SELF-EFFICACY IN ADULTS WITH FOOD INSECURITY AND TYPE 2 DIABETES

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DEDICATION

For my husband, Rey Galvan, and my children, Victor and Vivian. I thank you for your support, encouragement, patience, and love during this journey.

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ABSTRACT

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This study describes the level of diabetes self-efficacy for adults living with type 2 diabetes (T2DM) and food insecurity (FI), enrolled in a food prescription program at a low-income primary care clinic in Houston, Texas. A non-experimental descriptive study was conducted to examine if adults, who are enrolled in a food prescription program at a low-income primary care clinic, with FI and T2DM report increased levels of self-efficacy from baseline to 8 weeks. A convenience sample of 35 adults living with T2DM and FI enrolled in the primary care clinic food prescription program was obtained for this study. The diabetes self-efficacy survey (DSES) was used to assess the level of diabetes self-efficacy in patients before they enrolled into the food prescription program and re-administered 8 weeks into the program. Mean diabetes self-efficacy scores (SES) were calculated at two different points in time. Descriptive statistics were calculated with the data set. Internal consistency reliability of the DSES for this sample was Cronbach's alpha of 0.92. Of the 35 adults living with T2DM and FI, 100% completed the DSES at 8 weeks. The data analysis revealed that the participants of the food prescription program expressed increased levels of diabetes self-efficacy in each domain of the DSES ($p < .000$).

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CHAPTER I

INTRODUCTION

Diabetes is a common chronic disease that over the past decades has continued to steadily increase in prevalence. It disproportionately affects racial/ethnic minority populations (Centers for Disease Control and Prevention [CDC], 2020). The CDC reports that diabetes is the seventh leading cause of death in the United States. For individuals diagnosed with diabetes, approximately 90–95% are diagnosed with type 2 diabetes (T2DM). In 2018, the American Diabetes Association (ADA) estimated the annual cost of diagnosed diabetes in the United States to be $327 billion, which was a 26% increase from the previous 5-year period. The health care cost and utilization of medical services for individuals living with T2DM are overwhelming. The elevated glucose levels, known as hyperglycemia, in the bloodstream cause complications such as cardiovascular disease, blindness, renal failure, amputations, and cognitive decline (CDC, 2020). Health care systems and national organizations understand the burden of T2DM hence their interest in addressing underlying factors associated with poor management to prevent complications.

The ADA and the American Association of Clinical Endocrine (AACE) annually publish evidence-based recommendations designed to optimize the management of diabetes and delay complications (Beck et al., 2017; Garber et al., 2020). Randomized control trials (RCTs) demonstrate that the delay of T2DM complications can be achieved through early and aggressive treatment focused on glycemic control (Tanaka et al., 2020). The 2020 Standards of Medical Care in Diabetes (ADA, 2020) document that ongoing diabetes self-management is critical in preventing acute diabetes complications and for reducing the condition’s long-term effects.

Diabetes self-management education and support (DSMES) programs assist in providing patients living with T2DM with the knowledge about the disease, medications, importance of physical activity, and the need for healthy eating (Tanaka et al., 2020) for self-management of the condition. A cornerstone of DSMES is healthy eating. Healthy eating is associated with better glucose control; therefore, access to a consistent healthy food supply is crucial to successful diabetes self-management (Wetherill et al., 2019). A National Health and Nutrition Examination Survey (NHANES) study reported that food-insecure people experienced a higher prevalence of diabetes and expressed poorer health (Pruitt et al., 2016). For adults with T2DM, the presence of structural barriers to health such as poverty, transportation, racism, and food insecurity results in DSMES often being unattainable (Noya et al., 2020).

The ADA has acknowledged food insecurity (FI) as a significant social determinant of health for individuals living with diabetes. Medical societies such as the American Academy of Family Medicine, ADA, and the American Pediatrics Association have initiated FI screening recommendations for at-risk households (Bahadur et al., 2018; Patil et al., 2018). Food prescriptions are emerging as an intervention offered by health care providers to help adults with FI gain access to fresh fruits and vegetables (Bryce et al., 2017; Gucciardi et al., 2019). These programs demonstrate favorable, cost-effective interventions with areas of improved health outcomes (Cavanagh et al., 2017; Gucciardi et al., 2019).

Glycemic control is a cumulative indicator reflecting the network of several disease management elements, including medical care, patient education, prescriptive regimen, and the patient's engagement in self-management (Bermúdez-Millán et al., 2019). For proper self-management, individuals with diabetes must practice daily activities such as exercise, medication adherence, problem-solving related to high or low blood sugars, and healthy eating. For some individuals with diabetes, consistent access to healthy foods can be challenging. FI and low self-efficacy are associated with T2DM and negatively affect glycemic control (Mayer et al., 2016). Practical strategies for diabetes self-management and DSMES include addressing self-care, food affordability, mental health, emotional distress, medication adherence, and low efficacy in T2DM (Ippolito et al., 2017). For an adult with T2DM and FI, self-efficacy may be a challenge, leading to difficulty in diabetes self-management.

Self-efficacy, defined as one's level of confidence, is well studied and crucial in diabetes self-management (Bandura, 1997; D'Souza et al., 2017). Studies report adults with diabetes and low self-efficacy experienced worse diabetes control than counterparts with high self-efficacy (Indelicato et al., 2017). Other studies in adults with T2DM report an association between low self-efficacy and poor self-management adherence to medication, exercise, foot care, and diet (Xie et al., 2020). Individuals with expressed high self-efficacy are more likely to report the ability to perform diabetes self-management behaviors than those with low self-efficacy (Nugent & Wallston, 2016).

The ADA 2020 Diabetes Standards of Medical Care screening for FI and linkage to food resources is recommended. The standards also recommend DSMES programs that enhance self-efficacy and enable health care providers to consider the individuals' self-efficacy in treatment therapy. For an adult with T2DM experiencing FI, self-efficacy may be challenging when they cannot fulfill a basic need such as nutritional intake (Marpadga et al., 2019). The holistic approach for patients with T2DM must include interventions that facilitate behavior change in adults with T2DM and FI. It is essential for health care professionals to create DSMES programs with interventions that address social needs such as FI and diabetes self-efficacy for effective disease self-management.

Problem of Study

The burden of T2DM on society is well documented. In individuals with lower socioeconomic status, such as those seeking care in a low-income health care clinic, the burden and disease complications are higher (Berkowitz et al., 2018). DSMES programs provide the needed skills for diabetes self-management. The cornerstone of DSMES is nutrition, which can be challenging when adults with T2DM experience FI or access to healthy food, hence resulting in inadequate nutritional intake. FI in an adult with T2DM has been linked to poor glycemic control, depression, diabetes distress, and low self-efficacy (Ippolito et al., 2017). There is enough evidence demonstrating that a lack of perceived self-efficacy to self-manage chronic disease is associated with higher health care costs (Bleacher et al., 2020). The literature supports poor health outcomes when structural barriers to health care, such as FI, are not addressed in adults with T2DM and FI. The interconnection of T2DM, FI, and low self-efficacy are commonly experienced in the individual of lower socioeconomic status.

Harris Health System is located in Harris County, the third-most populous county in the United States and has over 4.7 million residents. The health system is the safety net for the residents of Harris County, therefore serving those persons most in need. At the primary care clinic, the food prescription program provides diabetes self-management education and addresses the FI needs of the patient with T2DM and FI. Considerations taken during the food prescription program's creation included developing a program promoting self-efficacy through diabetes knowledge and addressing FI. The program aimed to create behavior change by addressing a patient's verbalized social barrier to diabetes self-management. The purpose of this non-experimental descriptive study is to examine the impact of a food prescription program on diabetes self-efficacy in adults who have T2DM and FI.

Rationale for the Study

T2DM and FI are two conditions that disproportionality affect communities of low socioeconomic status (Coleman-Jensen et al., 2018). In a landmark study, FI was identified as a prevalent and modifiable condition that hinders the public's health and medical care (Seligman et al., 2010). As health care systems have begun to adopt FI screening and food support interventions into their workflow (Makelarski et al., 2017), it is crucial to evaluate these interventions for health and health care outcomes. An intervention currently in health care that addresses FI is the produce prescription, which may also be called food prescription. Interventions that use food prescriptions for produce link individuals to food resources and are one way to address structural influences on nutrition (Schlosser et al., 2019). The food prescription is emerging as an innovative approach to help address FI, but research is needed to explore impacts (De Marchis et al., 2019).

Successful T2DM control involves a considerable commitment to lifestyle modification that includes adopting a high-quality diet and the individual's perception of self-efficacy, to manage the daily diabetes self-management actions. In health care, patients with T2DM and FI lack glycemic control, even with receiving comprehensive medical management, placing them at a higher risk of morbidity, early mortality, and increased health care utilization and cost (Shalowitz et al., 2017). No research studies were found in which FI was addressed through a food prescription program delivered to adults with T2DM and FI evaluating levels of diabetes self-efficacy. Failure to address issues such as FI and low self-efficacy in adults with T2DM has long-term implications in population health and the health care system as a whole.

Theoretical Framework

Albert Bandura's social cognitive theory (SCT) provided the theoretical framework for this research study. SCT was chosen because the variable of study for this investigation is self-efficacy. The SCT premise is that individuals learn from their personal experiences and from observing others' actions and mentally processing the outcomes (Bandura, 2000), but learning involves more than imitation. He explained human behavior in terms of a three-way reciprocal model in which personal factors, environmental influences, and behavior continually interact (Bandura, 1989). Bandura's reciprocal model is considered bidirectional in nature, with the relationship being between individuals, their behaviors, and the environment. The SCT includes a large set of factors that function as regulators and motivators of established cognitive, social, and behavioral skills, and perceived self-efficacy acts upon these factors (Bandura, 1997, p. 35).

This study is focused on one component of the SCT, self-efficacy, and it is essential to distinguish it as only one concept of the SCT, which has a comprehensive system of determinants in the theory. Self-efficacy exemplifies the confidence to engage in a particular behavior to achieve a specific goal (Bandura, 1977). Without a sense of self-efficacy, individuals may not feel a need to change their behavior, believe in themselves, or persist through difficulties in achieving their goals (Bandura, 2004). Several studies have demonstrated the fundamental role of self-efficacy in weight loss, exercise, and chronic disease management for improving health (Martin et al., 2016). The 2020 Standards of Medical Care in Diabetes (ADA, 2020) recommend self-efficacy in adults with T2DM be evaluated for successful DSMES.

Bandura (1997) documented those individuals with chronic disease struggled with adherence due to their disbelief in their efficacy to do what they were prescribed and not due to the disease activity. Those of low self-efficacy take no action even after receiving knowledge about lifestyle modifications to health and identifying themselves as vulnerable to disease (Bandura, 2004). Self-management of chronic diseases serves as an example in which self-efficacy theory can develop cost-effective models with high social utility (Bandura, 1997). Bandura (1997) believed the treatment of chronic disease must focus on self-management over the lifetime rather than on cure. The goal is to slow the progression of the impairment and disability that is brought on by chronic disease and improve the quality of life for these individuals (Bandura, 1997).

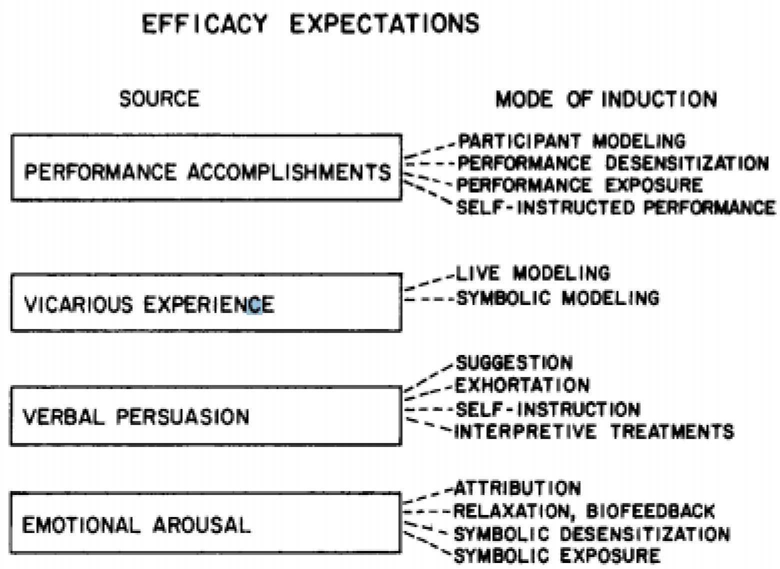
Chronic diseases are the leading causes of illness, disability, and death in the United States (CDC, 2020) but managing symptoms can reduce negative health outcomes. Activating individuals for chronic disease self-management requires more than clinical care and pharmacological intervention (Dye et al., 2016). Historically, individuals with chronic disease are treated with medications and traditional didactic health education that is often self-guided by the individual (Bandura, 1997). Managing a chronic illness such as cancer, arthritis, or diabetes daily is a daunting task. In a condition such as diabetes, daily tasks include glucose monitoring, decision-making for glucose levels, physical activity, medication management, and tracking nutritional intake. Support of diabetes self-management is successful when it goes beyond traditional patient education and includes interventions conducive to patient self-management.

The SCT notes that cognitive processes promote self-management behavior by improving knowledge, problem-solving skills, and self-efficacy (Bandura, 1997). SCT-based interventions improve self-efficacy, impacting the individual’s belief in themselves to perform a behavior (Bandura, 1997). It is one of the most common behavior change theories utilized in the management of T2DM. To promote diabetes self-management behaviors, it is important for patients with diabetes to attain diabetes self-efficacy (Jiang et al., 2019). Self-efficacy is essential in behavior change. It is constructed from four principal sources of information listed as follows: enactive mastery experiences, which perform as indicators of capability; vicarious experiences, which modify efficacy beliefs via the transmission of competencies and evaluation with the ability of others; verbal persuasion and allied types of social influences, which strengthen people's thoughts such that they possess the ability to master what they seek; and emotional and physiological states, through which people judge their capability, strength, and vulnerability to poor performance.

Figure 1 presents a visual representation that demonstrates the framework considerations taken in developing the food prescription program. It is based on Bandura's proposed four sources of efficacy Mastery of Experiences, Vicarious Experiences, Verbal Persuasion, and Physical/Emotional Arousal. The program created for adults with T2DM and FI addresses elements of the four self-efficacy sources with the goal to improve self-management through the duration of the food prescription program. For this study, self-efficacy scores were measured at baseline and then at 8 weeks to assess for impact of the intervention. The theoretical study model is supported by previous research documenting self-efficacy as crucial in DSMES and as a strong predictor in behavior change (Jiang et al., 2019; Walker et al., 2015; Zhao et al., 2016). The food prescription program in this study offers DSMES to adults with T2DM and FI. The intervention provides knowledge, promotes self-management, and behavior change, all of which may enhance self-efficacy.

Figure 1

Major Sources of Efficacy and the Principal Sources through Which Different Modes of Treatment Operate (Bandura, 1977).



Note. From "Self-Efficacy: Toward a Unifying Theory of Behavioral Change," by A. Bandura, 1977, *Psychological Review*, *84*(2), p. 195.

Assumptions

Albert Bandura's SCT posits that one's belief or confidence is a strong indicator of future behavior.

Assumptions for this study were:

1. People learn from observations and interactions with others in a social context.
2. For adults with T2DM and FI, participation in a food prescription program provides an opportunity to learn new knowledge and skills related to self-management.

Research Questions

The following research questions were addressed in this study:

Do adults with food insecurity and T2DM, who are enrolled in a food prescription program at a low-income primary care clinic, report increased levels of diabetes self-efficacy from baseline to eight weeks?

Is there a difference in reported diabetes self-efficacy scores from baseline to eight weeks based on gender, race/ethnicity, education level and relationship status?

Definitions of Terms

In this study, the variable of interest was diabetes self-efficacy. The conceptual and operational definitions for the dependent and independent variables for this research study are listed below.

Type 2 Diabetes Mellitus

Type 2 Diabetes Mellitus (T2DM) is caused by cells not responding normally to insulin; this is called insulin resistance (CDC, 2020). The insulin resistance causes blood sugar levels to rise in the bloodstream, which eventually causes damage to the body, such as heart disease, vision loss, and kidney disease. For this study, T2DM is operationally defined as a medical diagnosis for an adult patient receiving care at the primary care clinic. This variable is reported on the intake form/eligibility criteria.

Food Insecurity

FI refers to a lack of consistent access to enough food for an active, healthy life (Heerman et al., 2016). For this study, FI is operationally defined as a positive answer on the Hunger Vital Sign (HVS) questionnaire administered during the participant's office visit by the staff performing vital signs. The HVS (Hager et al., 2010) is a 2-item questionnaire; it is utilized to screen for FI. The two questions are: 1) within the past 12 months, we worried whether our food would run out before we got money to buy more and 2) within the past 12 months, the food we bought just didn’t last, and we didn’t have money to get more. The four possible responses to both items are: Often True, Sometimes True, Never True, and Don’t Know/Refused. A positive answer for FI is if the response is Often True or Sometimes True for either or both items.

Food Prescription Program

Prescriptions written by health care providers designed to get patients, who are food insecure, access to fresh fruits and vegetables at farmer’s markets, local community resources, or vouchers (Trapl et al., 2018). For this study, food prescription is operationally defined as a clinic-based program lasting 6 months or 12 visits in which participants receive the following:

- 30 pounds of food consisting of fresh produce and frozen protein every two weeks
- “Walk and Learn,” diabetes self-management education provided by the nurse-patient educator or a dietitian every 2 weeks. Topics discussed included participating in your medical visit, MyPlate, getting energized, and going lean
- Access to a SNAP coordinator through a referral process

Diabetes Self-Efficacy

Self-efficacy refers to the level of a person’s confidence in their ability to successfully perform a behavior (Bandura, 1997). For this study, self-efficacy is operationally defined as the participant’s level of confidence for behaviors to manage diabetes and was measured using the diabetes self-efficacy scale (DSES). The scale consists of eight questions that are scored on a scale from 1 (not at all confident) to 10 (totally confident). It was designed to measure self-efficacy related to behavior and medical management of diabetes.

Limitations

The study has several limitations. It was a non-experimental descriptive study; therefore, it cannot infer causality. The convenience sample approach of adults with T2DM and FI enrolled in a food prescription program may not represent the larger population. For this study, the diabetes self-efficacy questionnaire was provided to participants and used as the primary data capture source. When surveys are administered for data capture, participants may not be willing to answer honestly, so there may be potential threats to validity and reliability. Lastly, the study was conducted at only one clinic.

Summary

Self-efficacy is critical in DSMES. In adults with FI, self-efficacy is often compromised. A non-experimental descriptive designed was used to evaluate for increased levels of diabetes self-efficacy of adults with T2DM and FI enrolled in a food prescription program at a low-income clinic. Considering the variable of interest is self-efficacy, the study's theoretical foundation was Albert Bandura's SCT. Conceptual and operational terms were defined based on evidence-based literature and as utilized by the study. Assumptions were based on the SCT and the study's purpose.

CHAPTER II

LITERATURE REVIEW

The purpose of this study was to examine the impact of a food prescription program on levels of diabetes self-efficacy in adults with T2DM and FI. A literature review was performed to investigate diabetes self-efficacy, FI, and FI interventions such as food prescriptions. An online review was conducted using CINAHL and PubMed databases from the year 2015 to the present. For this study, the combination of the following keywords was included: diabetes AND self-efficacy, diabetes AND self-efficacy scales, food insecurity AND diabetes type 2, food prescriptions AND patient education, produce prescription, vegetable prescriptions, food insecurity interventions, and food insecurity programs.

Articles discarded were about children, editorials, pregnancy, based outside the United States, and did not mention chronic disease. Additionally, articles that only mention prevention in diabetes were removed (e.g., the National Diabetes Prevention Program). The review process for this literature review in each subgroup is explained throughout the following sections. Due to the scarcity of empirical research articles, all study designs were reviewed; they were observational, cross-sectional, and retrospective, and were with or without randomly selected samples.

Diabetes Self-Efficacy

Self-efficacy in adults with T2DM is crucial. The literature review found 15 relevant articles discussing the topic of self-efficacy, but further analysis only yielded 10 that were relevant to interventions targeted at adults with T2DM. There was no new literature discussing DSMES and measuring self-efficacy.

DSMES is critical for adults with T2DM, to learn how to manage their diabetes and prevent or delay disease complications (Tanaka et al., 2020). DSMES programs based on the self-efficacy model improve health quality and reduce medical services' needs (Bandura, 1997, p. 296). Studies report that DSMES educational interventions for people with T2DM enhanced glycemic control, weight loss, quality of life, and self-efficacy (Pillay et al., 2015). Self-efficacy, defined as an individuals' confidence in their ability to plan and follow actions that result in desired outcomes (Bandura, 1997), has been extensively studied in chronic diseases such as diabetes. How individuals approach lifestyle changes is linked to their perception of whether they can pursue the change (Lönnberg et al., 2020).

Self-efficacy is a strong predictor of self-care in individuals with T2DM (Ghosh & Roy, 2018). Interventions for improving glycemic control in adults with T2DM need to include a self-efficacy assessment (Walker et al., 2015). Lifestyle change is a personal matter, but the support provided by interventions created to increase self-efficacy is essential (Lönnberg et al., 2020). It gives the T2DM individual the perception that they can achieve their goal and modify their lifestyle. Additionally, an important point to note is that among individuals with T2DM and FI, research documents decreased self-efficacy in managing diabetes (Ferrer et al., 2019). Both FI and reduced self-efficacy increase T2DM-related health care utilization by over two-fold (Becerra et al., 2016). The combination of T2DM with FI and low self-efficacy is concerning due to the potential adverse health consequences.

Self-efficacy in medication adherence is another emerging area of study for adults with diabetes. The barriers and facilitators of T2DM medication adherence among Blacks were studied for key psychosocial and interpersonal factors and found that self-efficacy was significantly associated (M = 30.69 [7.95] to 32.48 [6.17] p < .01 = 0.66) with medication adherence (Rao et al., 2020). A limitation of this study was that the authors felt the participants were seeking more health information since no intervention was provided in this study; hence, their self-efficacy in self-management improved. Rao et al. (2020) recommended intensive interventions and a more extended study period.

Physical therapy is another area where self-efficacy for physical activity has been studied in adults with T2DM. Wilczynska et al. (2019) used the SCT to create physical activity interventions to improve aerobic and muscular fitness in the outdoor environment; the study was a two-arm randomized control design. Results found only a slight improvement in self-efficacy, but the study researcher team felt the overestimation of self-efficacy due to the participants connecting self-efficacy to motivation (A [SE] = 0.292 (0.121), $p < 0.05$). In this study, the intervention group benefited from the intervention that addressed social-cognitive components by creating specific plans for taking action on their physical activity intentions (Wilczynska et al., 2019), leading to confidence and self-motivation.

Physical activity in older adults with T2DM has also been studied. Olson and McAuley (2015) conducted an RCT on adults with T2DM ranging in age between 50 and 75 years, as they wanted to create interventions focusing on self-efficacy that would successfully increase physical activity. They used a comparison group to support their study. In this RCT, the education group completed an 8-week online diabetes course. The intervention group received a combination of onsite walking, group workshops, and the completion of a home log (Olson & McAuley, 2015). The group workshops taught behavior modification strategies grounding in SCT. The target of self-efficacy in these adults with T2DM was self-efficacy in exercise. The results demonstrated that there were short-term increases in physical activity. They also found the barrier efficacy beliefs peaked at week two, when the intervention participants were still receiving social support and social modeling from their cohort and research staff and had yet to attempt exercising exercising independently and then began to decline (Olson & McAuley, 2015).

Health care providers are encouraged to consider the burden of treatment and the patient’s level of confidence/self-efficacy for management of behaviors when providing DSMES (Beck et al., 2017). High self-efficacy is associated with better diabetes self-management behavior (Jiang et al., 2019). Diabetes self-management requires behavior change; hence, patients may need ongoing support for the behavior change’s sustainability (Tanaka et al., 2020). In diabetes, mitigating the impact of barriers to diabetes self-management is becoming more of an interest in health care systems (De Marchis et al., 2019). Barriers to diabetes self-management include social determinants of health such as FI. There is no new evidence targeted at diabetes self-efficacy in the adult with T2DM and FI in this literature review.

Food Insecurity

Nutrition is the cornerstone of diabetes self-management and control, but diabetes-appropriate foods are more expensive and often financially out of reach for food-insecure households (Seligman et al., 2010). Additionally, adults with diabetes and FI face self-management barriers that include cost-related medication nonadherence, depression, decreased self-efficacy, and distress (Christine et al., 2015; Silverman et al., 2015). In adults with FI and T2DM, there is less adherence to recommended diabetes self-management, specifically in the consistent healthy eating behavior area (Heerman et al., 2016). Health care organizations have recognized the adverse health care effects of FI and seek ways to help patients’ needs for adequate food (Ferrer et al., 2019). Organizations such as the Essential Hospitals Institute recommend health care organizations become involved by taking measures at the patient, system, and community level to help improve food security. As the negative health consequences are becoming more apparent to health care providers and organizations, they are engaging in providing interventions to assist with the problem.

A literature search was completed in PubMed and CINAHL, for studies on FI in adults living in the United States that were published in peer-reviewed journals from January 2015 through December 2020. The search was done by seeking a consultation with the Texas Woman's University medical research librarian (M.G.). The CINAHL search terms used to get a broader view of FI were food insecurity or food insecure in the United States. The results yielded a total of eight articles. The literature search found the article topics covered the following: COVID-19, college students, diabetes prevalence trends, attitudes towards FI, SNAP for the homebound and FI, social cohesion, and child bearding. Two articles were short editorials. The two articles discussing FI in childbearing and FI in college students were removed due to the covered topics not connected to the focus of this study. The final count was three articles about FI in the United States.

In the United States, the research found that FI is associated with higher mortality; however, other factors need to be considered. Walker et al. (2015), in a retrospective study evaluating all-cause mortality in food-insecure participants, used data from the 2003–2010 National Health and Nutrition Examination Survey (NHANES) and compared it with the National Death Index information. Out of 20,918 participants, 11.6% were food insecure. When FI was dichotomized, odds of mortality were 49% higher after adjusting for demographics (HR= 1.49; 95% CI, 1.19–1.87). Walker et al. (2015) adjusted for comorbidities, which found the hazard ratios (HR) remained significant but lost significance with adjustment for lifestyle factors and body mass index (HR = 1.15; 95% CI, 0.94–1.42). The investigators found HR for participants with very-low food security to have 46% higher odds of mortality (HR = 1.46, 95% CI 1.04–2.04). The conclusion is that a multifactorial approach to creating FI interventions that address the level of FI and lifestyle considerations such as smoking, and exercise should be part of the interventions.

In an adult with diabetes, a cross-sectional analysis of the NHANES (2011–2014) was conducted by Montgomery et al. (2017); they identified, after adjusting for demographic characteristics, mild FI was associated with 2.6 times higher odds (95% CI, 1.0–6.6) of current depression relative to being food secure; severe FI was associated with 3.5 times higher odds (95% CI, 1.9–6.3) of depression. The study also reported adults with FI were more likely to be non-Hispanic Black or Mexican American, have less than high school education, have low household income, and be a current smoker relative to food-secure adults (Montgomery et al., 2017). The study supports that FI is common among adults with diabetes and associated with psychological distress. Failing to address FI may lead to inadequate care and lower adherence to self-management recommendations (Montgomery et al., 2017). Understanding the prevalence of FI among adults with diabetes helps health care professionals consider interventions that address the conditions and increase the probability of adherence to diabetes self-management.

Diabetes self-management requires dedicated effort. FI has been identified as a social determinant of health that stems from poverty. In an adult with T2DM and FI, who is also uninsured, adherence to self-management behavior may be challenging. Heerman et al. (2016) studied an uninsured adult with T2DM plus FI and found that being food insecure was associated with low adherence to diet recommendations, less physical activity, and medication adherence problems. The study also noted a higher hemoglobin A1c in the food insecure, uninsured adults with T2DM supporting other research reporting poor glycemic control in adults with T2DM and FI (Heerman et al., 2016).

Food Prescriptions

Food prescriptions may also be referred to as produce prescriptions, which are emerging as innovative interventions in the health care setting to address FI in the patient population and are relatively promising. Health care organizations interested in implementing produce prescriptions are doing such to improve fruit and vegetable consumption and improve health outcomes (Joshi et al., 2019).

The literature search for food prescriptions used the search terms food Rx, food prescription, produce Rx, produce prescription, veggie Rx, and vegetable prescription. The terms were connected using AND and OR. For the literature review, the criteria used were as follows: last 5 years, in peer-reviewed journals, the United States, and adults. The search yielded 16 articles, but further analysis reduced it to six due to duplication.

Food prescriptions are similar to medical prescriptions written by health care providers in exchange for fresh produce (Saxe-Custack et al., 2018). Bryce et al. (2017) focused their food prescription on individuals with uncontrolled diabetes; this study included participants of the fresh Rx program. This study's participants were of lower socioeconomic status and mostly Spanish speaking from a federally qualified health center (Bryce et al., 2017). It was a 13-week program providing $10 per week to purchase produce at the collaborating farmer's market. They also received a complete health goals sheet; once completed, the participant received an additional $5 (Bryce et al., 2017). The study results noted a statistically significant change in HA1c (9.54 decreased to 8.83 $p < 0.0001$) but no changes in blood pressure or weight (Bryce et al., 2017). Investigators highlighted the importance of vegetable prescription programs for adults with T2DM.

The literature review also found a qualitative study using semi-structured interviews conducted on caregivers and their food prescription program experiences. The research was done in a pediatric clinic with a co-locating farmers' market and food voucher utilization. This study was grounded on Albert Bandura's SCT. The qualitative results demonstrated participants expressed appreciation to medical staff for going beyond traditional medical care (Saxe-Custack et al., 2018). There was an overall perception of improved quality of care. Another qualitative study that also included a farmers' market and low-income clinic patients found economic hardship in the hypertensive African American participants hindered their ability to maximize program participation and sustainability (Schlosser et al., 2019). Interestingly, in this study, a subgroup of program participants expressed individual motivation and self-control as part of their behavior change was needed for their medical condition (Schlosser et al., 2019).

Recently, York et al. (2020) took a different food prescription approach and created a medical vegetable prescription for adults with diabetes, using organic produce. They did a pilot study and provided a medical vegetable prescription, which supplied 12 weekly distributions of organic produce to Latino diabetic participants but did not offer any diabetes patient education. The results showed a significant fall in systolic blood pressure (-2.42 mm Hg, $p = 0.03$) with a greater systolic blood pressure (SBP) decline in individuals with a baseline >130 mm Hg (-7.5 mm Hg, $p = 0.005$); 14 female participants lost weight (-0.4 kg, $p = 0.029$), with nine having waist circumference reduction of 1.5 inches but no change to HbA1c. The research group reported the pilot study supported measurable health benefits and that a more extensive study was currently underway for adults with T2DM.

Aiyer et al. (2019) created a food prescription that had an educational component. In this study, the food prescription educational component was developed to help adults with FI learn about general nutrition, healthy recipes, easy food storage, and basic food safety (Aiyer et al., 2019). It was a one-group, pre-post mixed-methods evaluation conducted over 9 months; it was implemented at a federally qualified health center and two school-based clinics. The food prescription was redeemed at the local food pantry and not onsite. This study found self-reported FI decreased significantly (94% decrease in FI from baseline; $p < .01$). Health care providers at all the clinics expressed high perceived effectiveness and satisfaction of the program; 65% of the participants verbalized using the nutrition education booklet.

In another prescription program, PRxHTN, created to improve chronic disease care, demonstrated that the implementation of the PRxHTN was challenging due to workflows and organizational priorities, but with communication, adaptation to the clinic setting, and leadership engagement, PRxHTN was feasible. Trapl et al. (2018) evaluated the intervention effectiveness on patient utilization and fruit and vegetable consumption. The researchers found that the participants increased farmer's market utilization (88%), tried the farmer's market for the first time (82%), and 82% tried new fruits and vegetables also for the first time (Trapl et al., 2018). Results showed daily fruit consumption increased from a mean (SD) of 1.6 (1.3) servings to 2.4 (1.2) servings ($p < .001$), and daily vegetable consumption increased from a mean (SD) of 1.7 (1.1) servings to 2.5 (1.3) servings ($p <.001$). Fast food consumption significantly decreased from a mean of 1.3 days, per week to 0.7 days per week ($p < .001$).

Summary Self-Efficacy in T2DM and Food Insecurity

T2DM and FI are considered a public health challenge, and when combined, they are known to create adverse health outcomes. Adding to this documented public health concern, the

COVID-19 pandemic has brought profound changes in adults' daily lives with T2DM. The interruption of medical care due to mandatory lockdowns can lead to worse diabetes outcomes. The economic strain on the adults with T2DM due to business closures and job loss is likely to increase FI rates; some studies are reporting that the FI rate has doubled. FI has been identified as challenging in attaining diabetes self-management (Martin et al., 2016). FI in the patient with T2DM increases depressive symptoms, diabetes distress, and undermines self-efficacy (Hill-Briggs et al., 2020). Self-efficacy is critical in behavior change and in diabetes self-management (Powers et al., 2015). As medical societies have started to encourage addressing social factors such as FI, the health care industry is beginning to investigate different approaches to address FI to improve their patients' health. It is imperative to develop and implement evidence-based strategies that address the needs of T2DM patients beyond clinical management.

Healthy food incentive programs such as health care providers issuing coupons or vouchers known as prescriptions are one form of connecting patients produce access (Cavanagh et al., 2017). These programs are a promising strategy for addressing food access, but more research is needed to determine the effectiveness of food incentive programs in individuals with high-risk diseases and the need for behavior change (Cavanagh et al., 2017; De Marchis et al., 2019). Despite the growing attention to FI by health care systems as a barrier to disease self-management, there is little information on the health care setting food prescription interventions for adults with T2DM that address FI and self-efficacy.

Demographics, Food Insecurity, and Diabetes Mellitus

FI is a major public health problem with higher prevalence in households of lower socioeconomic status and in households with people of minority backgrounds (Coleman-Jensen et al., 2018). Understanding demographics as they relate to individuals living with diabetes and

FI is needed for consideration of self-efficacy in diabetes management. To complete the review of literature on demographics, FI, and T2DM the following search techniques were used. Search used the term demographics, FI, food Rx, food prescription, produce prescription, veggie Rx, and vegetable prescription. The terms were connected using AND and OR. The review included full-text peer-reviewed articles, in the last 5 years, including adults in the United States. The search led to 143 articles, but due to deletion of articles related to children, pregnant women, no food prescription and not in the diabetes patient population the search ended with six articles listed in Table 1. In the Aiyer et al. (2019) study age, gender, and ethnicity were reported. In this study, most participants were Hispanic (79%), female (79.1%), with a mean age of 47 years of age. Bryce et al. (2017) reported age, gender, race/ethnicity for their study participants. The majority were female (56%, *n* = 129) of those the age ranged from 25-73 years with a mean age of 52.5 years old (SD = 10.6) and of Latino race. The Saxe-Custack et al. (2018) study reported age, gender, ethnicity, and education level as the demographics of interest. In a total of 261 participants the mean age was 40 with 79% being African American, and female (54%) with their education level being high school degree or less (39%). In the Schlosser et al. (2019) study, age, gender, and ethnicity results were reported as food insecure participants being mainly middle-aged (mean 62 years of age), African American (100%), and female (78%). In the Trapl et al. (2018) study, age, gender, ethnicity, and educational level were the demographics of interest. The 266 participants enrolled in PRx HTN were African American/Black (97%) and women (72%) with a high school or equivalent or less (62%) with a mean age of 62 years of age. The York et al. (2018) study reported age, race, and gender as demographics of interest. The participants were Latino per study criteria with an average age of 56 years of age and female (91%). Diabetes and FI are complex and when combined have been shown to cause worse glycemic control and interventions targeting only food access may not be successful without the consideration of socioeconomic factors (Flint et al., 2020).

Table 1

Demographic Variables Discussed in the Literature Review

Author(s) Year	Age	Gender	Ethnicity	Education	Relationship Status
Aiyer et al., 2019	X	X	X		
Bryce et al., 2017	X	X	X		
Saxe-Custack et al., 2018	X	X	X	X	
Schlosser et al., 2019	X	X	X	X	
Trapl et al., 2018	X	X	X	X	
York et al., 2018	X	X	X		

Note. This table presents a summary of the demographic variables examined in studies on FI and diabetes.

CHAPTER III

METHODOLOGY

Research Design

The research design for this study is a quantitative, non-experimental descriptive design. Descriptive research seeks to observe, describe, and record aspects of a situation in its original environment, which can then serve as a beginning point for hypothesis generation (Polit & Beck, 2017). In this non-experimental descriptive study, the primary investigator (PI) used a survey approach to measure diabetes self-efficacy at two different points in time with the same group of patients with T2DM and FI enrolled in the primary care clinic Food Prescription Program. Because little is known about self-efficacy in adults with T2DM and FI enrolled in a health care setting food prescription program, this study offers an opportunity to identify future needs for studies in the health care setting. To date, the effectiveness of a food prescription program at the clinic from which the data were derived had not had an evaluation at any level.

Setting

The research setting is an ethnically diverse urban primary care clinic that serves low-income patients. Within the primary care clinic, there is a *Food Farmacy*. The Food Farmacy is a replica of a food pantry but located within the clinic and developed to address the FI needs for T2DM patients seeking medical care at the primary care clinic.

Patients attending primary care visit appointments at the clinic are screened by clinic staff for FI during their vital sign intake. If the patient expresses FI, a food prescription is always provided. The clinic staff supplying the food prescription informs the patient that they can redeem the food prescription at the Food Farmacy, located the clinic’s front entrance, after they complete their medical visit. Recruitment for the study took place in the Food Farmacy waiting area. Once the patient was enrolled in the food prescription program, the PI approached the patient, using a scripted approach while waiting in the Food Farmacy waiting area (see Appendix A). Patients that agreed to participate in the study completed an intake form (see Appendix B), which served as a confirmation of T2DM, FI, and new enrollment into the food prescription program. After the patient completed the screening form, consent for participation in the research study was provided. The Food Farmacy has an active environment, so potential participants were offered an area with privacy during the approval and surveying process.

Population and Sample

The population for this study were adults with T2DM and FI. A convenience sampling technique was utilized. This study recruited eligible patients visiting the Food Farmacy. The inclusion criteria for this study were: 1) 18 years of age and older, 2) type 2 diabetes, 3) food insecure, 4) English or Spanish speaking, and 5) first time recipient of food program prescription. Exclusion criteria include: 1) under 18 years old, 2) gestational diabetes, and 3) already enrolled in the food program prescription. A power analysis was performed to acquire the sample size for the research study. The sample size of the population was established by reviewing two studies designed to validate the statistical significance of the self-efficacy scale in chronic disease (Ritter & Lorig, 2014; Ritter et al., 2016). A priori power analysis G*Power 3.1.9 (Faul et al., 2007) was conducted to determine the minimum sample size required to find statistical significance using a paired samples *t*-test. With a desired level of power set at .80, an alpha (α) level at .05, and a moderate effect size of .50, it determined that a minimum of 28 participants would be required to ensure adequate power (Cohen, 1988). The 20% attrition rate applied, to the baseline participant quantity, resulted in 35 participants for the dissertation study. The data analysis of the pilot was used to inform the final study.

Protection of Human Subjects

Approval to conduct the proposed study was granted from the Health Agency department of research and sponsored programs (see Appendix D) and the Institutional Review Board (IRB) at Texas Woman's University (see Appendix E). Since the study was a single group study, the screening form, consent, and survey were all numbered in sequence, beginning with one. Survey information was entered directly into MS Excel and then transcribed into the Statistical Package for Social Sciences (SPSS) database. The Excel and the SPSS database were password protected and only accessible to the PI. All identifying participant information will be destroyed, by the PI, after 5 years of the completed study. Study results will be reported in peer-reviewed journals and poster presentations but will only contain de-identified aggregate data.

Instruments

Data collections instruments for this study include a demographic data form and the DSES, as discussed below.

Demographic Data Form

The PI created a demographic data form to collect personal data on all participants. The information included gender, age, education level, and relationship status (see Appendix F).

Diabetes Self-Efficacy Scale

This study's primary tool was the validated 8-item DSES (see Appendix G), initially created by the Stanford Patient Education Research Center. The instrument was developed using Albert Bandura's SCT as the theoretical background (Lee et al., 2020). The DSES is a 10-point Likert scale consisting of eight questions measuring the confidence to manage diabetes in different situations. The scale range begins with 1 (*not at all confident*) to 10 (*totally confident*). The scale asks participants to rate their level of confidence when performing various functions related to their diabetes. If needed, scoring considerations are to be done as follows: when the participant has circled two consecutive numbers, then the lower number must be recorded; if no consecutive circles, no number will be registered. The scale's score is the eight items' mean (Ritter et al., 2016). The DSES has demonstrated a history of stable reliability and validity measures in a wide range of health indicators and behaviors related to diabetes (Ritter et al., 2016). The DSES is also known to be utilized when longer scales might be burdensome for intervention participants (Ritter et al., 2016). This scale was very appropriate for this study, as the variable of interest is diabetes self-efficacy. Another consideration in its adoption for this study was that it is a short eight-item survey that may be easier to administer in a busy health care setting. The DSES is also available in English and Spanish versions.

Food Prescription Program

All patients seen at the clinic are screened for FI. This FI screening is standard for all patients and the clinic staff performs the screening during the vital signs intake. The presence of FI is determined by the HVS (Hager et al., 2010) questionnaire. The two questions are: 1) within the past 12 months, we worried whether our food would run out before we got money to buy more, and 2) within the past 12 months, the food we bought just didn't last, and we didn't have money to get more. The four possible responses to both items are: 1) *Often True*, 2) *Sometimes True*, 3) *Never True*, and 4) *Don't Know/Refused*. A positive screen for FI is if the response is *Often True* or *Sometimes True* for one or both items.

If the patient expressed being FI and having T2DM, they received a prescription to participate in a food prescription program. This food prescription program was redeemed on site at the primary care clinic Food Farmacy. Participation in this program includes:

- 30 pounds of food consisting of fresh produce and frozen protein every 2 weeks;

- “Walk and Learn,” diabetes self-management education provided by a nurse-patient educator or a dietitian every 2 weeks when patient returns to the Food Farmacy for food redemption. This standardized program includes topics such as participating in your medical visit and reviewing information such as MyPlate, Getting Energized, and Go Lean.
- Access and referrals to a Supplemental Nutrition Assistance Program (SNAP) coordinator as needed.

Data Collection

The PI was responsible for all data collection that occurred at baseline and 8 weeks post-enrollment on the food prescription program. The PI approached and recruited patients while they were in the waiting room area of the Food Farmacy. The PI is fluent in English and Spanish and used the language preferred by the patient. When a patient agreed to be in the study, the PI proceeded with intake and provided participants with a study folder containing the consent form and data collection instruments. All study materials were available in both English and Spanish, and the PI used the language preferred by the patient. Participants were provided a private cubicle for consenting and survey administration. Upon completion of the survey data, all data was entered into SPSS version 25 by the PI. For this study, all procedures were followed as approved by the IRB and administrative approval from health clinic where the data was collected.

At the 8 week follow-up, the PI used both telephone and email communication when contacting the participant to complete the follow-up survey. The survey was completed via telephone or in the clinic.

Treatment of Data

The SPSS version 25.0 software was used to enter and analyze the data. The data evaluation began with a review for outliers, missing data, and distribution normality before performing statistical data analysis. Descriptive statistics were calculated to determine frequency distributions and measures of central tendency. The DSES was analyzed for reliability by calculating the Cronbach alpha. Mean DSES scores were calculated for the baseline and eight-week time points and analyzed using a paired t-test statistic. A one-way ANOVA compared mean DSES scores related to the demographic variables. Alpha was set at 0.05.

Pilot Study Summary

A feasibility pilot study was conducted in the fall of 2020 at the primary care health center Food Farmacy. A summary of this study is presented related to testing the research methodology for the larger dissertation study.

Population and Sample Description

The pilot study recruited a sample of six adults living with T2DM and FI, additional enrolled them for the first time in the food prescription program. Of the 35 participants diagnosed with diabetes and expressing FI, nine met the inclusion criteria and six agreed to participate (66% acceptance rate). The two patients that refused did not indicate a reason for refusing. A third patient refused and verbalized that it was too much paperwork to enroll in the study.

The demographic results of the pilot indicate that the sample consisted of 67% females and 33% males. The participants ranged in age from 45 to 54 years old. Additionally, 83% self-identified as of Hispanic origin. The participant’s education level ranged from no formal education (2 participants, 33%) to participants with some high school but no diploma (2 participants, 33%) and recipients of a high school diploma (2 participants, 33%). The demographics analysis identified four out of the six participants stating their relationship status as single, never married (66%). The demographic breakdown is available for review in Table 2.

Table 2

Distribution of Demographic Characteristics N = 35

Characteristic	Total Sample	Total Sample %
Gender		
Female	25	71.4%
Male	10	28.6%
Age (years)		
35-44	6	17.1%
45-54	12	34.3%
55-64	15	42.9%
65-74	2	5.7%
Ethnicity		
Hispanic/Latino	28	80%
Asian/Pacific Islander	1	2.9%
Black or African American	5	14.3%
White	1	2.9%
Level of Education		
No schooling completed	4	11.4%
Some high school, no diploma	18	51.4%
High school graduate/diploma	13	37.1%

Characteristic	Total Sample	Total Sample %
or GED		
Relationship Status		
Single, never married	10	28.6%
Married or domestic partner	12	34.3%
Widowed	3	8.6%
Divorced	4	11.4%
Separated	6	17.1%

Pilot Statistical Analysis

The pilot study found that for the total sample, baseline DESE mean scores for adults with T2DM and FI went from 39.3 at intake to 65.1 (p = .047) at 8 weeks after enrolling in a food prescription program. Table 3 presents the analysis for baseline and 8-weeks survey. Of note is the increase in self-efficacy for participants with no formal education.

Table 3

Mean and Standard Deviations of Scores Pre and Post DSES

How confident do you feel…	M (*SD*)	Post M (*SD*)	*t*-test	*p*	Cohen's *d*
That you can eat your meals every 4 to 5 hours every day.	5.80 (3.0)	9.31 (1.1)	-6.96	.000	1.18
Follow diet when prepare/share food with others.	5.03 (3.0)	9.17 (1.8)	-7.35	.000	1.24
Choose appropriate foods to eat when hungry.	5.83 (3.4)	9.26 (1.6)	-5.96	.000	1.01

How confident do you feel…	M (*SD*)	Post M (*SD*)	*t*-test	*p*	Cohen's *d*
Exercise regularly 15-30 minutes, 4-5 times/week.	5.37 (3.6)	7.54 (2.7)	-4.28	.000	.72
Prevent low blood sugar when you exercise.	5.54 (3.1)	7.80 (2.1)	-4.18	.000	.71
What to do with high/low blood sugar.	7.77 (2.9)	9.37 (.94)	-3.30	.002	.56
When to visit doctor for changes in DM.	6.69 (3.3)	8.14 (1.9)	-2.87	.007	.48
Control DM so does not interfere with what you want to do.	5.43 (3.2)	6.97 (1.9)	-2.87	.007	.49
Total Score	47.45 (20.7)	67.57 (6.8)	-6.40	.000	1.08

Pilot Strengths and Limitations

The pilot study had two limitations. First, the convenience sampling recruitment method does not allow for generalization to the population. Second, the non-experimental descriptive approach offers no ability to support causal inferences.

Pilot Study Conclusion

Adults with T2DM experiencing FI find it challenging to self-manage their condition when access to food or healthy food is a barrier. This study found that adults T2DM and expressing FI reported increased levels of diabetes self-efficacy after eight weeks in the food prescription program. The pilot study confirmed the need to evaluate the level of self-efficacy for adults with T2DM and FI with more participants.

CHAPTER IV

ANALYSIS OF DATA

The purpose of this non-experimental research study was to examine if adults with FI and T2DM, who are enrolled in a food prescription program at a low-income primary care clinic, report increased levels of diabetes self-efficacy from baseline to eight weeks. For the study, a demographic form was used to identify the study sample's characteristics. The validated eight-item DSES (Ritter et al., 2016) was used to measure diabetes self-efficacy, defined as the confidence level, in eight behavioral and medical management topics in T2DM. Issues measured include nutrition, exercise, blood glucose management, and medical health management. DSES internal consistency reliability was estimated by calculating Cronbach's alpha for the eight-item scale. Descriptive statistics were used to analyze the data, which included exploratory data analysis of the demographic data.

Description of the Food Insecure Adults Living with Type 2 Diabetes

A total of 80 participants were screened as eligible for the study, with 45 declining study participation (56%). Twenty-four of the 45 persons declining participants (53%) reported time constraints. Eleven of the 45 decliners (24%) expressed they had already filled out a lot of paperwork and were not interested in completing more paperwork for the study. The final 10 potential participants who declined (22%) provided no reason. The remaining 35 people eligible for the study completed informed consent and completed the study for a retention rate from baseline to 8-weeks of 100%.

Seventy-one percent of the study participants living with T2DM and FI self-identified as females (n = 25). The remaining 29% identified as males (n = 10). The age range for the sample of 35 participants ranged from 35 to 74 years. Eighty percent (n = 28) of the participants were of

Hispanic/Latino origin and 14% (n = 5) identifying as Black/African American. There was one Asian/Pacific Islander and one White participant. Among the 35 participants, 18 (51%), obtained some high school but no diploma, 13 (37.1%) reported a high school diploma, and four reported no schooling. No participants reported education above the high school level.

The relationship status for the study participants living with T2DM and FI resulted with 34% as married or domestic partner, 28.6% single never married, 17.1% separated, 8.6% widowed, and 11.4% divorced (see Table 2).

Findings of the Study

The DSES was administered to study participants during their visit to the Food Farmacy, to assess for self-efficacy measured as confidence level in diabetes self-management. The DSES was then re-administered 8 weeks later during their Food Farmacy visit or by phone. The DSES was scored using a Likert scale ranging from 0 to 10, measuring the level of confidence from "*not at all confident*" to "*very confident,*" with a higher score indicating a higher confidence level. The confidence level measured areas in performing diabetes behaviors related to nutrition, exercise, medication, and health-seeking behaviors. A self-efficacy level of 7 or greater signifies that the behavior is likely (Ritter & Lorig, 2016).

The DSES scale in this study consisted of four items comprising nutrition and exercise, with the four additional items on blood glucose and health. Each of the eight questions appears in Table 3 along with the baseline mean score (M) and standard deviation (*SD*), 8-week M Score and SD, t-test, Cohen's *d* and p-value. Each of the eight questions and total score show a statistically significant increase in self efficacy from baseline to 8-weeks later.

This study attempted to describe the diabetes self-efficacy level of patients with T2DM and FI enrolled in a food prescription program, from baseline to 8 weeks. Mean scores with *SD*, Cohen's *d* and *p*-value were calculated for each of the eight DSES questions at two different points in time. Overall, the participants in this study expressed an increase in the level of diabetes self-efficacy with a large effect size from baseline to 8 weeks.

An exploratory analysis was completed on the demographics of the study participants to assess for changes in levels of diabetes self-efficacy by gender, age, race/ethnicity, education level, and relationship status (see Table 4). The analysis for meanSES related to gender demonstrates an increase in diabetes self-efficacy level from Time 1 (initial assessment) to Time 2 (8 weeks later) for females vs. males. Similarly, for age demographic, each age range increased their level of self-efficacy (see Table 4). Likewise for the race/ethnicity, the category demonstrated increases in diabetes self-efficacy in the Hispanic/Latino and Black or African American. The fourth category in the exploratory analysis of demographic data was the study population's level of education. Please see Table 4 for a significant increase in self-efficacy across time for each level of education. Lastly, relationship status mean self-efficacy scores were analyzed at intake and 8-weeks later, appear in Table 4 and show a significant increase for each relationship status.

In summary, all of the demographic characteristics changed for the betterment of self-efficacy, at end of intervention but the difference between the demographic variables and the DSES scores was not significant (see Table 4).

Table 4

Mean Pre and Post DSES by Demographics

Characteristic	Pre-Mean (*SD*)	Post Mean (*SD*)	*p*-value
Gender			
Female	5.51(2.71)	8.39 (.782)	SES $p = .130$

Characteristic	Pre-Mean (*SD*)	Post Mean (*SD*)	*p*-value
Male	6.98(2.02)	8.51(1.09)	PSES p = .777
Age-years			
35-44	4.97(3.59)	8.35(.619)	SES p = .748
45-44	6.44(1.97)	8.76(.615)	PSES p = .080
55-64	5.88(2.78)	8.36(1.00)	
65-74	6.06(2.20)	7.12(.707)	
Race/Ethnicity			
Hispanic/Latino	5.72(2.76)	8.39(.853)	SES p = .616
Black or African American	7.05(1.62)	8.82(1.03)	PSES p = .574
Education			
None completed	5.46(4.08)	8.68(.330)	SES p = .069
Some high school/ no diploma	5.09(2.27)	8.28(.980)	PSES p = .518
High school diploma	7.23(2.15)	8.54(.817)	
Relationship Status			
Single, never married	7.06(2.56)	8.58(.448)	
Married or domestic relationship	6.27(2.72)	8.34(1.21)	SES p = .091
Widowed	4.41(2.96)	8.25(1.40)	PSES p = .946
Divorced	6.56(1.54)	8.62(.540)	
Separated	3.70(1.51)	8.29(.615)	

Summary of the Findings

This is a study of 35 men and women who participated in this non-experimental descriptive study measuring diabetes self-efficacy, defined as confidence level, in adults living with T2DM and FI, enrolled in a food prescription program at a low-income primary care clinic in Houston, Texas. Diabetes self-efficacy was measured using the DSES created by Ritter and Lorig (2016) during their clinic visit and after they enrolled into the food prescription program.

The purpose of this study was to examine the impact of a food prescription program on levels of diabetes self-efficacy in adults with T2DM and FI. The descriptive analysis demonstrated that diabetes self-efficacy did significantly increase for adults with T2DM and FI enrolled in the food prescription program. Reliability of the DSES was adequate for this study.

CHAPTER V

SUMMARY OF THE STUDY

The demands that T2DM inflicts on the individuals living with it are complex. Daily, individuals with diabetes make decisions related to medication, glucose levels, and nutrition to help control their T2DM. Adherence to a healthy diet is foundational in diabetes management, but for low-income individuals living with diabetes and food insecurity, a healthy diet may be difficult to access.

Research has confirmed the vital role of self-efficacy in predicting behavior change in individuals living with T2DM and how it is compromised in the population with FI. Because an adult with T2DM and FI may not have food or enough healthy food for a healthy balanced diabetes-friendly meal, this study was designed to examine the impact of a food prescription program on diabetes self-efficacy. The objective was to assess the gap in the literature related to the level of diabetes self-efficacy in adults living with T2DM and FI enrolled in a food prescription program. This study assessed the level of diabetes self-efficacy from baseline to eight weeks post intervention. The conceptual framework used for the study was based on Albert Bandura's SCT, which posits that one's belief or confidence is a strong indicator of future behavior. The assumptions for this study were: 1) people will learn from observations and interactions with others in a social context and 2) for adults with T2DM and FI, participation in a food prescription program provides the opportunity to learn new knowledge and skills related to diabetes self-management. This chapter includes a summary of the findings, discussion, conclusions, implications for practice, and recommendations for future research.

Summary

A non-experimental descriptive study was used to examine the impact of a food prescription program on the level of diabetes self-efficacy in adults living with T2DM and FI. The study participants were a convenience sample recruited during their first visit to the Food Farmacy located at a low-income primary care clinic. The level of self-efficacy in diabetes self-management was measured during the acceptance to participate in the study then again at eight weeks. Descriptive statistics were performed on the survey data, with further exploratory analysis conducted on the demographic variables.

Discussion of the Findings

This study was performed with the theoretical proposition that self-efficacy, one’s belief or confidence level, is a strong indicator of future behavior. All participants in this study were adults with T2DM and FI who received care at a primary care health center. The study documented an increase in the level of diabetes self-efficacy for adults living with T2DM and FI with very large effect size across all questions and regardless of demographic characteristics of age, ethnicity, relationship status, or educational level. All participants significantly increased their self-efficacy following the receipt of food.

The respondents living with food insecurity and T2DM visiting the low-income clinic are Hispanic or Black, more likely to be female and single, and apt to have lower levels of educational completion. This non-experimental descriptive study demonstrates an increase in the level of diabetes self-efficacy of this group of individuals enrolled in the food-prescription program; hence presenting valuable information for the planning of future studies. Wetherill et al. (2019) found that among households with diabetes accessing food pantries, most were women, young in age, single, Hispanic or Black, and with a lower level of education; therefore, health care providers should consider the needs of people with diabetes who live in food-insecure households. Diabetes self-management education (DSME) is necessary for diabetes self-care, which helps with improved management of the condition. DSMES curriculums developed by the American Association of Diabetes Educators and supported by the ADA imbed assessing and building DSMES programs that provide improved self-efficacy, by providing education and skills that support behavior change critical in diabetes self-management.

Conclusions

The results of this study on adults living with T2DM and FI enrolled in a food prescription program at a low-income clinic indicate that:

1. Participants had an increase in self-efficacy from baseline to 8 weeks
2. Females represent a high level of individuals with food insecurity and T2DM
3. Social and cultural factors are relevant to healthy food initiatives
4. Diabetes self-efficacy increased in individuals with little or no education

Implications for Nursing

Implications suggested by this study are:

1. Food insecurity remains an essential issue in our patient population with significant implications in nutrition-driven diseases such as T2DM
2. Provide and promote linkages to community-based organizations to help address patient-expressed resources and bridge clinical care and community care to help improve patients' health strong partnerships and matching priorities
3. Nurses can advocate for effective federal and community programs and improve the nutrition quality of existing emergency food programs

4. Nurses' considerations into developing diabetes programs that are multi-faceted and provide hands-on education help with patient engagement that improves patient health and community health
5. Nurses working in diabetes self-management patient education must consider creating education written at a high school level or below
6. Considerations when developing nutrition education should include whether it is for single or partnered households

Recommendations for Future Research

There is a gap in research regarding perceived diabetes self-efficacy for adults living with T2DM and FI who seek care in low-income primary care clinics. Research has been conducted in community food pantries, but none in a health care clinic. Several recommendations for future research encouraged from this study results include:

1. Replication of this study using a larger sample and, more diversity in ethnicity, and random sampling, assigning half of participants to delayed intervention
2. An examination using comparison of participants enrolled in a food prescription program with participants not enrolled in a program
3. Conduct a study on adults living with T2DM and FI during the COVID-19 pandemic, as this was not part of this study but could help explain the younger population and married individuals seen in this study
4. Conduct a longer longitudinal study to investigate the level of diabetes self-efficacy beyond the 8-week mark
5. Add an examination of biometric values such as reduction in hemoglobin A1C

6. Investigate the role of nurses in primary care settings such as nurse case management or nurse-patient educator in a food prescription program

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APPENDIX A

Recruitment Script

Recruitment Script for Potential Participants

Script: Good morning/afternoon Mr. or Mrs. XXX. My name is Esperanza Galvan and I am a nursing doctoral student at Texas Woman's University. My research topic of interest is the patient with diabetes and food insecurity. I plan on conducting a study on adults with diabetes and food insecurity who are enrolled in the food prescription program. The study will include participants completing the 8-item Diabetes Self-Efficacy Questionnaire during the first Food Farmacy visit and at 3 months. The questionnaire takes about fifteen minutes and once the study is completed participants will be given a $15 gift card. The purpose of this study is to examine the impact of a food prescription program on Diabetes self-efficacy (or one's confidence in their ability). Your participation in this study does not affect your Food Farmacy program at all. Are you interested in participating?

If answer is No then:

Thank you so much for your time and have a great day.

If the answer is Yes then move into consenting.

APPENDIX B

Intake Form

Study ID #____________________________________

Intake and Screening Form

Have you been diagnosed with type 1 or type 2 diabetes? Yes No

Have you agreed to enroll in the food prescription program? Yes No

If answers yes to the 2 questions, proceed to next questions.

Contact Information:

Name:______________________________________

Food Bank #__________________________________

Cell phone #__________________________________

Email address:________________________________

APPENDIX C

Clinic Approval Letter

HARRISHEALTH
SYSTEM

Harris Health System
P.O. Box 66769, Houston, Texas 77266-6769

Dear Sir/Madame,

This is to inform you that I, Dr. Glorimar Medina, am giving approval for Esperanza Galvan (nursing doctoral student at Texas Woman's University-Houston) to perform her dissertation research study, "Self-Efficacy in Adults with Food-Insecurity and Type 2 Diabetes," at Acres Health Center. The goal of her study is to 1) investigate associations between self-efficacy and food insecurity in adults with type 2 diabetes and 2) evaluate whether self-efficacy increases in food insecure diabetes participants when provided with onsite food access and a diabetes education intervention.

I am happy to offer any further information if necessary.

Sincerely,

GMedina

Glorimar Medina, MD, MBA
Executive Vice-President
Ambulatory Care Services

APPENDIX D

IRB Approval

IRB-FY2020-378 - Initial: Expedited Approval Letter Inbox x

irb@twu.edu
to amalecha, me

Sep 28, 2020, 4:40 PM

Texas Woman's University
Institutional Review Board (IRB)
irb@twu.edu
https://www.twu.edu/institutional-review-board-irb/

September 28, 2020

Esperanza Galvan
Nursing - Houston

Re: Initial - IRB-FY2020-378 Self-Efficacy in Adults with Food-Insecurity and Type 2 Diabetes

Dear Esperanza Galvan,

The above referenced study has been reviewed and approved using expedited review procedures on September 19, 2020 by the TWU IRB - Houston operating under FWA00000178. If you are using a signed informed consent form, the approved been stamped by the IRB and uploaded to the Attachments tab under the Study Details section. This stamped version of the consent must be used when enrolling subjects in your study.

Note that any modifications to this study must be submitted for IRB review prior to their implementation, including the submission of any agency approval letters, changes in research personnel, and any changes in study procedures or instruments. Additionally, the IRB must be notified immediately of any adverse events or unanticipated problems. All modification requests, incident reports, and requests to close the file must be submitted through Cayuse.

Approval for this study will expire on September 18, 2021. A reminder of the study expiration will be sent 45 days prior to the expiration. If the study is ongoing, you will be required to submit a renewal request. When the study is complete, a close re may be submitted to close the study file.

If you have any questions or need additional information, please contact the IRB analyst indicated on your application in Cayuse or refer to the IRB website at http://www.twu.edu/institutional-review-board-irb/.

Sincerely,

TWU IRB - Houston

APPENDIX E

Demographic Information Form

Gender: Male Female Transgender Prefer not to answer

Age: 18-24 years old Prefer not to answer

25-34 years old

35-44 years old

45-54 years old

55-64 years old

65-74 years old

75 years or older

Ethnic origin:

Hispanic or Latino Native American or American Indian

Asian/Pacific Islander White

Black or African American Other

Prefer not to answer

Level of education:

No schooling completed Associate or Technical degree

Some high school, no diploma Bachelor's degree

High school graduate, diploma or the GED Master's degree

Prefer not to answer Doctoral degree

Marital Status: Single, never married Separated

Married or domestic partnership Prefer not to answer

Widowed

Divorced

APPENDIX F

Self-Efficacy for Diabetes Scale

Study ID #____________________________

SMRC
Self-Management

Self-Efficacy for Diabetes

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

1. How confident do you feel that you can eat your meals every 4 to 5 hours every day, including breakfast every day?

   not at all confident 1 2 3 4 5 6 7 8 9 10 totally confident

2. How confident do you feel that you can follow your diet when you have to prepare or share food with other people who do not have diabetes?

   not at all confident 1 2 3 4 5 6 7 8 9 10 totally confident

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

   not at all confident 1 2 3 4 5 6 7 8 9 10 totally confident

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

   not at all confident 1 2 3 4 5 6 7 8 9 10 totally confident

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

   not at all confident 1 2 3 4 5 6 7 8 9 10 totally confident

6. How confident do you feel that you know what to do when your blood sugar level goes higher or lower than it should be?

   not at all confident 1 2 3 4 5 6 7 8 9 10 totally confident

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

   not at all confident 1 2 3 4 5 6 7 8 9 10 totally confident

8. How confident do you feel that you can control your diabetes so that it does not interfere with the things you want to do?

   not at all confident 1 2 3 4 5 6 7 8 9 10 totally confident

1