority immigrants and need to promote ethnic immigrants' facilitation of feasible self-care agency such as family support, friends support, and knowledge.

Policy

The findings of this study empower health care professionals to bring awareness of health barriers and facilitators among senior Korean immigrants. Diabetes is a chronic disease and needs long-term care plans. The ideal goal in managing diabetes is to prevent complications and maintain optimal health status rather than eliminate the disease. Thus, individuals with diabetes need to be supported by community-based health services like long-term care. With an increase of immigrant populations in the U.S., health care professionals and legislators need to recognize high-risk factors for aged ethnic immigrants and try to provide adequate health care services and resources. The development of culturally sensitive interventions is essentially required to lessen health vulnerability and improve the quality of life among ethnic immigrants. To initiate new

health care services for ethnic immigrants, the evaluation of health care policy and strategies for ethnic immigrants should be prioritized at the state and federal levels.

Previous literature has been reporting health disparities among immigrants in the U.S. It is evident that undocumented and legal immigrants have lower health insurance rates and face more challenges than U.S.-born populations. Health policies are required to expand access to health insurance and community-based health care services. Funding for community health care centers should be increased, and culturally competent health care professionals need to help immigrants navigate trusted health care sources and programs. The results from this study show impacts of diabetes knowledge and social support on self-care activities among senior Korean immigrants. The results can be practical evidence when community activists and legislators establish health policies and laws. In terms of poor access to health care and public health systems causing negative implications for the health of immigrants, health policies and systems should be well equipped.

Strengths of the Study

This study has several worthy strengths. First, this study generated a Korean version of the Simplified Diabetes Knowledge Test (S-DKT) based on WHO guidelines and validated the instrument's psychometric properties. The Korean version of the S-DKT will be used for future researchers interested in the diabetes knowledge of Koreans.

Secondly, this study measured the psychometric properties of the four instruments, the GSE scale, the S-DKT, the LSNS-6, and the SDSCA questionnaire. Future studies will be able to use the reliabilities and validities of this study in comparison with their findings.

Thirdly, this study conducted a path analysis and generated a path model to demonstrate direct and indirect effects and relationships among variables. The pathways help health care providers to identify the related factors on self-care activities among senior Korean immigrants with diabetes and utilize the path model to other ethnic groups with diabetes.

Lastly, this study focused on an underrepresented ethnic immigrant group, particularly the senior group. Thus, the findings of this study can be used in understanding the minority group and in developing health care services and policies in the U.S.

Limitations

Due to the Covid-19 pandemic, most of the responses were collected through an online survey. Elderly Korean immigrants who have difficulty using mobile phones or computers may have been missed. Therefore, the findings in this study may not be representative of all senior Korean immigrants with diabetes in the U.S.

Furthermore, even though a larger sample size is more appropriate for a complex model, due to the Covid-19 pandemic, the actual sample size in this study was 190. The small sample size is one of the limitations in interpretation of this study.

Regarding the Simplified Diabetes Knowledge Test (S-DKT), the drawback of the S-DKT is that it measures limited diabetes knowledge. Even though the instrument includes 20 items that measure the level of diabetes knowledge, it missed some essential diabetes knowledge that individuals with diabetes should know. For example, normal and abnormal glucose levels, symptoms of hypoglycemia or hyperglycemia, and precautions about taking medications are essential pieces of knowledge in managing diabetes.

However, the items of the S-DKT do not include vital diabetes knowledge. Therefore, the score measured by the S-DKT should be interpreted with caution.

Recommendations

This study examined the relationship between sociodemographic, self-efficacy, diabetes knowledge, social support, and self-care among senior Korean immigrants with diabetes in the U.S. However, besides those variables, there are also other important factors related to diabetes self-care. For example, with diabetes knowledge, health literacy is also one of the crucial factors that affect self-care among senior Korean immigrants with diabetes. Most senior Korean immigrants have a language barrier. Therefore, it may cause low health literacy and low diabetes knowledge.

The difficulty of acculturation and culture conflict may cause vulnerability in mental health among senior immigrants. Moreover, many senior Korean immigrants come to the U.S. at a later age, so they face more challenges related to acculturation and cultural conflict with adult children. Future studies need to continue exploring and examining other unique factors that affect self-care activities among ethnic senior minority immigrants.

Additionally, future research needs to examine various types of social support related to the self-care of diabetes. This study only measured family and friends' support; thus, other types of social support need to be investigated related to self-care activities of diabetes.

Conclusion

This study examined the relationships and effects among socio-demographics, self-efficacy, diabetes knowledge, social support, and self-care activities among senior

Korean immigrants with diabetes. Mainly, this study assessed self-care activities with five aspects, including healthy diet, exercise, blood glucose test, foot care, and unhealthy lifestyle. From a regression and path analysis, this study showed that four types of self-care activities, healthy diet, exercise, blood glucose test, and foot care, have direct and indirect effects with socio-demographic variables such as sex, age, years of residency in the U.S., and educational level. The self-care activities are also influenced by diabetes knowledge, self-efficacy (coping and confidence), and family support.

The GSE scale, the S-DKT, the LSNS-6, and the SDSCA questionnaire are valid and reliable scales for U.S. senior Korean immigrants with diabetes. The path model demonstrates the relationships and effects among the related self-care variables and provides a better understanding of self-care among senior Korean immigrants with diabetes. The findings of this study can be utilized in future nursing research, education, and practice and to initiate the development of health policies for ethnic minority immigrant groups.

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APPENDIX A: TABLES OF EVIDENCE

Table 25

Studies of Self-Care Among Korean Immigrants with Diabetes

Author	Purpose	Design	Sample	Measurement	Result
Cha et al., 2012	To explore potential factors affecting the self-care behaviors of Korean immigrants with T2DM	A qualitative descriptive study	N=20, Female=11, male=9Age range: 37-77years, Atlanta, Georgia, U.S.	Face to face interview, 45 to 60minutes semi-structured interviews	Identified three major ideas: (1) issues on treatment regimen related to medications & diet (2) resources that helped or hindered their ability to manage diabetes (3) physician-patient relationship
Choi et al., 2014	To identify domains of spousal support in diabetic self-care	Focus group, a qualitative study	Five focus groups, Korean immigrants in Orange County, U.S., Mean age: 68.1(pt), 74.4 (spouses)	Audiotaped, transcribed, and translated	Six domains identified: diet, exercise, emotional support, medical regimen, communication with clinicians, & information. Diet was the most frequently described across all groups. Individualizing spousal support and recognizing diabetes management as teamwork is an important element of successful spousal support.
Choi and Ruch, 2012	To assess the effectiveness, feasibility, & culturally tailored, community-based diabetes self-management program for Korean immigrants with T2DM	A single-group pretest & posttest design	N=41, Korean immigrants with T2DM on the West Coast, U.S., Mean age: 70 years of age (30-87 years), 53% female	SDSCA, Diabetes Knowledge Test, Self-efficacy scale, PHQ-9 for Mood, HbA1c	After 3 months intervention, patients exhibited significant improvement on behavioral & physiological measures. A1c & waist circumference decrease, while high-density lipoprotein decreased. Patients reported increase feet checks and frequency of exercise activities. The feasibility of the intervention was established.
Joo and Lee, 2016	To explore barriers & facilitators of diabetes self-care among Korean senior immigrants with T2DM	A qualitative study	N=23, Female=11, male=12, Mean age: 68.5±2.5 Midwest in the US	Three focus groups & five individual interviews, digitally recorded, transcribed verbatim & translated	Five perceived barriers: the high cost T2DM care, language barriers, loss of self-control, memory loss, & limited access to healthcare resources. Three facilitators: time, seeking information, & family & peer supports
Nam et al., 2013	To examine challenges in diabetes self-care among Korean immigrants to guide clinicians in providing	A qualitative study	N=23, Five focus groups, mean age: 58.5±7.3, male=14. U.S.	Open-ended questions focusing on previous experiences in living with diabetes	Most patients were reluctant to disclose diabetes due to social stigma and did not have proper diabetes knowledge. Diabetes self-care is not always a top priority for their life due to family obligation or financial status. They experience conflicts with family

Author	Purpose	Design	Sample	Measurement	Result
	culturally tailored diabetes care				members in managing diabetes. Traditional women's roles seem to leave Korean women vulnerable to a lack of self-care.

Table 26

Studies of Self-Efficacy Among Korean Immigrants with Diabetes

Author	Purpose	Design	Sample	Measurement	Result
Bohanny et al., 2013	To explore the relationships among health literacy, self-efficay, & self-care of patients with T2DM	Cross-sectional study with a descriptive correlational design	N=150, a public DM clinic in the Marshall Islands	S-TOFHLA (Baker et al.,1999) used for health literacy. DMSES used for self-efficacy. SDSCA for self-care	Diabetes education & health literacy were positively correlated with self-efficacy. In regression, health literacy, diabetes education, & employment status explained 11.8% of the variance in self-efficacy, In the regression, self-efficacy and marital status together explained 16.7% of the variance in self-care ($F(2,148)=15.95$, $p<.001$)
Borhaninejad et al., 2017	Examine association b/t social support & self-efficacy with self-care in senior with diabetes	Observational cross-sectional population-based survey	N=374 (female=226, male=148), senior (≥60years) with diabetes, Kerman city, Iran	Self-care: SDSCASocial Support: multidimensional scale of perceived social support Self-efficacy: diabetes management self-efficacy scale	Positive and significant correlation of social support & self-efficacy with self-care. The independent variables accounted for 44.3% of the variance in self-care.
Chang et al., 2012	Evaluate the psychometric properties (reliability&validity) of the Korean version of DM self-efficacy Scale among Korean older adults with T2DM	Psychometric test	N=278 older adults with T2DM, South Korea	The Diabetes Self-Efficacy Scale by the Stanford Patient Education Research Center (1996); The Korean version of SDSCA by Toobert et al. (2000)	Cronbach's alpha=.89, The Kaiser-Meyer-Oklin=.88, the Bartlett's test of sphericity was statistically significant ($\chi^2=1183.96$, $p<.01$),

Author	Purpose	Design	Sample	Measurement	Result
Cherrington et al., 2010	To examine associations b/t depressive symptoms, self-efficacy, & glycemic control among men & women with T2DM	A cross-sectional study with correlational & meditational analyses	N=162, female=98, male=64, two clinics in Vanderbilt university hospital & University of North Carolina, USA	The Perceived Diabetes Self-Management Scale (PDSMS) for self-efficacy, the Center for Epidemiologic Studies Depression (CES-D) for depression	For males, there was a significant correlation b/t depressive symptoms and DM self-efficacy, but not significant for females. Both depression and self-efficacy were correlated with glycemic control for males, not females.
DePalma et al., 2015	To investigate how AI/ANs' attitudes & beliefs influence how they manage diabetes with particular attention.	A descriptive study. Structural Equation Modeling and our inferential analyses.	N=117, American Indian or Alaska Native, USA	Multidimensional Diabetes Questionnaire (MDQ) for self-efficacy, The Diabetes Family Behavior Checklist for social support, SDSCA for DM self-care	Diabetes self-efficacy was strongly related to DM management.
Hunt et al., 2012	To examine whether social support & social-problem-solving were mediators of the relationship between self-efficacy & diabetes self-management behaviors in rural Alabamians with T2DM	A descriptive, correlational design	N=152, Aged from 19 to 81, African American 58.6%, Female 65.8%, USA	Diabetes self-efficacy scale was used. SDSCA	Self-efficacy was found to be a strong predictor of the diabetes self-care. The effects of social support on DM self-care differed b/t men & women. Social support & social problem-solving were significantly associated with DM self-care in men. Social support & social problem-solving were not mediators of relationship b/t self-efficacy & self-care.
Liu, 2012	Concept analysis of self-efficacy in senior with diabetes in China	Systematical literature review	31 articles were reviewed	The search terms *self-efficacy, diabetes, type2, aged, self-care, & China*	4 attributes of self-efficacy were identified: (a)cognitive recognition of requisite specific technique & skill required to DM self-care,(b) perceived expectations of self-care, (c) confidence in the capability to perform self-care,(d) sustained efforts in self-care of DM
Malanda et al., 2016	To investigate the effects of self-monitoring of BS in	Three-armed randomized controlled	N=181, the Netherlands	The Dutch validated version of the Problem Areas in Diabetes scale (PAID) for	There were no statistically significant between-group differences in changes in PAID and CIDS-2 after12 months.

Author	Purpose	Design	Sample	Measurement	Result
	blood or urine, on DM distress and self-efficacy, compared with usual care in people with T2DM	trial, three groups comparison, blood self-monitoring (n=60), urine self-monitoring (n=59) or usual care(n=62).		DM specific distress, the Confidence in Diabetes Self-Care questionnaire (CIDS-2) for self-efficacy.	
Messina et al., 2018	To adapt the English version to Italian & to evaluate the psychometric properties of the Italian version of DMSES in type 2 diabetes (IT-DMSES).	A cross-sectional study	N=165, patients with T2DM, Female=55, male=110, Italy	Psychometric testing including construct validity (principal component analysis), internal consistency (Cronbach's α coefficient) & convergent/discriminant validity (Spearman's correlation coefficient).	IT-DMSES's validity and reliability were validated.
Olson and McAuley, 2015	Test the efficacy of a brief intervention on self-efficacy & self-regulation to increase physical activity in older adults with T2DM	Intervention study	N=116 (female=75, male=41), USA	Physical activity: accelerometry Self-efficacy: Barrier-specific Self-Efficacy Scale/ Walking self-efficacy Self-regulation: Physical activity Self-Regulation Scale(PASR-12)	The intervention is effective at increasing physical activity levels. The intervention had strongest effects on self-efficacy. Change in self-efficacy & self-regulation were associated with physical activity post-intervention.
Osborn et al., 2010	To describe the association b/t health literacy, numeracy, & self-efficacy in patient with diabetes and predicted pathway linking health literacy, numeracy, & self-	Cross-sectional study	N=383, Diabetes clinics at three medical centers, Tennessee, USA	Perceived diabetes self-management scale (PDSMS) was used. The Rapid Estimate of Adult Literacy in Medicine (REALM) for health literacy. Wide Range Achievement Test for Numeracy.	Health literacy & numeracy is directly associated with self-efficacy and indirectly with glycemic control.

Author	Purpose	Design	Sample	Measurement	Result
	efficacy to glycemic control				

Table 27

Studies of Diabetes Knowledge Among Korean Immigrants with Diabetes

Author	Purpose	Design	Sample	Measurement	Result
Bukhsh et al., 2019	To explore the relationship of knowledge with glycemic control and self-care in diabetes	A cross-sectional study	N=218, Female=106, male=112, Pakistani people with diabetes, Pakistan	Diabetes Knowledge Questionnaire (DKQ), Diabetes Self-Management Questionnaire (DSMQ)	Diabetes knowledge was significantly associated with patient's gender, level of education, family history of diabetes, and glycemic control. In correlation matrix, DKQ is strongly positive with DSMQ (r=0.63, p<.001).
Goncalves et al., 2017	To analyze knowledge of people with T2DM in five family	A cross-sectional study	N=222, Female=148, Male=74, Brazil	Diabetes Knowledge Test Questionnaire (DKN-A)	The mean DKN-A score was 11, indicating satisfactory knowledge regarding diabetes.
Hartayu et al., 2012	To improve diabetic knowledge, attitude & self-care by implementing CBIA-DM	A time series pre & post quasi-experimental with control groups design	N=90, intervention grou*p*=30, DM club=30, normal care=30, Indonesia	Community Based Interactive Approach (CBIA) intervention	CBIA group showed increasing in good level of knowledge, significantly improve attitude, and adherence to self-care.
Van der Heide et al., 2014	To examine the relationship b/t health literacy & self-care and diabetes knowledge's mechanism in the association.	A cross-sectional study	N=1714, based on data retrieved from patient registrations, Netherlands	Diabetes Knowledge Test (Fitzgerald et al., 1998). Glucose self-control, glucose level, physical activity, smoking, & HbA1c (5indicators) for level of self-care	More diabetes knowledge were less likely to smoke, more likely to control glucose. Diabetes knowledge was a mediator in the association b/t health literacy and glucose self-control and b/t health literacy and smoking.

Hu et al., 2012	To explore the relationship of diabetes knowledge, self-care, demographic, & clinical variables	A descriptive correlational study	N=108, Beijing, China	DKQ (Garcia et al., 2001), SDSCA (Toobert et al., 2000)	Age & systolic BP were negatively associated with diabetes knowledge. Knowledge was not related to self-care activities or glucose level. In regression, education & clinical variables significantly predicted diabetes knowledge, 29% of the variance in knowledge. Family history of diabetes, visit of TCM and attending diabetes edu-program were more likely to have high knowledge.
Jackson et al., 2014	To assess the knowledge of self-care practices, factors responsible for knowledge among T2DM patients	A cross-sectional, descriptive study	N=303, Female=171, male=132, Nigeria	Diabetes Self-Care Knowledge (DSCK-30)	The majority, 241(79.5%) had a high (70% over) overall knowledge level about self-care, while the rest (20.5%) low overall knowledge. Self-care knowledge was associated with level of education, monthly income, & duration of diabetes.
Kueh et al., 2015	To examine a model describing the relationship b/t diabetes knowledge, attitudes, self-care, & QOL with T2DM	A cross-sectional study	N=291, female=99, male=192, Australia	Diabetes Knowledge Test, Diabetes Integration Scale-19 for attitude, SDSCA, DQoL	Diabetes knowledge was a significant predictor for attitudes & self-care in terms of blood glucose testing. Self-care in blood glucose testing was a significant predictor of impact of QoL, and self-care in diet was a significant predictor of impact of QoL.
Kueh et al., 2017	To examine the effect of diabetes knowledge & attitude on self-care & QoL of people with T2DM	A cross-sectional study, path analysis	N=266, female=137, male=129, Malaysia	Diabetes Knowledge Test (DKN), SDSCA, DQoL, Diabetes Integration Scale-19 for attitude	Diabetes knowledge was not a significant predictor for either satisfaction or impact related to QoL of T2DM.
McCleary et al., 2011	To examine health literacy and the association with diabetes knowledge, self-efficacy, & self-care	A descriptive correlational study	N=50, female=38, male=12 Midwest, USA	Diabetes Knowledge Test (DKT), SDSCA, health literacy (REALM), Diabetes self-efficacy scale	Health literacy was positively associated with diabetes knowledge (r=.506, p=.000). Diabetes knowledge was positively associated with Dietary self-care activities (r=.299, p=.035).
Phillips et al., 2018	To identify the relationship b/t diabetes knowledge & glycemic control	A descriptive study	N=17, female=7, male=10, USA	Michigan Diabetes Knowledge Test (MDKT), A1C level	The patients who had not received education scored 15.3% lower on diabetes knowledge and had an average A1C 0.89% higher than those who had education. But, this was not statistically significant. There was a significant association b/t knowledge & presence of retinopathy.

Wang et al., 2013	To determine the relationship among self-care knowledge, A1C, & Total cholesterol	A descriptive cross-sectional study	N=78, Hawaii, USA	DKA was a revised scale from the Diabetes Self-Management Record.	There is significance b/t self-care & diabetes knowledge, but not significant b/t knowledge & total cholesterol.

Table 28

Studies of Social Support Among Korean Immigrants with Diabetes

Author	Purpose	Design	Sample	Measurement	Result
Borhaninejad et al., 2017	To examine association b/t social support & self-efficacy with self-care in senior with diabetes	A cross-sectional study	N=374, Senior with diabetes, Mean age:67.0 Iran	Multidimensional scale of perceived social support questionnaire, SDSCA, Diabetes management self-efficacy scale.	67.37% of participants were classified as poor adherence to diabetes self-care behaviors. In Pearson's correlation, there was a positive and significant correlation b/t social support & self-care (r=.456, p<. 01).
Bouldin et al. 2017	To determine the association b/t informal caregiver, social support, & self-care among adults with diabetes	A cross-sectional study	N=253, Mean age: 51.1 (no caregiver group), 53.5 (caregiver group) USA	Four-item social support subscale of the Multidimensional Diabetes Questionnaire, SDSCA	Social support score was associated with better medication adherence and healthy eating (OR=1.22, 95% CI:1.03-1.45, p<.05). Having informal caregiver was significantly more likely to report moderate or high medication adherence. (OR=1.93, 95% CI:1.07-3.49, p<.05).
Choi et al., 2015	To identify domains of spousal support in diabetic self-care	Focus group, a qualitative study	Five focus groups, Korean immigrants, age 60 or older, Mean age: 68.1(patients), 74.4 (spouses)	Audiotaped, transcribed, and translated	Six domains: diet, exercise, emotional support, medical regimen, communication with clinicians, & information. Diet was the most frequently described in all groups. Individualizing spousal support and recognizing DM management as teamwork is an important element of successful spousal support.
Koetsenruijter et al., 2016	To explore which aspects of social network are related to self-care capabilities	A cross-sectional study	N=1692, Mean age: 66.1 Six European countries	Health education impact questionnaire (HeiQ) used-self-care capabilities	More network members providing informational or emotional support, and participation in community organizations were associated with higher self-care.

Author	Purpose	Design	Sample	Measurement	Result
Shao et al., 2017	To examine the effect of social support on glycemic control and mediating roles of self-efficacy & adherence	A cross-sectional study, SEM	N=532, Glycemic control group mean age: 63.27±10.95No Glycemic control Mean age: 63.51±11.19China	Social Support Rating Scale (SSRS) designed by Xiao (1998), Self-efficacy scale (Loring et al., 1996)	Social support, self-efficacy, adherence, and glycemic control were correlated each other (P<.05). The relationship b/t social support & glycemic control was sequentially and completely mediated by self-efficacy & adherence. Better social support was associated to better glycemic control.
Shayeghian et al., 2015	To explore the role of social support & coping styles in the relationship b/t self-care & HbA1c in patients with T2DM	A cross-sectional study	N=100, Mean age: 55.44±8.59 Iran	SDSCA, Multidimensional Scale of Perceived Social Support scale, the brief COPE questionnaire	Social support, HbA1c, and coping styles, and self-care was significantly related each other. Social support had a moderating role on the relationship b/t self-care & HbA1c.
Surucu et al., 2018	To investigate social support, empowerment, diabetes-related characteristics as predictors of self-care behaviors & glycemic control in persons with T2DM	A descriptive cross-sectional study	N=220, Mean age: 53.63±11.48 Turkey	Multidimensional Scale of Perceived Social Support (MSPSS),Diabetes Self-Care Activities Questionnaire (DSCAQ), Diabetes Empowerment Scale (DES)	Social support was a statistically significant predictor of diet (β=.24; p<.001), exercise (β=.26; p<.001), blood glucose monitoring (β=.16; p=.011), and foot care (β=.19; p=.003).
Werfalli et al., 2020	To determine the relationship of social support and self-care	A cross-sectional study	N=406, 60 years old or older, South Africa	Social Support: The Diabetes Care Profile (DCP), The Diabetic Self-Management Practice (DSMP)	Family support was positively associated with self-care practice score for a diabetic meal plan, foot care, physical activity, testing blood sugar, handling feeling, but not for taking medications.

APPENDIX B: DEMOGRAPHIC QUESTIONNAIRE:

ENGLISH AND KOREAN VERSION

Demographic Questions

Instructions: The following questions are about your background. Please answer each question. There are no wrong answers.

1. **Are you male or female?**
   ☐ Male ☐ Female
2. **What is your age?** _____years old
3. **Marital status**
   ☐ Never married ☐ Married ☐ Separated ☐ Divorced ☐ Widow/Widower
4. **Living arrangement**

☐ Living in facilities (ex: nursing home, assist living)
☐ Living alone at apartment or any type house
☐ Living with family/relatives
☐ Living with nonfamily/friends

5. **Level of education completed**
   ☐ Less than high school graduate
   ☐ High school graduate
   ☐ Some college or associate's degree
   ☐ Bachelor degree or higher
6. **Employment status**
   ☐ Employed ☐Unemployed
7. **Annual income: $ _____**/per year
8. **Health insurance status (Mark all that applied)**
   ☐ MediCare M ☐ Medi-Cal ☐ Private insurance ☐ Uninsured
9. **What is your religion?**
   ☐ Christianity ☐ Buddhist ☐ Islam ☐ Others ☐ None
10. **Years of staying in the US** _____ years
11. **Have you been diagnosed with diabetes by primary care provider?**
    ☐ Yes ☐ No

기본 인적 사항 질문

다음 질문들을 당신의 기본 인적 사항에 대한 것입니다. 각 질문에 답해주세요.

1. **성별** : ☐ 남자 ☐ 여자
2. **나이**: (만 _____ 세)
3. **결혼여부**

   ☐ 미혼 ☐ 기혼 ☐ 별거 ☐ 이혼 ☐ 사별
4. **주거형태**

   ☐ 단체시설(예를 들어 널싱홈)에 거주

   ☐ 혼자 거주

   ☐ 가족 또는 친척과 거주

   ☐ 가족이 아닌 사람들/친구와 거주
5. **교육수준**

   ☐ 고등학교 미만

   ☐ 고등학교 졸업

   ☐ 전문대학 졸업

   ☐ 4년제 대학 졸업 이상
6. **고용여부**

   ☐ 직장근무중 ☐ 무직
7. **연소득: (년간 _____달러)**
8. **건강보험 (해당하는 부분에 모두 표시하세요)**

   ☐ 메디케어 가입되있음

   ☐ 메디칼 가입되어있음

   ☐ 개인 사보험 가입되어있음

   ☐ 가입된 보험 없음
9. **종교**

   ☐ 기독교 또는 천주교 ☐ 불교 ☐ 이슬람교 ☒ 그 외 종교 ☐ 종교 없음
10. **미국에 거주한 기간: (_____ 년)**
11. **주치의나 의료인으로 부터 당뇨 진단을 받은 적이 있습니까?**

    ☐ 네, 진단 받은 적이 있습니다.

    ☐ 아니요, 진단 받은 적이 없습니다.

APPENDIX C: THE GENERAL SELF-EFFICACY SCALE:

ENGLISH AND KOREAN VERSION

The General Self-Efficacy Scale

About: This scale is a self-report measure of self-efficacy.
Items: 10

Reliability:

Internal reliability for GSE=Cronbach's alphas between .76 and .90

Validity:

The General Self-Efficacy Scale is correlated to emotion, optimism, work satisfaction. Negative coefficients were found for depression, stress, health complaints, burnout, and anxiety.

Scoring:

	Not at all true	Hardly true	Moderately true	Exactly true
All questions	1	2	3	4

The total score is calculated by finding the sum of the all items. For the GSE, the total score ranges between 10 and 40, with a higher score indicating more self-efficacy.

References

Schwarzer, R., & Jerusalem, M. (1995). Generalized Self-Efficacy scale. In J. Weinman, S. Wright, & M. Johnston (Eds.), *Measures in health psychology: A user's portfolio. Causal and control beliefs* (pp. 35-37). NFER-NELSON.

	Not at all true	Hardly true	Moderately true	Exactly true
1. I can always manage to solve difficult problems if I try hard enough	□	□	□	□
2. If someone opposes me, I can find the means and ways to get what I want.	□	□	□	□
3. It is easy for me to stick to my aims and accomplish my goals.	□	□	□	□
4. I am confident that I could deal efficiently with unexpected events.	□	□	□	□
5. Thanks to my resourcefulness, I know how to handle unforeseen situations.	□	□	□	□
6. I can solve most problems if I invest the necessary effort.	□	□	□	□
7. I can remain calm when facing difficulties because I can rely on my coping abilities.	□	□	□	□
8. When I am confronted with a problem, I can usually find several solutions.	□	□	□	□
9. If I am in trouble, I can usually think of a solution	□	□	□	□
10. I can usually handle whatever comes my way.	□	□	□	□

자기 효능감 조사

이 설문은 당신의 자기 효능감에 대한 것입니다. 각 항목을 읽고 당신의 생각에 가까운 대답 하나만 선택해주세요.

	전혀 아님	거의 아님	대체로 그러함	매우 그리함
1. 어려운 일도 내가 노력하면 해결할 수 있다.				
2. 다른 사람이 내 의견에 반대해도 나는 끝까지 내 뜻대로 한다.				
3. 나는 마음먹은 일을 해 내는데 어려움이 없다고 생각한다.				
4. 생각지도 않은 일이 있어도 나는 적당한 태도를 취할수 있다.				
5. 뜻밖의 결과를 접해도 나는 잘 대처해 나갈 수 있다고 믿는다.				
6. 어떤 일이 일어나더라도 나는 올바른 판단을 내릴 수 있다.				
7. 언제나 나의 능력을 믿기 때문에 어려운 상황에도 당황하지 않을 수 있다.				
8. 어떤 문제에 처해도 나는 여러가지 해결방법을 가지고 있다.				
9. 어떠한 문제에 부딪혀도 나는 해결방법을 찾아낸다.				
10. 새로운 문제에 부딪혀도 나는 잘 처리해 나갈수 있다.				

APPENDIX D: THE SIMPLIFIED DIABETES KNOWLEDGE TEST:

ENGLISH AND KOREAN VERSION

The Simplified Diabetes Knowledge Test

The 20 items in this section are about diabetes. Some are true statements and some are false. Please read each statement carefully, and then indicate whether you think it is true or false. If you do not know the answer please mark as "Don't know".

1. The diabetes diet is a healthy diet for most people	TRUE / FALSE / DON'T KNOW
2. Glycosylated haemoglobin (HbA1c) is a test that measures your average blood glucose level in the past week.	TRUE / FALSE / DON'T KNOW
3. A pound of chicken has more carbohydrate in it than a pound of potatoes.	TRUE / FALSE / DON'T KNOW
4. Orange juice has more fat in it than low fat milk.	TRUE / FALSE / DON'TKNOW
5. Urine testing and blood testing are both equally as good for testing the level of blood glucose.	TRUE / FALSE / DON'T KNOW
6. Unsweetened fruit juice raises blood glucose levels.	TRUE / FALSE / DON'T KNOW
7. A can of diet soft drink can be used for treating low blood glucose levels.	TRUE / FALSE / DON'T KNOW
8. Using olive oil in cooking can help lower the cholesterol in your blood.	TRUE / FALSE / DON'T KNOW
9. Exercising regularly can help reduce high blood pressure.	TRUE / FALSE / DON'T KNOW
10. For a person in good control, exercising has no effect on blood sugar levels.	TRUE / FALSE / DON'T KNOW
11. Infection is likely to cause an increase in blood sugar levels.	TRUE / FALSE / DON'T KNOW
12. Wearing shoes a size bigger than usual helps prevent foot ulcers.	TRUE / FALSE / DON'T KNOW
13. Eating foods lower in fat decreases your risk for heart disease.	TRUE / FALSE / DON'T KNOW
14. Numbness and tingling may be symptoms of nerve disease.	TRUE / FALSE / DON'T KNOW
15. Lung problems are usually associated with having diabetes.	TRUE / FALSE / DON'T KNOW
16. When you are sick with the flu you should test for glucose more often.	TRUE / FALSE / DON'T KNOW

17. High blood glucose levels may be caused by too much insulin.	TRUE / FALSE / DON'T KNOW
18. If you take your morning insulin but skip breakfast your blood glucose level will usually decrease.	TRUE / FALSE / DON'T KNOW
19. Having regular check-ups with your doctor can help spot the early signs of diabetes complications.	TRUE / FALSE / DON'T KNOW
20. Attending your diabetes appointments will stop you getting diabetes complications.	TRUE / FALSE / DON'T KNOW

당뇨지식 측정도구

아래에는 당뇨에 관한 20개의 설명이 있습니다.

그 중 일부는 옳은 설명이고 또 일부는 틀린 설명입니다. 각 설명을 읽으신 뒤 귀하께서 옳은지 틀렸는지 생각하는 것에 따라 “옳음” 또는 “틀림”에 표시하여주십시오. 만약 답을 알지 못하신다면 “모름”에 표시 하여 주십시요.

1. 당뇨 식이는 대부분의 사람들에게 건강한 식이요법이다.	옳음 / 틀림 / 모름
2. 당화헤모글로빈(당화혈색소)는 지난 한 주간 당신의 평균 혈당수치를 측정하는 검사이다.	옳음 / 틀림 / 모름
3. 닭고기 1 파운드(약 450 그램)가 감자 1파운드보다 더 많은 탄수화물을 가지고 있다.	옳음 / 틀림 / 모름
4. 오렌지 주스는 저지방 우유보다 지방을 더 많이 가지고 있다.	옳음 / 틀림 / 모름
5. 소변검사와 혈액검사는 혈당수치를 측정하는데 있어서 둘다 동등하게 타당하다.	옳음 / 틀림 / 모름
6. 무가당 과일 주스는 혈당수치를 올린다.	옳음 / 틀림 / 모름
7. 다이어트 탄산음료 한 캔은 저혈당을 치료하는데 사용되어질 수 있다.	옳음 / 틀림 / 모름
8. 요리할때 올리브 기름을 사용하는 것은 혈액 내 콜레스테롤이 올라가는 것을 예방하는데 도움을 줄 수 있다.	옳음 / 틀림 / 모름
9. 규칙적인 운동은 고혈압을 낮추는데 도움을 줄수 있다.	옳음 / 틀림 / 모름
10. 혈당 조절이 잘되고 있는 사람의 경우는 운동이 혈당수치에 효과가 없다.	옳음 / 틀림 / 모름
11. 감염이 혈당수치 증가를 초래할 것 같다.	옳음 / 틀림 / 모름

12. 신발을 평상시보다 한 치수 크게 신는것은 발 궤양을 예방하는데도움을 준다.	옳음 / 틀림 / 모름
13. 지방이 적게 든 음식을 먹는것은 심장질환의 위험성을 낮춘다.	옳음 / 틀림 / 모름
14. 무감각이나 톡톡쏘는 느낌 (저림)은 신경질환의 증상일수 있다.	옳음 / 틀림 / 모름
15. 폐 문제들은 일반적으로 당뇨를 가진것과 연관이 있다.	옳음 / 틀림 / 모름
16. 당신이 플루(독감)으로 아플때에는 당신은 혈당검사를 더 자주 해야만 한다.	옳음 / 틀림 / 모름
17. 높은 혈당 수치는 과도한 인슐린 때문에 생길수 있다.	옳음 / 틀림 / 모름
18. 만약 당신이 아침에 인슐린을 맞았는데 아침식사를 걸렀다면, 당신의 혈당 수치는 일반적으로 내려갈 것이다.	옳음 / 틀림 / 모름
19. 당신의 주치의를 정규적으로 만나는 것은 당뇨 합병증의 초기 증상을 발견하는데 도움을 줄 수 있다.	옳음 / 틀림 / 모름
20. 당뇨관련 약속에 참석하는 것은 당뇨 합병증이 생기는 것을 막는다.	옳음 / 틀림 / 모름

APPENDIX E: THE LUBBEN SOCIAL NETWORK SCALE-6:

ENGLISH AND KOREAN VERSION

Lubben Social Network Scale – 6 (LSNS-6)

FAMILY: Considering the people to whom you are related by birth, marriage, or adoption.

1. How many relatives do you see or hear from at least once a month?
0=none 1=one 2=two 3=three or four 4=five thru eight 5=nine or more
2. How many relatives do you feel at ease with that you can talk about private matters?
0=none 1=one 2=two 3=three or four 4=five thru eight 5=nine or more
3. How many relatives do you feel close to such that you could call on them for help?
0=none 1=one 2=two 3=three or four 4=five thru eight 5=nine or more

FRIENDSHIPS: Considering all of your friends including those who live in your neighborhood

4. How many of your friends do you see or hear from at least once a month?
0=none 1=one 2=two 3=three or four 4=five thru eight 5=nine or more
5. How many friends do you feel at ease with that you can talk about private matters?
0=none 1=one 2=two 3=three or four 4=five thru eight 5=nine or more
6. How many friends do you feel close to such that you could call on them for help?
0=none 1=one 2=two 3=three or four 4=five thru eight 5=nine or more

사회적 네트워크

이제부터는, 얼마나 자주 귀하가 가족/친척이나 친구를 만나고 이야기를 나누는 지에 대해 묻는 질문입니다.

가족: 먼저 가족에 대해 여쭤보겠습니다. 결혼이나 혈연관계로 맺어진 “가족”들을 생각하시고 다음 질문에 대답해 주시길 바랍니다.

1) 보통 한달에 한번 정도 연락하거나 만나는 가족/친척이 몇명이나 있습니까?
0: 전혀없음 1:1명 2: 2명 3: 3명- 4명 4: 5명-8명 5: 9명 이상

2) 개인적인 문제에 관해 털어놓을 만큼 편안하게 느끼는 가족/친척이 몇명이나 있습니까?

   0: 전혀없음 1:1명 2: 2명 3: 3명- 4명 4: 5명-8명 5: 9명 이상

3) 필요할 때 도움을 요청할 정도로 가깝게 느끼는 가족/친척이 몇명이나 있습니까?

   0: 전혀없음 1:1명 2: 2명 3: 3명- 4명 4: 5명-8명 5: 9명 이상

친구: 이제 같은 내용으로 친구에 대해 질문드리려고 합니다. 귀하와 가까이 살고 있는 이웃을 포함한 모든 친구들을 생각하시고 대답해 주시길 바랍니다.

1) 보통 한 달에 한 번 정도 연락하거나 만나는 친구가 몇명이나 있습니까?

   0: 전혀없음 1:1명 2: 2명 3: 3명- 4명 4: 5명-8명 5: 9명 이상

2) 개인적인 문제들에 관해 털어놓을 만큼 편안하게 느끼는 친구가 몇명이나 있습니까?

   0: 전혀없음 1:1명 2: 2명 3: 3명- 4명 4: 5명-8명 5: 9명 이상

3) 필요할때 도움을 요청할 정도로 가깝게 느끼는 친구가 몇명이나 있습니까?

   0: 전혀없음 1:1명 2: 2명 3: 3명- 4명 4: 5명-8명 5: 9명 이상

Hong, M., Casado, B. L., & Harrington, D. (2011). Validation of Korean Versions of the Lubben Social Network Scales in Korean Americans. *Clinical Gerontologists, 34*, 319-334. https://doi.org/10.1080/07317115.2011.572534

APPENDIX F: THE SUMMARY OF DIABETES SELF-CARE ACTIVITIES:

ENGLISH AND KOREAN VERSION

English version of SDSCA

The below questions ask you about your 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.

Item	Content
Diet 1	How many of the last seven days have you followed a healthful diet plan? 0 1 2 3 4 5 6 7
Diet 2	On average, during the past month, how many days per week have you followed your diabetic eating plan? 0 1 2 3 4 5 6 7
Diet 3	On how many of the last seven days did you eat 3 small plates amount of vegetables and fruits per meal (specifically, more two types of steamed vegetables or raw vegetables, including Kim-Chi)? 0 1 2 3 4 5 6 7
Diet 4	On how many of the last seven days did you eat high fat foods such as Gal-Bi, Korean barbequed pork, Bul-Go-Gi, fried food, Korean style pan cake? 0 1 2 3 4 5 6 7
Exercise 5	On how many of the last seven days did you do at least 30minutes of physical activity (Total minutes of continuous activity, including walking)? 0 1 2 3 4 5 6 7
Exercise 6	On how many of the last seven days did you participate in a specific exercise program (such as swimming, bicycling, jogging, excluding walking around your house or job-related activities)? 0 1 2 3 4 5 6 7
Blood Sugar testing 7	On how many of the last seven days did you test your blood sugar? 0 1 2 3 4 5 6 7
Blood Sugar testing 8	On how many of the last seven days did you test your blood sugar the number of times recommended by your doctor? 0 1 2 3 4 5 6 7
Foot Care 9	On how many of the last seven days did you check your feet? 0 1 2 3 4 5 6 7

Foot Care 10	On how many of the last seven days did you inspect the inside of your shoes? 0 1 2 3 4 5 6 7
Smoking 11	During the past seven days, have you smoked a cigarette even one puff? 0. No 1. Yes.

한국형 당뇨 자가 관리 행위 측정

※다음 질문들은 지난 7일 동안 당신의 당뇨병 자가 관리 행위를 측정하는 문항들입니다. 만약 지난 7일 동안 아픈 적이 있으셨다면, 아프지 않았던 그 전 7일 동안에 어떻게 자가 관리를 하셨는지 응답하시면 됩니다. 각 항목당 해당 일수(숫자)에 표시해 주십시오.

항목	내 용
1 식이	지난 7일 동안 며칠 정도 건강한 식습관을 지키셨습니까? 0 1 2 3 4 5 6 7
2 식이	지난 1달 동안 일주일에 평균 며칠 정도 당뇨식단을 지키셨습니까? 0 1 2 3 4 5 6 7
3 식이	지난 7일 동안 며칠 정도 충분한 야채 (김치를 포함하여 매끼 2종류 이상의 야채 반찬을 작은 접시 3개 정도의 양)를 드셨습니까? 0 1 2 3 4 5 6 7
4 식이	지난 7일 동안 며칠 정도 지방이 많이 포함된 식품 (갈비, 삼겹살, 불고기, 튀김, 전 등)을 드셨습니까? 0 1 2 3 4 5 6 7
5 운동	지난 7일 동안 며칠 정도 적어도 30분 이상 신체 활동 (걷기를 포함하여 한번 할 때 30분 이상)을 하셨습니까? 0 1 2 3 4 5 6 7

6 운동	지난 7일 동안 며칠 정도 특별한 운동 프로그램 (예를 들어 수영, 자전거 타기, 조깅 등, 집 주위 걷기 또는 직업과 관련된 신체활동은 제외) 에 참여하셨습니까? 0 1 2 3 4 5 6 7
7 혈당 검사	지난 7일 동안 며칠 정도 혈당 검사를 하셨습니까? 0 1 2 3 4 5 6 7
8 혈당 검사	지난 7일 동안 며칠 정도 담당 의사가 권유한 횟수만큼 혈당 검사를 하셨습니까? 0 1 2 3 4 5 6 7
9 발관리	지난 7일 동안 며칠 정도 당신의 발을 검사하셨습니까? 0 1 2 3 4 5 6 7
10 발관리	지난 7일 동안 며칠 정도 당신의 신발 안쪽을 검사하셨습니까? 0 1 2 3 4 5 6 7
11 흡연	지난 7일 동안 담배를 한 개피라도 (한 모금이라도) 피우신 적이 있으십니까? 0. 없다. 1. 있다.

APPENDIX G: PERMISSIONS TO USE INSTRUMENTS

Permission for the General Self-Efficacy Scale

Everything you wanted to know about the
General Self-Efficacy Scale
but were afraid to ask

by Ralf Schwarzer, January 5, 2009

The purpose of this FAQ is to assist the users of the scales published at the author's web pages http://www.ralfschwarzer.de/

DOWNLOAD of PDFs: http://userpage.fu-berlin.de/~health/self/selfeff_public.htm

Before attending to the questions below you might want to study our web pages. You might not have any questions after reading the web pages.

Do I need permission to use the general perceived self-efficacy (GSE) scale?

You do not need our explicit permission to utilize the scale in your research studies. We hereby grant you permission to use and reproduce the General Self-Efficacy Scale for your study, given that appropriate recognition of the source of the scale is made in the write-up of your study.

The international source is:
Schwarzer, R., & Jerusalem, M. **(1995)**. Generalized Self-Efficacy scale. In J. Weinman, S. Wright, & M. Johnston, *Measures in health psychology: A user's portfolio. Causal and control beliefs* (pp. 35-37). Windsor, England: NFER-NELSON.

The source for the German version is:
Schwarzer, R., & Jerusalem, M. (Eds.). (1999). *Skalen zur Erfassung von Lehrer- und Schülermerkmalen: Dokumentation der psychometrischen Verfahren im Rahmen der Wissenschaftlichen Begleitung des Modellversuchs Selbstwirksame Schulen*. Berlin: Freie Universität Berlin.

I am not sure whether I want to measure general perceived self-efficacy (GSE) or specific health-related self-efficacy.

You have to decide which one fits your research question. If you intend to predict a particular behavior you are better off with a specific scale. You might be best off by designing your own items, tailored to your study, such as:
"I am certain that I can do ...xy..., even if ...zz ..." (1 2 3 4).

Health-specific self-efficacy scales can be found at:
http://userpage.fu-berlin.de/~health/healself.pdf

For the English version of the teacher self-efficacy scale, see Schwarzer & Hallum (2008).

If you are interested in other health behavior constructs, consult the NCI Health Behavior Constructs Website:

Permission for DKT

Malec, Mary<mmalec@med.umich.edu> Thu, Apr 30, 12:51 PM

Dear Jung Kim
Please feel free to use our Simplified Diabetes Knowledge Test. We only ask that you cite our center as follows: "The project described was supported by Grant Number P30DK020572 Michigan Diabetes Research Center (MDRC) from the National Institute of Diabetes and Digestive and Kidney Diseases" and/or "The project described was supported by Grant Number P30DK092926 Michigan Center for Diabetes Translational Research (MCDTR) from the National Institute of Diabetes and Digestive and Kidney Diseases"
The link to our survey instruments can be found at http://diabetesresearch.med.umich.edu/Tools_SurveyInstruments.php
Translations
The Michigan Survey Instruments have already been translated into multiple international languages. Please find further information on the existing translations on Mapi Research Trust website at: https://eprovide.mapi-trust.org.

Thank you and best wishes on your project –

Mary A Malec, ***Center Administrator***
Michigan Diabetes Research Center (MDRC)
Michigan Center for Diabetes Translational Research (MCDTR)
http://diabetesresearch.med.umich.edu
Work Hours: M-Th 6-4

Permission for LSNS

James Lubben<lubben@bc.edu>

Jung Eun Kim,
Thank you for your interest in the LSNS. You certainly have my permission to use any of the three versions of the LSNS (LSNS-R, LSNS-18 or the LSNS-6). There is no charge for the use of these scales. Meanwhile you may wish to review some of the following websites for additional information about the LSNS as well as social isolation:

https://www.bc.edu/centers/ioa/videos/social-isolation.html
https://www.bc.edu/bc-web/schools/ssw/sites/lubben.html
I also recommend that you review the recently published NASEM report on isolation and loneliness. It is very comprehensive and very relevant to your analyses.
National Academies of Sciences, Engineering, and Medicine. 2020. *Social Isolation and Loneliness in Older Adults: Opportunities for the Health Care System*. Washington, DC: The National Academies Press. https://doi.org/10.17226/25663.
Here is a link to where you can secure a free pdf of the NASEM report:
https://www.nap.edu/catalog/25663/social-isolation-and-loneliness-in-older-adults-opportunities-for-the
Good luck with your research. I look forward to reading about your results.

All the best,
James Lubben
Boston College: Professor Emeritus & Louise McMahon Ahearn Professor (retired)
UCLA: Professor Emeritus

Permission for SDSCA

Deborah Toobert<Deborah@ori.org>

Dear Jung,

Thank you for your payment of $25 for permission to use the Summary of Diabetes Self-Care Activities Questionnaire (SDSCA) in your study. Now that we have received your payment, you have our permission to use the English and Korean versions of the Summary of Diabetes Self-Care Activities Questionnaire in your research project and we will be able to provide answers to any questions you may have. We have previously attached the 2000 Diabetes Care article with the SDSCA psychometric information. At the end of the article, there is an appendix with the English version of the questionnaire, and the scoring information. We also previously sent you user-friendly copy of the English version of the SDSCA instrument.

Attached are the Korean versions of the SDSCA in my possession.

Here is the contact information in case you need it for one of the versions. I do not have contact information for Dr. Sunju Chang.

Sang Hui Chu, PhD, RN And Eun Jin Choi	Assistant Professor Dept. of Clinical Nursing Science Yonsei University College of Nursing 250 Seongsanno, Seodaemun-gu Seoul 120-752, Korea Tel: 82-2-2228-3257 Fax: 82-2-392-5440 E-mail: shchu@yuhs.ac

Please be sure to check our website first for the most frequently asked questions:
http://www.ori.org/sdsca
We wish you every success with your research,
Deborah
Deborah J. Toobert, PhD
Retired Senior Research Scientist
Oregon Research Institute
1776 Millrace Drive
Eugene, Oregon 97403
http://www.ori.org/
Home office (541) 338-8037 mobile: 541 953-3702
email: deborah@ori.org

APPENDIX H: COPY OF FORWARD TRANSLATION OF THE SIMPLIFIED DIABETES KNOWLEDGE TEST (ENGLISH TO KOREAN)

당뇨지식 측정도구

아래에는 당뇨에 관한 20개의 설명(기술???)이 있습니다. 그 중 일부는 옳은 설명이고 또 일부는 잘못된 설명입니다. 각 설명을 읽으신 뒤 귀하께서 옳은지 틀렸는지 생각하는 것에 따라 “옳음” 또는 “틀림”에 동그라미 표시를 하여 주십시오. 만약 답을 알지 못하신다면 “모름”에 동그라미 표시를 하여 주십시요.

1. 당뇨 식이는 대부분의 사람들에게 건강한 식이요법이다.	옳음 / 틀림 / 모름
2. 당화헤모글로빈(당화혈색소)는 지난 한 주간 당신의 평균 혈당수치를 측정하는 검사이다.	옳음 / 틀림 / 모름
3. 닭고기 1 파운드가 감자 1파운드보다 더 많은 탄수화물을 가지고 있다.	옳음 / 틀림 / 모름
4. 오렌지 주스는 저지방 우유보다 지방을 더 많이 가지고 있다.	옳음 / 틀림 / 모름
5. 소변 검사와 혈액 검사는 혈당 수치를 측정하는데 있어서 둘다 동등하게 타당하다 (혹은 좋다?).	옳음 / 틀림 / 모름
6. 무가당 과일 주스는 혈당 수치를 올린다.	옳음 / 틀림 / 모름
7. 다이어트 탄산음료 한 캔은 저혈당을 치료하는데 사용되어질 수 있다.	옳음 / 틀림 / 모름
8. 요리할때 올리브 기름을 사용하는 것은 혈액 내 콜레스테롤이 올라가는 것을 예방하는 것을 도울 수 있다.	옳음 / 틀림 / 모름
9. 규칙적인 운동은 고혈압을 낮추는데 도움을 줄수 있다.	옳음 / 틀림 / 모름
10. 혈당 조절이 잘되고 있는 사람의 경우는 운동이 혈당 수치에 효과가 없다.	옳음 / 틀림 / 모름
11. 감염이 혈당 수치 증가를 초래할 것 같다.	옳음 / 틀림 / 모름
12. 신발을 평상시보다 한 치수 (사이즈) 크게 신는것은 발 궤양을 예방하는데 도움을 준다.	옳음 / 틀림 / 모름
13. 지방이 적게 든 음식을 먹는것은 심장질환의 위험성을	옳음 / 틀림 / 모름

낮춘다.	
14. 저림(무감각?)이나 톡톡쏘는 느낌 (저린 느낌?)은 신경질환의 증상일수 있다.	옳음 / 틀림 / 모름
15. 폐 문제들은 일반적으로 당뇨를 가진것과 연관이 있다.	옳음 / 틀림 / 모름
16. 당신이 플루(독감)으로 아플때에는 당신은 혈당검사를 더 자주 해야만 한다.	옳음 / 틀림 / 모름
17. 높은 혈당 수치는 과도한 인슐린 때문에 생길수 있다.	옳음 / 틀림 / 모름
18. 만약 당신이 아침에 인슐린을 맞았는데 아침식사를 걸렀다면, 당신의 혈당 수치는 일반적으로 내려갈 것이다.	옳음 / 틀림 / 모름
19. 당신의 주치의를 정규적으로 만나는 것은 당뇨 합병증의 초기 증상을 발견하는데 도움을 줄 수 있다.	옳음 / 틀림 / 모름
20. 당뇨관련 약속에 참석하는 것은 당뇨 합병증이 생기는 것을 막는다?.	옳음 / 틀림 / 모름

도움 주셔서 대단히 감사합니다!

Collins, G., Mughal, S., Barnett, A., Fitzgerald, J., & Lloyd, C. E. (2011) 도구에서 번역됨

APPENDIX I: COPY OF BACKWARD TRANSLATION OF THE SIMPLIFIED DIABETES KNOWLEDGE TEST (KOREAN TO ENGLISH)

Diabetes Knowledge Assessment

Below are 20 statements regarding diabetes. Some of those statements will be true and some will be false. After reading and assessing each statement, circle either "True" or "False". If you do not know, circle "Not Sure".

1. A diabetes diet is a healthy diet for most people.	True / False / Not Sure
2. The glycated hemoglobin test measures your average blood sugar levels over the past week.	True / False / Not Sure
3. A pound of chicken contains more carbohydrates than a pound of potatoes.	True / False / Not Sure
4. Orange juice contains more fat than low fat milk.	True / False / Not Sure
5. Urine tests and blood tests are both equally valid for measuring blood sugar levels.	True / False / Not Sure
6. Unsweetened fruit juice raises your blood sugar level.	True / False / Not Sure
7. Diet soda can be used to treat hypoglycemia.	True / False / Not Sure
8. Using olive oil when cooking can be helpful in preventing high cholesterol.	True / False / Not Sure
9. Regular exercise can help reduce high blood pressure.	True / False / Not Sure
10. Exercise has no effect on blood sugar levels for those with good blood sugar control.	True / False / Not Sure
11. Infection will lead to increased blood sugar levels.	True / False / Not Sure
12. Wearing shoes that are one size larger helps prevent foot ulcers.	True / False / Not Sure
13. Eating low fat foods lowers the risk for heart disease.	True / False / Not Sure
14. Stupor or tingling (pins and needles) may be a symptom of a neurological disease.	True / False / Not Sure
15. Lung conditions are usually associated with diabetes.	True / False / Not Sure
16. When you have the flu, you must take blood sugar tests more frequently.	True / False / Not Sure
17. Excessive insulin can result in high blood sugar levels. .	True / False / Not Sure
18. If you took insulin in the morning, but skipped breakfast, your blood sugar level will generally go down.	True / False / Not Sure

19. Seeing your physician regularly can help detect early symptoms of diabetes complications.	True / False / Not Sure
20. Attending diabetes related appointments will prevent complications from diabetes.	True / False / Not Sure

Thank you very much for your participation!

Collins, G., Mughal, S., Barnett, A., Fitzgerald, J., & Lloyd, C. E. (2011)

APPENDIX J: CREDENTIALS OF TRANSLATORS AND EXPERT

Forward translator

Young Ju Kim, BSN, RN

PIH Whittier hospital, Home Health QI team

Expert

Jinyoung Kim, PhD, RN, Associate Professor
School of Nursing, University of Nevada, Las Vegas
4505 S. Maryland Pkwy.
Las Vegas, NV 89154-3018
Tel: (702) 895-3418
E-mail: jinyoung.kim@unlv.edu

Back translator

Bynn Dokgo, BS in kinesiology

California State University, at Long Beach

APPENDIX K: IRB EXEMPT STATUS

Azusa Pacific University
Institutional Review Board
Office of Research and Grants

Exempt Status

DATE: October 01, 2020

TO: Jung Eun Kim

FROM: Institutional Review Board

IRB ID NUMBER: 20-342

PROJECT TITLE: SELF-EFFICACY, KNOWLEDGE, AND SOCIAL SUPPORT ON SELF-CARE AMONG SENIOR KOREAN IMMIGRANTS WITH DIABETES

Based on the information you have submitted, the project referenced above has been reviewed and declared Exempt from the requirements of the human subject protection regulations as described in 45 CFR 46.101(b).

The determination of Exempt status means that:

- Further review in the form of filing an annual Renewal form or a Closure report form is not necessary.
- Research must be carried out exactly as describe in the application. Additional review is required for *any* modifications to the research procedures.
- All protocol deviations, unanticipated or serious adverse events must be reported to the IRB within one week. See the IRB handbook for instructions.

For assistance please contact the Institutional Review Board Coordinator at 626.815.2036.

APPENDIX L: INFORMED CONSENT FORM FOR PAPER SURVEY:

ENGLISH AND KOREAN

Informed Consent Form

Key Information:

If you agree to participate in this study, it will involve:

- Korean immigrants, 55 years of age and above, and able to read, write, and understand Korean or English
- There are no risks associated with this study
- You will be provided a copy of this consent form

Invitation:

You are being invited to participate in a research study conducted by the researchers listed below. You are being asked to volunteer since you meet the requirements for enrollment into this study. Before you can make your decision, you will need to know:

- What the study is about;
- What you will have to do in this study, and
- The possible risks and benefits of being in this study

The researcher will talk to you about the study, and she will give you this consent form to read. You may also decide to discuss it with your family or friends. If you find some of the language difficult to understand, please ask the researcher about this form. If you decide to participate, you will be asked to sign this form. You can also respond to this survey online. If you decide to do so, please provide your email address, and the researcher will send you the link that include an Informed Consent for Electronic Survey Questionnaire, then you will be able to start responding to the survey.

Purpose: The study for which you are being asked to participate is designed to examine the relationships among self-efficacy, knowledge, social support, and self-care activities for senior Korean immigrants with diabetes, living in the United States. The specific aims of the study are to describe the socio-demographic characteristics of the study population and to determine the effects.

Procedure: To be a voluntary participant in this study, you will be asked to complete a survey which it will take approximately 15 minutes.

Possible Risks: It is expected that participation in this study will provide you with no more than minimal risk or discomfort which means that you should not experience it as any more troubling than your normal daily life. If you feel uncomfortable or distressed, please tell the researcher and she will ask you if you want to continue. The foreseeable risks in this study include emotional discomfort or sad feeling related to self-care of diabetes, unhappy past experiences, or personal background by answering questionnaire. If you experience any discomfort during the survey, you may stop the participation at any time. There is no penalty. If there is a concern about your immediate health or safety, the primary researcher will request the participant(s) to be referred to a primary care physician.

Benefits: You will not receive any direct [non-monetary] benefits from participating in this study; however, your participation in this study will help improve the knowledge about self-care among senior Korean immigrants with diabetes in the US Furthermore, in the future, healthcare providers will understand better about self-care of senior Korean

immigrants and develop culturally tailored health strategies to improve self-care of senior Korean immigrants. Your participation may also benefit other people with similar concerns.

Confidentiality: The investigator conducting this study will keep your personal information collected for the study strictly confidential. Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission or as required by law. Your identity will be kept strictly confidential by not collecting personally identifiable information such as name, phone numbers, or addresses in the survey. Once you sign the consent form, it will be detached from the survey to ensure anonymity. Then, a single data collector will translocate information into a statistical program. All hard copies of the consent form and original surveys will be secured in a locked safe in compliance with the APU policies and guidelines.

This document explains your rights as a research subject. If you have questions regarding your participation in this research study or have any questions about your rights as a research subject, please contact the Principal Investigator using the information at the bottom of this form. Concerning your rights or treatment as a research subject, you may contact the Research Integrity Officer at Azusa Pacific University (APU) at (626) 815-2034 or at vbowden@apu.edu.

Conflict of Interest: The Principal Investigator has complied with the Azusa Pacific University Conflict of Interest in Research policy.

Compensation: You will not receive financial compensation for participation in the study.

Voluntary Status: Your participation is voluntary which means you can choose whether or not you want to participate. You may withdraw any time without penalty. If you decline to continue, any data gathered to that point may be used in data analysis. If you choose not to participate, there will be no loss of benefits to which you are entitled.

Consent: I understand that my participation in this study is entirely voluntary and that I may refuse to participate or may withdraw from the study at any time without penalty. I understand the procedures described above, and I understand fully the rights of a potential subject in a research study involving people as subjects. My questions have been answered to my satisfaction. I agree to participate in this study. I have received a copy of this consent form.

_____ _____ _____

Participant Name Printed Participant Name Signed Date

I have explained the research to the subject or his/her legal representative and answered all of his/her questions. I believe he/she understands the information described in this document and freely consents to participate.

_____ _____ _____

Signature of Principal Investigator Date Time

[Signed by researcher or certified assistant after participant has demonstrated understanding of research procedures through questions and answers]

Jung Eun Kim, RN, PhD student
School of Nursing, Azusa Pacific University

(213)275-9482
Jungkim16@apu.edu

사전 동의서

당신이 이 설문에 참여하신다면,

- 당신은 한국어 또는 영어를 읽고, 쓰고, 이해하는 만 55세 이상의 한국인 이민자이고,
- 이 설문연구와 관련된 위험요인은 없으며,
- 당신은 이 사전 동의서의 복사본을 제공받으실 것입니다.

연구초대:
당신은 아래에 기재된 연구자에 의해 이뤄지는 연구에 초대 되셨습니다. 당신은 이 연구에 참여하기 위한 기본 요건을 충족하시기 때문에 자발적으로 이 연구에 참여여 주시길 부탁드려진 것입니다. 연구에 참여할지를 결정을 하시기 전에, 당신은 아래의 내용을 확인하셔야 합니다.

- 이 연구가 무엇에 대한 것인지;
- 당신이 이 연구에서 무엇을 해야하는지;
- 이 연구에 참여하는 데 있어서의 가능한 위험과 이익

연구자는 이 설문조사에 대해 당신에게 설명을 해줄 것이고 이 사전 동의서를 읽도록 제공할 것입니다. 당신은 참여할지에 대한 결정을 하기 위해 당신의 가족이나 친구와 의논할수도 있습니다. 당신이 만약 이해하기 힘든 단어를 발견한다면 연구자에게 질문해 주십시오. 만약 당신이 이 설문조사에 참여하시기로 결정하셨다면, 당신은 이 사전 동의서에 서명하셔야 합니다. 또한, 당신은 온라인으로도 이 설문조사에 참여하실수 있습니다. 온라인으로 참여하길 원하신다면, 이메일 주소를 알려주십시요. 연구자가 온라인 설문조사에 참여하실수 있도록 온라인 링크를 당신의 이메일로 보낼것입니다. 그 온라인 링크를 통해 당신은 이 설문조사에 참여할수 있습니다.
연구목적: 이 연구의 목적은 미국에 거주하는 당뇨를 가진 한국인 시니어 이민자들의 자가 간호 행위와 자기 효능감, 당뇨지식, 사회적 지지의 상호 관계를 알아보고자 함입니다. 세부 연구목적은 당뇨를 가진 한국 이민자들의 사회적 특성을 기술하고자 함입니다.
연구과정: 이 연구에 자발적으로 참여하기 위해서 당신은 설문지를 모두 응답하셔야하고, 이 모든 과정은 약 15분 정도가 소요될것입니다.
가능한 위험성: 이 연구참여로 발생하는 위험성의 수준은 당신이 일상 생활에서 있을수 있는 위험성보다 높지 않을 것으로 예상합니다. 만약 당신이 불편감을 느끼신다면, 연구자에게 당신이 이 설문조사 참여를 계속 할지 아닐지에 대해 질문하십시요. 이 설문조사에 응답하면서, 당신의 사적인 경험이나 과거 불쾌했던 경험들, 당뇨 관리와

관련된 불편했던 감정들이 떠오를수 있습니다. 만약 당신이 이 설문조사에 참여하는 동안 그런 불편감을 느끼게 되신다면 당신은 언제든지 이 설문 참여를 중지하실 수 있습니다. 이것에 대한 어떠한 불이익도 없습니다. 만약 즉각적인 건강이나 안전에 관련된 염려할 부분이 있다면 본 연구자는 연구 참여자가 주치의에게 연락을 취하여 만날것은 요청할 것입니다.
연구참여의 이익: 이 연구참여에 대한 직접적인 이익은 발생하지 않을것입니다. 그러나 이 연구참여는 미국에 거주하는 당뇨를 가진 한국 이민자들의 자가 간호와 관련된 지식를 쌓는데 기여할 것입니다. 뿐만 아니라, 미래에, 건강 제공 의료인들이 당뇨를 가진 한국 시니어 이민자들의 특성을 더 잘 이해하고 한국인 이민자들이 자가간호를 효과적으로 할수 있도록, 문화특성에 맞는 건강 계획을 개발하는데 도움을 줄것입니다. 또한 비슷한 관심을 가진 다른 사람들에게도 도움을 줄것입니다.

비밀보장: 연구자는 비밀보장을 유지하기 위해서 당신의 개인정보를 보호할 것입니다. 이 연구에서 얻어진 모든 정보는 보안이 유지될 것이고 법적으로 당신의 허락에 한해서만 공개될 수 있을 것입니다. 당신의 신원보호를 위해 당신의 이름이나, 전화번호, 또는 주소와 같은 정보는 이 설문조사에서 수집되지 않을 것입니다. 당신이 이 사전 동의서에 서명을 한뒤, 이 동의서는 익명성 보호를 위해 따로 분리될 것입니다. 그 다음, 수집된 설문 응답은 통계 프로그램으로 옮겨질 것입니다. 이 사전동의서와 설문 응답지는 **APU** 약관지침을 준수하면서 열쇠로 잠금이 된 안전한 곳에 보관될것입니다.

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본 연구자는 아주사 퍼시픽 대학의 연구 규약에 있는 **Conflict of Interest** 내용을 준수합니다.
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자발적인 참여: 이 연구에 대한 참여는 자발적인 것입니다. 당신이 참여를 할지 않할지 결정할 수 있습니다. 언제든지, 어떠한 제약없이 중지 하실수 있습니다. 만약, 중간에 중지하신다면, 그때까지 수집된 정보만 사용될 수도 있습니다. 만약 참여하지 않기로 결정하신다면, 당신이 가진 이익에 있어서 어떠한 손실도 없을것입니다.

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_____ _____ _____

연구 참여자 이름(Name Printed) 참여자 싸인 (Participant Signed) 날짜(Date)

나는 연구 참여자 또는 대리자에게 이 연구에 대한 설명을 제공했고 모든 질문에 답했습니다. 본 연구자는 연구참여자가 이 서류에 기재된 내용을이해를 했고, 연구 참여에 대해 자유롭게 동의했다고 믿습니다.

_____ _____

연구자의 싸인 (Signature of Principal Investigator) 날짜 (Date)

김정은, 간호사, 아주사 퍼시픽 대학의 간호학 철학박사 과정 학생
전화번호: (213)275-9482
이메일: jungkim16@apu.edu

APPENDIX M: INFORMED CONSENT FORM FOR ELECTRONIC SURVEY:

ENGLISH AND KOREAN

Informed Consent for Electronic Surveys

Purpose: You are being invited to participate in a survey research study. The study for which you are being asked to participate is designed to examine the relationships among self-efficacy, knowledge, social support, and self-care activities for senior Korean immigrants with diabetes, living in the United States.

Procedure: To be a voluntary participant in this study, you will be asked to complete a one-time online survey. The survey will take approximately 15 minutes t
o complete.

Possible Risks: It is expected that participation in this study will provide you with no more than minimal risk or discomfort which means that you should not experience it as any more troubling than your normal daily life. If you feel uncomfortable or distressed, please tell the researcher and she will ask you if you want to continue. The foreseeable risks in this study include emotional discomfort or sad feeling related to self-care of diabetes, unhappy past experiences, or personal background by answering questionnaire. If you experience any discomfort during the survey, you may stop the participation at any time. There is no penalty. If there is a concern about your immediate health or safety, the primary researcher will request the participant(s) to be referred to a primary care physician.

Benefits: There are no direct benefits to participating in this study, however, your response will help us to better understand the research topic. Furthermore, in the future, healthcare providers will understand better about self-care of senior Korean immigrants and develop culturally tailored health strategies to improve self-care of senior Korean immigrants. Your participation may also benefit other people with similar concerns.

Confidentiality: The investigator involved this study will not be collecting any personal information for the study. All responses to this survey are anonymous and confidential. Your name or identity will not be linked in any way to the research data. Concerning your rights or treatment as a research subjects, you may contact the Research Integrity Officer at Azusa Pacific University (APU) at (626) 815-2034 or vbowden@apu.edu.

Compensation: You will not receive financial compensation for participation in the study.

Voluntary Status: Your participation is voluntary which means you can choose whether or not you want to participate. You may withdraw any time without penalty.

Consent: I understand that my participation in this study is entirely voluntary and that I may refuse to participate or may withdraw from the study at any time without penalty. I have read this entire form and I understand it completely. By clicking below and completing the online assessments that follow, I am acknowledging that I am at least 55 years of age and am giving my consent to participate in this study.

Jung Eun Kim, RN, PhD student,
School of Nursing, Azusa Pacific University
(213)275-9482
Jungkim16@apu.edu

AZUSA PACIFIC UNIVERSITY

온라인 설문조사를 위한 사전 동의서

연구목적: 당신은 설문조사에 참여하시기 위해 초대되셨습니다. 이 연구의 목적은 미국에 거주하는 당뇨를 가진 한국인 시니어 이민자들의 자가 간호 행위와 자기 효능감, 당뇨지식, 사회적 지지의 상호 관계를 알아보고자 함입니다.

연구과정: 이 연구에 자발적으로 참여하기 위해서는 이 온라인 설문지 질문에 응답하셔야 합니다. 모든 설문을 마치는데에는 약 15분 정도가 소요될것입니다.
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비밀보장: 본 연구자는 이 연구를 위해 연구참여자로부터 개인적인 정보를 수집하지 않을것입니다. 이 설문에 대한 모든 응답은 익명으로 처리되며 비밀보장이 유지됩니다. 당신의 이름이나 신원은 연구자료에 어떠한 방법으로도 연결되지 않을것입니다. 연구 대상자로서의 권리나 대우에 관하여, **APU** 연구사무실, 전화번호 **(626) 815-2034** 로 전화하시거나 vbowden@apu.edu 이메일로 문의하실수도 있습니다.

보상: 이 설문조사에 참여함에 있어서 재정적인 보상은 없습니다.
자발적인 참여: 이 연구에 대한 참여는 자발적인 것입니다. 즉, 당신이 참여를 할지 않할지 결정할 수 있습니다. 언제든지, 어떠한 제약없이 중지 하실수 있습니다.

동의: 나는, 이 연구에 참여하는 것이 전적으로 자발적이고, 아무런 제약없이 어느때든 연구참여를 거절할 수 있음을 이해하였습니다. 나는 이 동의서 전체 내용을 읽었고 충분히 이해하였습니다. 아래를 클릭하고 이 온라인 설문조사를 참여함으로써 나는 55세 이상이고 이 연구에 참여하는 것에 대해 승락하였음을 동의합니다.

김정은, 간호사, 아주사 퍼시픽 대학의 간호학 철학박사 과정 학생
전화번호: (213)275-9482
이메일: jungkim16@apu.edu

APPENDIX N: RESEARCH FLYER FOR PAPER SURVEY:

ENGLISH AND KOREAN

Are you Senior Korean immigrants with Diabetes?

Participate in a nursing research survey!!
This study is to examine related factors on self-care among senior Korean immigrants with diabetes.

To participate in this study, you must be

- Korean immigrant who lives in the US
- Older than 55 years old
- Able to read and write in Korean or English
-

This study is conducted by Jung Eun Kim, RN, a doctoral student in nursing at Azusa Pacific University, California.
This survey will be between 10/01/2020 and 10/30/2020.

If you are interested in participating in this survey, please, call and check your eligibility for this study.

Contact number: **Jung Eun Kim** **213-275-9482**
Email **jungkim16@apu.edu**

The survey will last approximately 15 minutes.
Your participation devotes to improve health of Korean immigrants and build effective health strategies in the future!
If you have any questions, please contact to above information.

Thank you so much

당뇨를 가진 (55세 이상)한국인 이민자이십니까?

간호 건강연구에 참여하여 주세요!!
이 연구는 미국에 거주하는 당뇨가 있는 55세 이상 한국인 이민자에 대한 연구입니다.

이 연구에 참여하시기 위한 조건은 아래와 같습니다.

- 미국에 거주중인 한국인 이민자
- 만 55세 이상이신 분
- 한국어 또는 영어로 읽고 쓰기가 가능하신분

이 연구는 아주사 퍼시픽 대학에 간호학, 철학박사 과정 학생인 김정은 간호사에 의해 2020년10월1일부터 10월 30일 까지 진행됩니다.

이 연구에 참여하길 원하시는 분은 아래 연락처로 전화주셔서 참여 가능 여부를 확인하여주세요.

연락처: 연구자 김정은 연락처 213-275-9482
이메일 jungkim16@apu.edu

인터뷰는 약 15분정도 소요될 것입니다.
여러분의 이 설문조사 참여는 미국에 거주하는 한국인 이민자들의 건강을 증진하고, 향후 효과적인 건강증진 계획을 하는데에 기여될 것입니다.
질문 사항이 있으시면 위 연락처로 연락주세요.

대단히 감사합니다.

APPENDIX O: SCRIPT OF INVITATION FOR ONLINE SURVEY: ENGLISH AND KOREAN

Are you Senior Korean immigrants?

Hi. My name is Jung Eun Kim, and I am a student at Ph.D nursing program, Azusa Pacific University. I am currently conducting a survey to investigate the relationships and effects among self-efficacy, knowledge, social support, and self-care among senior Korean immigrants, if you would like to participate, please click the below online link. The link will bring you to the online survey web page. The participation in the online survey is completely voluntary and you may withdraw anytime without penalty. The survey does not collect any personal identification and will be handled utmost confidentiality.

한국어 https://www.surveymonkey.com/r/FZKX32Y

English https://www.surveymonkey.com/r/PTJ923H

한국인 시니어 (55세 이상) 이민자이십니까?

안녕하세요. 저는 아주사 퍼시픽 대학, 간호학 박사과정에서 공부중인 김정은 이라고 합니다. 저는 한국인 시니어 이민자의 자가 간호와 자기 효능감, 지식, 사회적 지지의 관계를 연구중입니다. 만약 이 연구에 참여하고 싶으시다면, 아래의 링크를 클릭해주세요. 아래 온라인 링크는 당신을 온라인 설문조사를 하는 페이지로 연결해줄 것입니다. 이 온라인 설문조사 참여는 전적으로 자발적인것이고, 당신은 아무때나, 어떠한 불이익없이 설문조사를 중지할 수 있습니다. 이 설문조사는 어떠한 개인적인 정보를 수집하지 않고 당신의 응답은 비밀이 유지될 것입니다.

한국어 https://www.surveymonkey.com/r/FZKX32Y

English https://www.surveymonkey.com/r/PTJ923

APPENDIX P: CITI PROGRAM CERTIFICATE

CITI PROGRAM

Completion Date 04-Apr-2018
Expiration Date 03-Apr-2021
Record ID 26694338

This is to certify that:

jung eun kim

Has completed the following CITI Program course:

Not valid for renewal of certification through CME. Do not use for TransCelerate mutual recognition (see Completion Report).

Social & Behavioral Research - Basic (Curriculum Group)
Social & Behavioral Research - Basic (Course Learner Group)
1 - Basic Course (Stage)

Under requirements set by:

Azusa Pacific University

CITI
Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?w170ba042-7d92-42ba-af89-b85ef120f77f-26694338