MEASURING ACCEPTABILITY AND EFFICACY OF CULTURALLY SENSITIVE PEER-TAUGHT DIABETES NUTRITION EDUCATION FOR A LOW-INCOME, LOW-LITERACY, SPANISH-SPEAKING HISPANIC POPULATION

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ABSTRACT

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Objective: Examine the efficacy and acceptability of culturally sensitive diabetes education.

Methods: Subjects were assigned to Usual Care (UC) or Culturally Sensitive (CS) groups to receive diabetes education. The UC group received education from an English-speaking healthcare professional speaking through an interpreter. The CS group received education from a peer educator. Learning was assessed by comparing pre-test and post-test scores. Acceptability was measured using a post-class survey.

Results: Significant improvement was demonstrated in both groups, with a 43% improvement from pre-test to post-test. No significant difference in scores was detected between groups. Post-class surveys revealed significantly greater perceived understanding of the instructor and greater intent to change behavior in the CS group.

Conclusions: A culturally sensitive diabetes nutrition education program can improve knowledge of dietary management of diabetes, whether taught by a healthcare professional or a peer educator. Greater acceptability may be experienced when taught by a peer educator.

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LIST OF ABBREVIATIONS

AADE	American Association of Diabetes Educators
ADA	American Diabetes Association
AND	Academy of Nutrition and Dietetics
ANOVA	Analysis of variance
CDC	The Centers for Disease Control and Prevention
CDE	Certified diabetes educator
CHIS	California Health Interview Survey
CoDE	Community Diabetes Education for Uninsured Mexican Americans
CS	Culturally sensitive
DSME	Diabetes self-management education
DSME/S	Diabetes self-management education and support
FBG	Fasting blood glucose
FQHC	Federally Qualified Health Center
HbA1c	Hemoglobin A1c
LHEP	Lay Health Educator Program
NHANES	National Health and Nutrition Examination Survey
OGTT	Oral glucose tolerance test
PRIDE	Partnership to Improve Diabetes Education
SAM	Suitability Assessment of Materials

T1DM	Type 1 diabetes mellitus
T2DM	Type 2 diabetes mellitus
UC	Usual care
U.S.	United States

CHAPTER I

INTRODUCTION

Diabetes is a serious and growing health problem in the United States (U.S.) and throughout the world. The Centers for Disease Control and Prevention (CDC) estimates that 29.1 million Americans have diabetes (CDC, 2014). Diabetes is defined as a state of hyperglycemia, or high blood glucose, caused by insufficient insulin, dysfunction of insulin utilization, or both (CDC, 2014). Type I diabetes mellitus (T1DM) is an autoimmune disorder characterized by the destruction of the insulin-producing cells of the pancreas, resulting in a complete lack of insulin. Type II diabetes mellitus (T2DM) is far more common, accounting for 90-95% of diagnosed cases of diabetes and is characterized by insulin resistance at the cellular level, resulting in elevated blood glucose attributable to cells inability to properly utilize insulin to facilitate glucose uptake. There are 29.1 million individuals living with diabetes in the US, of which it is estimated that 8.1 million are undiagnosed (CDC, 2014). This is particularly concerning because the consequences of uncontrolled diabetes are severe. It is the seventh leading cause of death and the leading cause of kidney failure, non-traumatic lower-limb amputation, and blindness among adults in the United States. A diagnosis of diabetes increases a person's risk for heart disease or stroke by two-to-four-fold (CDC, 2011). However, diabetes and diabetes-related complications can be prevented or their onset delayed with early nutrition, lifestyle and medical interventions.

While no exact cause of T2DM has been determined, risk factors include obesity, physical inactivity, older age, family history of diabetes, and race/ethnicity. African Americans, Hispanics and Latinos, Native Americans, and Pacific Islanders are at particularly high risk of developing T2DM and the associated complications. Diabetes is diagnosed when hemoglobin A1c (HbA1c) is 6.5% or greater, or fasting blood glucose (FBG) is greater than 126 mg/dL, or when a 2-hour plasma glucose during an oral glucose tolerance test is 200 mg/dL or greater (Ross, Caballero, Cousins, Tucker, & Ziegler, 2014). A diagnosis of "pre-diabetes" or impaired fasting glucose is determined when hemoglobin A1c is 5.7% - 6.4%, or when FBG is 100 – 125 mg/dL, or when plasma glucose is 140-199 mg/dL 2 hours following an oral glucose tolerance test (OGTT (Ross et al., 2014)]). Often, there are no early symptoms of T2DM. It is often diagnosed when hyperglycemia is noticed during periodic medical checks. Unfortunately, hyperglycemia is likely to go undetected for years in individuals of lower socioeconomic status due to a lack of adequate access to healthcare.

CHAPTER II

REVIEW OF LITERATURE

Hispanic Americans and Diabetes

Hispanic Americans are a diverse and varied culture consisting of multiple ethnicities, including Mexican, Puerto Rican, Cuban, Central American, and South American. On average, Hispanic Americans, especially Mexican Americans, are disproportionately represented in lower socioeconomic groups and have lower levels of education (Albrecht & Gordon-Larsen, 2013). The Hispanic population is particularly affected by the obesity trend, with 42.7% of the Hispanic population reported as obese in the 2013-2014 National Health and Nutrition Examination Survey (NHANES; Flegal, Kruszon-Moran, Carroll, Fryar, & Ogden, 2016). This disparity is worsening over time, as overweight prevalence among Hispanic adolescents increased 120% from 1986-1998 compared to a 50% increase among white adolescents (Albrecht & Gordon-Larsen, 2013). Attributable to the strong link to obesity, predictably, Hispanic Americans are at a greater risk of developing T2DM. Compared to non-Hispanic whites, the risk of being diagnosed with diabetes is 66% higher for Hispanic adults. This disparity is even greater for certain ethnicities within the Hispanic culture, with an 87% higher risk for Mexican Americans and 94% higher risk for Puerto Ricans (CDC, 2011). According to the U.S. Census Bureau, Hispanics represented the largest minority group in the U.S. As of July 1, 2012, 16.9% of the U.S. population and 38.2% of the Texas population identified as

Hispanic or Latino (U.S. Department of Commerce, 2015). Additionally, the Hispanic population is the fastest growing segment of the population, increasing by 9.7% between 2000 and 2010, outpacing the overall population growth by four times (Ennis, Rios-Vargas, & Albert, 2010). Given that this large and rapidly growing population is disproportionately affected by diabetes and diabetes related complications, successful nutrition and lifestyle interventions could have a dramatic impact on health and quality of life of a large segment of the U.S. population.

Access to healthcare services is often limited for low-income, uninsured minorities, especially those with undocumented immigration status. Healthcare access is critical for the proper diagnosis and treatment of T2DM, where inadequate access is likely to lead to poor glycemic control and thus poor outcomes. In a cross-sectional analysis of the 2007 California Health Interview Survey (CHIS), the researchers compared healthcare access and utilization by documented and undocumented Mexican immigrants residing in California (Vargas Bustamante et al., 2012). They found that only 46.6% of undocumented immigrants from Mexico reported a usual place to go when sick, and only 56.8% had seen a doctor in the past year (Vargas Bustamante et al., 2012). Another study of immigrant farmworkers found that only 37% of those interviewed had used medical care in the past year, despite 49% of them reporting poor or fair physical health (López-Cevallos, Lee, & Donlan, 2014). If over half of these individuals do not have access to regular healthcare, important screening, treatment, and health education is likely not being conducted. Federally Qualified Health Centers (FQHCs) can serve as a

safety net for undocumented immigrants. However, a recent audit demonstrated that those with limited English proficiency still experience difficulty accessing FQHCs in certain locations (Nathenson, Saloner, Richards, & Rhodes, 2016). Faith-based organizations and clinics, often with free or sliding-scale healthcare provided, represent an opportunity for underserved undocumented immigrants to access healthcare. Previous studies have demonstrated these to be effective locations for health promotion interventions (Arredondo et al., 2015; Kim et al., 2016).

Hispanic Americans and immigrants face numerous barriers not only to accessing healthcare to treat conditions like diabetes, but they also face barriers in applying diet and lifestyle recommendations to prevent or manage diabetes. In a focus group study conducted in a low-income Latino neighborhood in California, researchers determined that some key barriers to eating healthy among the participants were inability to afford healthy food, inadequate transportation, language barriers, work conditions, and immigration status (Chaufan, Constantino, & Davis, 2012). The focus group participants reported a high cost of "healthy" foods such as produce at local neighborhood markets, while inexpensive foods such as instant soup and pizza was readily available at a low price. The respondents also reported that less expensive produce was available at larger chain supermarkets, but that shopping at those stores often involved taking multiple busses and occupied a large portion of their day. One participant stated "For instance, I am diabetic. I now know I must eat vegetables...and sometimes we don't have enough money to buy that special food for me" (Chaufan et al., 2012). Work conditions also

interfere with their ability to implement diet recommendations. A consistent carbohydrate diet, in which a person consumes a pre-determined amount of carbohydrate spaced regularly throughout the day, is often recommended for glycemic control, but may be difficult for low-income immigrant workers to implement. Several participants in the focus group reported working multiple jobs and long hours to acquire an adequate income to meet basic needs. Additionally, they reported not being allowed to take any breaks during their work day, preventing them from consuming regular meals as recommended. A diabetes education program designed for this population would need to account for these barriers in order to provide reasonable interventions to achieve desired outcomes.

Health literacy and numeracy are also important factors affecting an individual's ability to comprehend and implement any health recommendations. Health literacy refers to an individual's ability to understand and apply health information. It is estimated that as many as half of Americans have low health literacy affecting their ability to act on health information (Sørensen et al., 2012). Health numeracy is a type of health literacy involving an individual's ability to use quantitative skills in health management (White, Wolff, Cavanaugh, & Rothman, 2010). Health numeracy is especially important in the nutritional management of diabetes, as quantitative skills are required for measuring or estimating portion sizes, understanding food labels, and counting carbohydrates (White et al., 2010). However, a 2003 assessment of adult health literacy by the U.S. Department of Education found that only 4% of Hispanic adults demonstrated proficient health literacy,

and 41% exhibited health literacy below a basic level (Kutner, Greenburg, Jin, & Paulsen, 2006). It has been well established that individuals with diabetes who have low health literacy and numeracy tend to have poor glycemic control and worse health outcomes than those with more proficient levels of health literacy and numeracy (White et al., 2010). Thus, diabetes education programs must appropriately account for the health literacy and numeracy skills of the target population.

Diabetes Treatment

The goal of treatment for diabetes is to achieve adequate glycemic control, defined as hemoglobin A1c <7.0%, which has been shown to be a great indicator of risk of developing microvascular or macrovascular complications from diabetes (Chamberlain, Rhinehart, Shaefer, & Neuman, 2016). Treatment often includes a combination of oral glucose-lowering medications, insulin therapy, dietary changes, and lifestyle modification. Diabetes self-management education (DSME) is a process of teaching individuals dietary and lifestyle modifications to manage diabetes, to prevent diabetes, or to delay the onset of diabetes. In the 2016 Standards of Medical Care in Diabetes, the American Diabetes Association (ADA) recommended that individuals with diabetes should receive DSME when diabetes is diagnosed and on an ongoing basis (Chamberlain et al., 2016). Studies have shown that DSME is effective at reducing hospital admissions and readmissions as well lowering healthcare costs among patients with diabetes (Duncan et al., 2011; Healy, Black, Harris, Lorenz, & Dungan, 2013). Further, the ADA stated that DSME programs were appropriate for those with pre-

diabetes in order to develop and maintain skills and behaviors needed to prevent or delay onset of diabetes, and that DSME can result in improved outcomes for those with diabetes or pre-diabetes. The Academy of Nutrition and Dietetics (AND) position paper stated that diabetes self-management education and support (DSME/S) has been shown to not only reduce HbA1c by up to 1%, but that it has been shown to have other clinical and psychological benefits including improving quality of life, enhancing self-efficacy, reducing diabetes complications, and decreasing stress related to diabetes (Powers et al., 2016). However, despite the recommendations and numerous established benefits for DSME, low-income, uninsured minorities often do not receive adequate DSME needed to successfully execute self-management for glycemic control (Shaw, Killeen, Sullivan, & Bowman, 2011). The AND noted that DSME has historically been delivered in a traditional outpatient clinical setting, but that increased access may be achieved when DSME is offered in other non-traditional settings such as pharmacies, community health centers, and via technology (Powers et al., 2016).

Monitoring carbohydrate intake and considering the blood glucose response to carbohydrate intake are keys to glycemic control (ADA, 2016). Despite advances in medications available to assist with glycemic control, adequate control cannot be achieved without adherence to an appropriate eating plan (Mechanick et al., 2012). A 2011 meta-analysis demonstrated that low carbohydrate diets improved glycemic control when compared to control diets, such as low-fat or conventional carbohydrate diets (Ajala, English, & Pinkney, 2013). Carbohydrate counting involves tracking the amount

of carbohydrates consumed in grams, establishing target carbohydrate intake for meals, and balancing carbohydrate intake with physical activity and diabetes medications. While limited research has evaluated the effect of carbohydrate counting for individuals with T2DM, a systematic review demonstrated significant reduction of HbA1c in Type 1 diabetic patients after the introduction of carbohydrate counting techniques (Schmidt, Schelde, & Nørgaard, 2014). However, studies have shown that carbohydrate counting may be one of the more difficult aspects of diabetes self-management, especially for low-literacy individuals (Martins, Ambrosio, Nery, Aquino, & Queiroz, 2014). In order to properly apply carbohydrate counting, an individual must be able to identify carbohydrate foods, determine the carbohydrate content of a food serving, and determine the total carbohydrate amount consumed in a particular meal or snack (Ortiz et al., 2014). In a cross-sectional study of 21 patients with T2DM at the *Hospital das Clinicas* of the School of Medicine, Sao Paulo, subjects attended 3 sessions of carbohydrate counting education, totaling 4 hours of education. The researchers found that although a significant reduction in HbA1c was observed a year after attending the final carbohydrate counting class, 66% of the patients in the study reported that the carbohydrate counting method was difficult (Martins et al., 2014).

The plate method, a means of teaching healthy eating habits through a visual representation of a dinner plate, was developed by the Swedish Diabetic Association in 1987 as a simple method of nutrition education (Camelon et al., 1998). The plate method demonstrates a method of assembling a meal by dividing the plate into three sections,

with half the plate dedicated to non-starchy vegetables, a quarter of the plate for grains and carbohydrate foods, and a quarter for meat and meat alternatives. The visual representation provides emphasis on building meals with appropriate portions of the different food groups, even if the individual has no knowledge of correct servings sizes or measurements. A benefit of the plate method is its simplicity; no math is involved, unlike the carbohydrate counting method. This makes the plate method a potential tool for teaching nutrition interventions to individuals with low literacy and low numeracy. In a randomized controlled trial, researchers compared the effectiveness of carbohydrate counting and a modified plate method of diabetes nutrition education delivered by a certified diabetes educator (CDE) versus general health education (Bowen et al., 2016). In the study, 150 participants with T2DM were randomized into either a carbohydrate gram counting group, a modified plate method group, or an attention control group which received general health education. At a 6-month follow-up, significant reductions in HbA1c were seen for participants in both the carbohydrate gram counting group ($p = 0.04$) and the modified plate method group ($p < 0.001$), while the reduction in HbA1c for the attention control group was not statistically significant ($p = 0.34$). However, when numeracy scores were taken into account, researchers observed important differences in outcomes between the carbohydrate counting group and the modified plate method group. While only subjects with high numeracy scores saw HbA1c improvements in the carbohydrate gram counting group, those with both high and low numeracy scores saw HbA1c reductions in the modified plate method group. Subjects in the modified plate

method group also saw significantly improved self-efficacy scores compared to baseline at the 6-month follow up, and no significant change was noted in the carbohydrate gram counting group. The researchers concluded that the plate method may be easier for individuals of all knowledge and skill levels to apply due to its simplicity, whereas the carbohydrate gram counting method requires advanced numeracy skills (Bowen et al., 2016).

Another benefit of the plate method is the relative flexibility and applicability to a wide range of cultural and personal eating habits. While appropriate portions of the different food groups are specified, a wide range of foods can fit into each food group. This makes the plate method an ideal tool for adaptation to culturally sensitive nutrition education, allowing instructors to tailor the education by using foods typically found in the individual's cuisine. The method can be further adapted to the individual by asking the student about foods typically consumed and then formulating meals using those foods in appropriate portions based on the plate method. Thus, the individual is taught meal planning techniques using foods familiar to and enjoyed by them, possibly improving dietary compliance.

Culturally Competent Diabetes Education

The U.S. Department of Education has reported low health literacy and numeracy among Hispanics in the United States (Kutner et al., 2006). This minority group is also at increased risk for developing T2DM and experiences worse clinical outcomes associated with the disease (CDC, 2011). Evaluation of the 2005-2008 National Health and

Nutrition Examination Survey (NHANES) indicated that knowledge of HbA1c, blood pressure, and cholesterol levels was highest among non-Hispanic whites and those with higher incomes and education levels, and lowest among Mexican Americans (Stark Casagrande et al., 2012). Development of culturally acceptable, understandable diabetes education materials and education programs for Mexican Americans could improve the health outcomes for a large and growing portion of the population who is currently underserved in healthcare. A survey of low-income minority women with gestational diabetes revealed low perceived self-efficacy in adhering to nutrition-related recommendations for management of their blood glucose (Yee, McGuire, Taylor, Niznik, & Simon, 2016). Two key findings from semi-structured interviews were that the women expressed difficulties in using and decoding nutrition labels, and that they found it difficult to balance the nutrition recommendations with their own taste preferences and cultural norms (Yee et al., 2016).

Several studies have examined culturally competent community-based diabetes education programs. The Starr County Diabetes Education Study, a longitudinal community-based diabetes intervention study conducted from 1994 to 1998, investigated the development of a culturally competent diabetes education program (Brown & Hanis, 1999). The researchers began with a community assessment in Starr County, a Texas-Mexico border community with a population reported as 97% Mexican American and a high prevalence of diabetes. Some key revelations from the community assessment were that the respondents did not have a good understanding of the concept of “blood sugar,”

they wanted to avoid complicated exchange lists, they would not use currently available diabetes education materials due to literacy levels, they wanted their family members involved in care, and they resented being told that they should not eat Mexican American foods (Brown & Hanis, 1999). These findings highlighted the need to develop culturally competent, simple, easy to understand diabetes education materials and programs which do not instruct individuals to avoid foods which they find important and which do not involve advanced numeracy or literacy skills.

In development of the PRIDE (Partnership to Improve Diabetes Education) Toolkit, researchers aimed to develop culturally sensitive diabetes education materials for a low-literacy, low-numeracy Hispanic population (Wolff et al., 2016). Merely translating English language diabetes education materials will not produce culturally and linguistically appropriate education materials for this population. In revising already available education materials from the ADA and American Association of Diabetes Educators (AADE), the researchers noted the importance of adapting those materials for cultural influences, addressing functional health ability, and addressing patients' ability to afford treatment. Education materials were adapted from existing materials by a team of healthcare providers (physicians, registered dietitians, certified diabetes educators, and a behavioral psychologist) using the Suitability Assessment of Materials (SAM) tool to ensure suitability for low-literacy patients. Additionally, prior to finalization of the education materials, the team sought feedback from both patients and healthcare providers on the usability and appropriateness of the materials (Wolff et al., 2016). The

resulting education materials were evaluated by two independent raters, and all 30 modules received “superior” scores, as defined as a SAM score of >70%. The raters concluded that the PRIDE toolkit was acceptable for use by all members of the multidisciplinary healthcare team to assist patients with low health literacy and numeracy skills to manage their diabetes (Wolff et al., 2016). However, the study did not examine the ability of the education materials to improve diabetes knowledge in this patient population.

Peer Educators

Access to health care is often a major challenge for the low-income, uninsured Hispanic population, so traditional health education programs provided at local clinics and hospitals are likely to be inaccessible. Previous community-based health education programs have demonstrated efficacy in use of community health workers, lay educators, or peer educators to deliver important health improvement or disease prevention messages to low-income populations. A systematic review which examined 61 studies involving community health workers demonstrated that community health workers were most often utilized in cancer prevention and cardiovascular risk reduction (Kim et al., 2016). Community health workers were found to be effective in a range of roles, including health education, counseling, case management, assisting in healthcare navigation, social services, and social support. The researchers concluded that interventions by community health workers can be beneficial and cost-effective for management and prevention of certain conditions, especially among underserved, low-

income minority groups (Kim et al., 2016). The Lay Health Educator Program (LHEP) at Johns Hopkins University is a 10-week program which recruits and trains individuals from local congregations. On completion of the program, the lay health educators are expected to serve the community in which they reside by conducting health promotion events and disseminating reliable health information (Galiatsatos et al., 2016). In a review of programs delivered by LHEP graduates in 2013 and 2014, the program managers found that the lay educators reached 2004 members of their community with health promotion messages on a wide variety of topics, including depression, heart disease, diabetes, nutrition, stroke, medication management, and oral health, among others (Galiatsatos et al., 2016). While the lay educators in this review appear to have reached a large number of people, the review did not examine the efficacy of the programs delivered.

The Community Diabetes Education for Uninsured Mexican Americans (CoDE) program demonstrated statistically significant reductions in HbA1c ($p<0.01$) in subjects who participated in a 12-month program with education and support by paid community health workers (Culica, Walton, & Prezio, 2007). Researchers determined that the program costs were $461 per patient per year, including the salary of the community health worker. However, compliance in this program was low. Only 55 participants of the initial 162 who enrolled in the program (34%) completed the 12-month follow-up and only 36 (22%) participants were determined to be compliant with quarterly visits (Culica et al., 2007). This lack of participation was likely due to the time requirement involved

for the patients, requiring three initial 60-minute visits followed by 30-60 minute quarterly visits over a 12-month period. In a low-income uninsured population, individuals are likely working multiple jobs and may also experience transportation challenges, making long-term interventions with high time requirements difficult to implement.

In another community-based program, researchers at the National Hispanic Council on Aging evaluated the efficacy of a large community outreach program utilizing *promotoras de salud* (community workers) and culturally appropriate education materials (Cruz, Hernandez-Lane, Cohello, & Bautista, 2013). This large community intervention resulted in 26% improvement of diabetes knowledge when comparing pre-test and post-test scores. Researchers concluded that culturally sensitive, linguistically appropriate education taught by *promotoras de salud* is an effective method for delivering diabetes education to the Hispanic population (Cruz et al., 2013). However, this study did not make a comparison between those taught by *promotoras de salud* and those taught by non-Spanish speaking health professionals speaking through an interpreter. In contrast, Project Dulce, an ADA recognized peer-led diabetes education program, did compare clinical outcomes of a control group receiving usual care at a clinic and those receiving DSME by a peer educator, although "usual care" was not defined by the study. Patients assigned to the intervention group (n = 104) attended 8 weekly peer-led diabetes education sessions. Peer educators received 40 hours of training and were required to demonstrate specific competencies prior to leading diabetes education sessions. In this

parallel-group randomized clinical trial of 207 Mexican-American patients with HbA1c >8%, researchers demonstrated significant improvements in HbA1c (-1.5%, p = 0.01) from baseline to 10 months in the peer-led group, but no significant improvement in the control group (Philis-Tsimikas, Fortmann, Lleva-Ocana, Walker, & Gallo, 2011). However, similar to the results of the CoDE program, researchers reported significant barriers to participation. A total of 961 individuals were identified as eligible for the study, but 236 declined to participate due to barriers such as time constraints, lack of transportation, and lack of childcare (Philis-Tsimikas et al., 2011). This indicates that peer education can be an effective model for DSME in the low-income Hispanic population, but barriers to participation need to be accounted for when planning these peer-led programs. If DSME taught by community health workers is as effective or more effective than DSME taught by English-speaking health professionals in improving diabetes knowledge, a low-cost program to improve health of those with T2DM could be developed in underserved Hispanic communities.

Diabetes is a growing problem throughout the world and United States, and the low-income, uninsured Hispanic population is disproportionately affected by the disease. Despite efforts to develop culturally competent diabetes education programs, a large portion of this community still exhibits poor glycemic control and poor outcomes. Numerous barriers exist which prevent individuals from achieving optimal glycemic control, including limited access to healthcare, language barriers, low health literacy and numeracy, transportation, work conditions, time, and cultural barriers. Community health

workers, peer educators, and lay educators have been demonstrated to be effective at overcoming some of these barriers in the management of diabetes and other chronic diseases. However, the studies reviewed required significant time commitments from participants, resulting in low participation and low compliance. There is a need for culturally competent diabetes education programs which deliver simple health messages without a large time commitment by the participants. Peer educators delivering culturally competent nutrition education at community health clinics during pre-scheduled appointments may be an opportunity to intervene with individuals who might not otherwise attend lengthy education sessions or programs.

CHAPTER III

OBJECTIVE AND HYPOTHESES

The objective of this study was to develop and test culturally sensitive diabetes education materials for a low-income, low-literacy Hispanic population and to examine the difference in learning and acceptability of DSME nutrition education taught by a medical or nutrition professional speaking through an interpreter compared to those taught by Spanish-speaking peer educators from the community being served. The null hypotheses of this study were: (1) there is no difference in DSME nutrition knowledge gained by low-income, low-literacy Hispanic participants taught by Spanish-speaking peer educators compared to those taught by medical or nutrition professionals speaking through an interpreter, (2) there is no difference in the acceptability of DSME nutrition education by low-income, low-literacy Hispanic participants taught by Spanish-speaking peer educators compared to those taught by medical or nutrition professionals speaking through an interpreter, and (3) there is no difference in intent to modify nutritional behavior by low-income, low-literacy Hispanic participants taught by Spanish-speaking peer educators compared to those taught by medical or nutrition professionals speaking through an interpreter. While other studies have examined the use of peer educators in the community for long-term health interventions, this study examined the use of peer educators for concise (<30 minutes) nutrition education delivered at a community clinic

to patients already there to receive care. This likely represents the time constraint that many in this population are willing and able to commit to due to obligations of multiple jobs, family, and transportation challenges.

CHAPTER IV

RESEARCH DESIGN AND METHODS

Subjects

Participants for this study were recruited at the *Casa El Buen Samaritano* Clinic in Houston, TX from October 2015 to August 2016. Potential participants were identified by clinic staff as either having a diagnosis of diabetes mellitus or having risk factors for developing the disease. Subjects recruited were Spanish-speaking Hispanic patients receiving care at the clinic and were adults ages 18 and older. Additionally, family members and caregivers of patients were invited to participate in the study, particularly if they reported involvement in the patient's care and meal preparation. A total of 67 patients and caregivers were approached to participate in the study and a total of 51 consented to participate. Of those, completed pre-tests and post-tests were collected from a total of 48 subjects. Post-study surveys were completed by 46 subjects. Due to concerns about immigration status, anonymity is of particular concern for this population of subjects. Therefore, no identifiable or personal data were collected nor was any information on age, gender, or country of origin, because providing the information may have discouraged participation of some subjects.

Study Design

Diabetes education materials designed using the plate method of carbohydrate management were designed with the assistance of a Spanish interpreter and then were

reviewed by Spanish-speaking clinic staff and volunteers for readability, appropriate language, and inclusion of foods which are consumed by the target audience. Peer educators, identified by clinic staff as individuals respected in their community who also had risk factors for T2DM or a diagnosis of T2DM, were also given the opportunity to provide feedback on education materials prior to finalization. Peer educators were critical in this process, as they pointed out that consumption of three meals per day is often not reasonable for many in this population due to working multiple jobs and family commitments. Undocumented status of these individuals often means that they are not working in jobs which comply with Department of Labor laws regarding meal and break times. Therefore, peer educators recommended development of a separate handout which listed portable snacks of appropriate carbohydrate content which can be carried to work. Such a handout was designed with input from peer educators and clinic volunteers to ensure culturally appropriate foods as well as language were used on the handout. Participants who consented to participate in the study were all provided the same Spanish language education materials developed for this study. Participants who did not consent to the study but who desired information on diabetes management were also provided the education materials and attended the class, but did not complete pre-tests, post-tests, or surveys. In order to optimize participation, education sessions were conducted at the clinic in conjunction with pre-scheduled appointments. When possible, the sessions were conducted after fasting lab draw while the patient was waiting for his or her provider

appointment. Snacks of appropriate carbohydrate content were offered to prevent hypoglycemic episodes following the fasting labs.

Subjects were either assigned to receive usual care (UC) diabetes nutrition education or culturally sensitive (CS) diabetes nutrition education. Lesson plans for both groups were identical and focused on identification of carbohydrate foods and use of the plate method of carbohydrate management in which ½ of a 9-inch plate is filled with non-starchy vegetables, ¼ with protein foods, and ¼ with carbohydrate foods. Food models, plates, and measuring cups were used to demonstrate appropriate portions of carbohydrate foods. At the end of the lesson, subjects were invited to participate in a hands-on activity using food models and a plate to design appropriate meals using the plate method.

Subjects in the UC group were taught by an English-speaking health professional (nurse, nurse practitioner, or registered dietitian) speaking through an interpreter, as is often done in the clinical setting. Subjects in the CS group were taught an identical lesson plan taught by a peer educator who previously received training on the subject and lesson plan from a registered dietitian. A bilingual certified diabetes educator attended the first peer educator taught education session to verify that the lesson plan was correctly followed.

Learning achieved was assessed by comparing pre-test and post-test scores. Subjects were tested on ability to correctly identify carbohydrate foods from a list of sample foods, appropriate portion sizes of carbohydrate foods, meal composition, and

tools for managing diabetes. Attitudes regarding the diabetes education provided were assessed using a Likert-scale survey after the post-test. The survey included questions about the readability and comprehensibility of the education materials, the ease of understanding the instructor, the usefulness of the material presented, the ability of the subject to make healthy meal choices, and the intent of the subject to make diet changes based on what was learned in class.

Statistics

Statistical analyses were conducted using IBM® SPSS® Statistics Version 23. Comparisons of pre-test and post-test means was conducted using the paired sample t-test. Analysis of between group differences of pre-test and post-test scores was conducted using univariate analysis of variance (ANOVA). Between group differences in survey responses were evaluated using the non-parametric Mann-Whitney U test.

CHAPTER V

RESULTS

Pre-test and post-test scores for each group were summarized (Table 1). There was no significant difference detected in mean pre-test scores between UC (n=23, 8.22 ± 1.98) and CS (n=25, 8.72 ± 1.70) groups (p=0.479). Significant improvement was seen in mean post-test scores (12.10 ± 2.45) when compared to mean pretest scores (8.48 ± 1.83) for all subjects (p=0.002), however no significant between-subjects difference in means was observed for post-test scores (p=0.696) or for mean differences in scores (p=0.162). Increase in test scores from pre-test to post-test represents a 43% increase within all groups (UC, CS, and all subjects), representing significant increase in knowledge.

Table 1

Mean Pre-Test, Post-Test and Differences Between Scores

	N	Pre-Test Scores[a]	Post-Test Scores[a]	Difference[b]
All Subjects	48	8.48 ±1.83	12.10 ± 2.45	+3.63 (2.95, 4.30)*
Usual Care	23	8.22 ± 1.98	11.74 ± 2.63	+3.52 (2.37, 4.67)*
Culturally Sensitive	25	8.72 ± 1.70	12.44 ± 2.27	+3.72 (2.87, 4.57)*

[a] Mean ± Standard deviation. [b] Paired samples difference pre-test to post-test (95% Confidence Interval).

*p<0.001

Pre-test and post-test scores were summarized by question type (carbohydrate identification, serving and portion sizes, and general diabetes questions) (Table 2). Analysis by question type produced similar results to overall test results analysis, with

significant improvement seen for all question types ($p<0.001$); however, no significant difference was observed between UC and CS groups.

Table 2

Pre-Test and Post-Test Scores by Question Type

	# of Questions	Pre-Test[a]	Post-Test[a]	Difference[b]
Carbohydrate Identification	13	6.63 ± 1.36	8.67 ± 1.93	2.04 (1.36, 2.73)*
Serving Size / Portion Size	2	0.27 ± 0.54	1.00 ± 0.74	0.73 (0.51, 0.95)*
General Diabetes Knowledge	3	1.50 ± 1.07	2.29 ± 0.92	0.73 (0.51, 0.95)*

[a] Mean score ± Standard deviation. [b] Paired samples difference (95% Confidence Interval)
*$p<0.001$

Post-test survey results were analyzed using the non-parametric Mann-Whitney U test (Table 3). Median scores for all questions were 5 (strongly agree) on the Likert scale for all survey statements; therefore, mean scores are reported instead of median scores. There were no significant differences in survey responses between UC and CS groups for survey statements 1, 3, or 4. However, significant differences were observed in mean responses for Statement 2, "The instructor was easy to understand" and Statement 5, "I plan on making at least one change in what I eat based on what I learned in class." Mean response for Statement 2 for UC (n=23, 4.26 ± 1.10), differed significantly from CS (n=23, 4.78 ± 0.74), M = 178 ($p=0.01$), indicating more ease in understanding the peer educator directing the CS group compared to the professional directing the UC group.

Statement 5 evaluated intent to change, and mean response for UC (n=24, 4.33 ± 0.96) differed significantly from CS (n=24, 4.71 ± 0.91), M = 209 (p=0.04).

Table 3

Post-Class Survey Results

Statement	UC[a]	CS[a]	M[b]	p-value
1. The handouts were easy to read and understand	4.79 ± 0.51	4.70 ± 0.70	262	0.66
2. The instructor was easy to understand	4.26 ± 1.10	4.78 ± 0.74	178	0.01
3. The material presented was useful to me	4.63 ± 0.58	4.55 ± 1.01	235	0.41
4. I understand how to make healthy food choices for managing diabetes	4.35 ± 0.83	4.54 ± 1.14	208	0.08
5. I plan on making at least one change in what I eat based on what I learned in class	4.33 ± 0.96	4.71 ± 0.91	209	0.04

[a] Mean ± Standard deviation. [b] M = Mann-Whitney U

CHAPTER VI

DISCUSSION

Diabetes is a rapidly growing problem for the United States, and underserved minorities are disproportionately suffering the many burdens of the disease. Determining methods to deliver simple, concise health education in a culturally sensitive manner for low-literacy, low-income Hispanic immigrants is critically important for improved health and quality of life. Community health clinics, often affiliated with a local church or religious organization and staffed by volunteers, provide much needed health care in many Hispanic communities throughout the country. These community health clinics provide a means of identifying individuals in need of DSME and serve as an ideal location to provide diabetes education. A major challenge facing these clinics, however, is often limited funding and reliance on volunteers, and therefore regular access to a CDE is likely not feasible for most clinics. This study demonstrated that culturally sensitive diabetes nutrition education materials, whether delivered by a professional healthcare worker or a trained peer educator from the community, can increase knowledge of carbohydrate management for blood glucose control. Although there was no significant difference in post-test scores between groups, subjects receiving instruction from a peer educator did respond more favorably to the post-class survey statement “the instructor was easy to understand.” This finding indicates that although knowledge increased in

both groups, the group receiving education from a peer educator felt like they understood the presented material better.

Diabetes nutrition education provided in this study involved simple, direct information on carbohydrate identification, meal composition, and appropriate serving sizes. Lessons were short (<30 minutes, not including testing and surveys) and did result in improved knowledge. However, a limitation of this study was that behavior modification was not evaluated. The final post-class survey question did evaluate intent to change, and the group receiving education from a peer educator did rate significantly higher intent to change on the survey. The *En Balance* study did demonstrate behavior change in Spanish-speaking Hispanic subjects with T2DM, with a significant increase in physical activity after 3 months of a culturally sensitive and language-sensitive diabetes education program taught in Spanish by bilingual educators (Wheeler et al., 2012). While a 3-month education series may not be feasible for the low-income population in this study, follow-up sessions at 3 months and 6 months to evaluate behavior change as well as blood markers of glycemic control such as fasting blood glucose, HbA1c, and serum lipids would be ideal to determine the education's efficacy to induce behavior change.

The relatively small sample sizes of both the subjects and peer educators in this study is another potential limitation of this study. Although significant differences were detected in within group analysis of pre-test and post-test scores, the sample size may have been too small to detect between-group differences in pre-test and post-test scores. Further studies with larger groups and at multiple community locations would be

beneficial. Additionally, although multiple peer educators were trained on the materials, only one peer educator was used throughout the study to avoid differences in peer educator teaching abilities from impacting results. However, when applied in community settings, the use of multiple peer educators is recommended to improve outreach to the largest number of people.

Numerous studies have demonstrated that trained community health workers, peer educators, or lay educators can be a cost-effective means of delivering important health education and support (Brown & Hanis, 1999; Galiatsatos et al., 2016; Kim et al., 2016; Philis-Tsimikas et al., 2014; Salto et al., 2011). However, these studies did not compare efficacy of the peer educators to usual care, and they involved time commitments beyond what many in this population are willing or able to attend. This study demonstrated that short, concise, culturally sensitive diabetes nutrition education delivered in a community clinic can result in improved diabetes knowledge whether taught by a certified health professional or a trained peer educator from the community being served. Furthermore, post-class survey questions revealed greater ease in understanding the instructor, as well as greater intent to make behavior changes, when the class was taught by a peer educator rather than a certified health professional.

CHAPTER VII

CONCLUSIONS

Consistent with the findings of previous studies, the current study demonstrated the efficacy of peer educators in delivering diabetes education in underserved minority communities. As demonstrated by Cruz et al., this study demonstrated that appropriately trained peer educators can successfully improve the diabetes knowledge in this low-literacy population (Cruz et al., 2013). The present study further built upon the success demonstrated by Cruz et al. by comparing the efficacy of the peer educators in improving diabetes knowledge to that of certified health professionals, demonstrating that the peer educators may be as good at improving diabetes knowledge as the health professionals.

A major challenge noted in this study, as previously noted by the Johns Hopkins LHEP lay educator program, was difficulty in identification and recruitment of peer educators (Galiatsatos et al., 2016). However, it appears to be worth the effort to identify and recruit members of the community being served to become health promoters. Peer educators, with proper training, can become an integral, cost-effective part of community health education in underserved Hispanic communities.

Development of culturally competent health education materials is imperative. While Spanish-language diabetes education materials exist, it has been reported that existing materials were not considered usable due to low literacy levels (Brown & Hanis, 1999). The Hispanic population in the United States is a diverse, heterogeneous

population with varying needs, literacy, and linguistics, so it is unlikely that a "one size fits all" approach to development of education materials will be successful. This study demonstrated that development of education materials with input from the community can result in a high level of acceptance of the materials, possibly increasing their efficacy. Continued efforts to reach out to and improve the health of the underserved immigrant Hispanic population are needed. The community health clinics which serve these communities are ideal places to implement education and outreach programs. The healthcare workers should consider training peer educators from the community as a cost-effective means to deliver diabetes education programs using education materials developed for the specific needs of their community.

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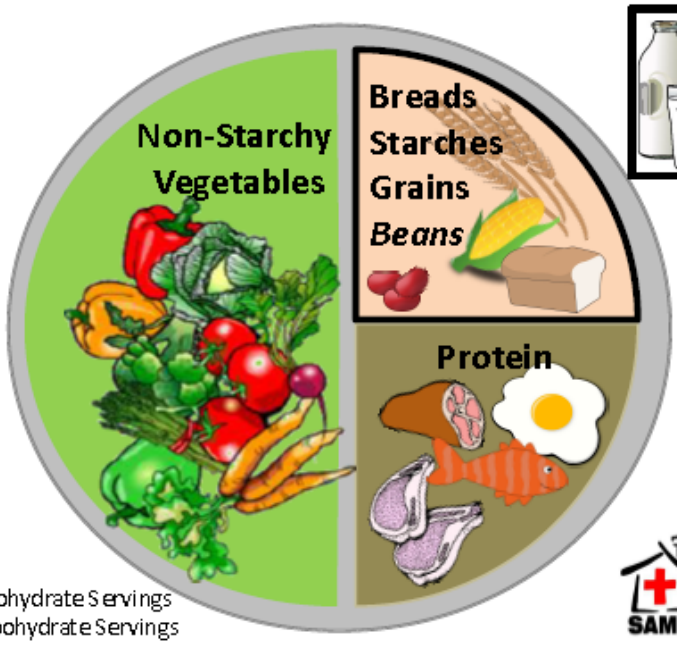
APPENDIX A

Diabetes Education Materials

Diabetes Meal Planning



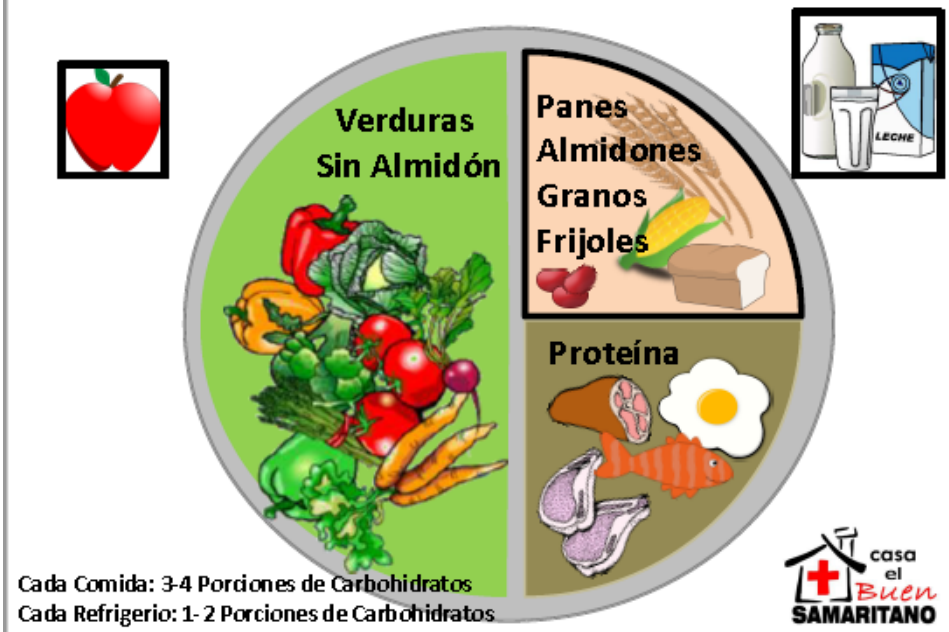
Meals: 3-4 Carbohydrate Servings
Snacks: 1-2 Carbohydrate Servings

casa el Buen SAMARITANO

Carbohydrate Foods – 1 Serving

1 Carbohydrate Serving = 15 grams				
Starches	Fruit	Starchy Vegetables	Dairy	Sweets
Bread - 1 Slice	Fresh Fruit – 1 Small	Corn – ½ Cup	Milk - 1 Cup	Cookies - 2 Small
Tortilla - 1 Small (6-inches)	Canned Fruit – ½ Cup	Peas – ½ Cup	Yogurt - 2/3 Cup (unsweetened)	Ice Cream - 1/2 Cup
Bagel – ¼ Large	Dried Fruit - 2 Tablespoons	Sweet Potato – ½ Medium	Soy Milk - 1 Cup	Frozen Yogurt - 1/2 Cup
Taco Shells - 2 Small (5-inches)	Berries - 1 Cup	Potato – ¼ Large		Syrup - 1 Tablespoon
Unsweetened Cereal – ¾ Cup	Melon - 1 Cup			Jam/Jelly - 1 Tablespoon
Cooked Cereal – ½ Cup	Fruit Juice - ½ Cup			Sugar - 1 Tablespoon
Crackers - 4-6 Small Crackers				Honey - 1 Tablespoon
Rice – 1/3 Cup				Agave - 1 Tablespoon
Pasta - 1/3 Cup				
Beans – ½ Cup				
Popcorn - 3 Cups				

Planificación de las Comidas



Cada Comida: 3-4 Porciones de Carbohidratos
Cada Refrigerio: 1- 2 Porciones de Carbohidratos

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Los Alimentos con Carbohidratos

1 Porcion = 15 gramos de Carbohidratos				
Almidones	Frutas	Verduras Con Almidón	Productos Lácteos	Dulces
Pan – 1 Rebanada	1 Fruta Fresca Pequeña	Maíz – ½ taza	Leche - 1 taza	Helado – ½ taza
1 Tortilla (6 pulgadas diametro)	Fruta Enlatada ½ taza	Chícharos – ½ taza	Yogurt no endulzado – 2/3 taza	Yogurt Helado – ½ taza
¼ Rosca de pan grande	Fruta Seca - 2 cucharadas	½ Mediano Camote	Leche de Soya – 1 taza	Jarabe - 1 Chucharada
2 Tortillas para taco (5 pulgadas)	Moras - 1 taza	¼ Papa Grande		Mermelada – 1 Chucharada
Cereal sin azúcar – ¾ taza	Melón - 1 taza			Azúcar - 1 Chucharada
Cereal cocido – ½ taza	Jugo de Fruta- ½ taza			Miel - 1 Chucharada
4-6 Galletas saladas pequeñas				Agave - 1 Chucharada
Arroz – 1/3 taza				
Pasta - 1/3 taza				
Frijoles – ½ taza				
Palomitas de maiz (ya preparadas) – 3 tazas				

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Tips for Good Diabetes Control

- Check your blood glucose daily
  - Fasting: 80-130*
  - 2 hours after meals: less than 180*
- Eat every 4-5 hours
- Limit meals to 3-4 Carbohydrate servings
- Limit snacks to 1-2 Carbohydrate servings
- Get some physical activity every day

Snack Suggestions

1 Carbohydrate Serving Each Choose 1-2 Snacks
1 ¼ Cup Strawberries
½ Cup Sugar-Free Pudding
1 Small Granola Bar
5 Celery Stalks with 2 Tablespoons Peanut Butter
10 Baby Carrots with 5 Tablespoons Hummus
¼ Cup Nuts with 1 Tablespoon Raisins
6 Whole Wheat Crackers and 1oz String Cheese
1 Cup Cooked Soy Beans (edamame), unsalted
2 Rice Cakes
1 Small Apple, Peach, or Orange
10-15 Grapes
1 oz Tortilla Chips with 3 Tbsp Salsa
6 oz Light Yogurt (Sugar-Free)
½ Turkey Sandwich
6-Inch Tortilla with 1oz Cheese

Consejos para controlar la diabetes

- Control de la glucosa
  - Glucosa plasmática preprandial (antes de comer): 80–130
  - Glucosa plasmática posprandial (1-2 horas después del inicio de la comida): Menos de 180
- Comer cada 4-5 horas
- Cada Comida: 3-4 Porciones de Carbohidratos
- Cada Refrigerio: 1-2 Porciones de Carbohidratos
- Estar activos todos los días

Sugerencias de Meriendas

1 Porción de Carbohidratos Seleccione 1-2 meriendas
1 ¼ Taza de Fresas
½ Taza de Pudding ("sugar-free")
1 Barra de Granola Pequeña
5 Palitos de Apio o Celery con 2 Cucharadas de Mantequilla de Mani
10 Zanahorias Pequeñas con 5 chucharadas de humus
¼ Taza de Nueces con 1 Cucharada de Pasas
6 galletas integrales con 1 onza de queso bajo en grasa
1 taza de habichuelas de soya (edamame) sin sal añadida
2 galletas de arroz
1 1 pequeña fruta (manzana , melocotón o naranja)
10-15 uvas
1 onza de tortilla chips con 3 chucharadas de salsa
6 onzas de yogurt ("sugar-free")
½ emparedado de pavo
1 Tortilla (6 pulgadas diametro) con 1 onza de queso

APPENDIX B

Pre-Test and Post-Test

Quiz Version A

Instructions: This is an anonymous quiz; please do not put your name on this quiz. Participation is voluntary. Results from this quiz will be used to evaluate the efficacy of nutrition education programs and to improve future nutrition education programs.

1. Which ONE of the following foods is MOST LIKELY to make blood sugar rise?

Butter_____	Grilled Chicken_____	Tortilla_____
Diet Soda_____	Steak_____	Cheese_____

2. Which of the following foods will increase blood sugar (mark all that apply)?

__Apple	__Grilled Chicken
__Whole Milk	__Cheese
__Tortilla	__Skim (Fat-free) Milk
__Pasta	__Sugar-free Candy
__Grilled Fish	__Bacon
__Diet Soda	__Orange Juice

3. True or False: If you have diabetes, you should NEVER eat foods with carbohydrates.

4. If you have diabetes, how many servings of carbohydrates should you aim for in a typical meal?

5. If you want to eat one serving of rice with your meal, how much rice should you eat (use either household measurements such as teaspoon, tablespoon, or cup, or describe what the amount of rice looks like)?

6. True or False: If you have diabetes, you should eat meals which contain a mix of carbohydrates, protein, and some fat.

7. True or False: Diet, exercise, and medication can help maintain good blood sugar levels in order to avoid serious health complications of diabetes.

Cuestionario Versión A

Instrucciones: Esta es una prueba anónima. Por favor no ponga su nombre en esta prueba. La participación es voluntaria. Los resultados de esta prueba serán usados para evaluar la eficacia de programas educacionales de nutrición y para mejorar los programas de nutrición en el futuro.

1. Cual de los siguientes alimentos es MAS PROBABLE que eleve los niveles de azúcar en la sangre?

   Mantequilla_____ Pollo Asado_____ Tortilla_____
   Refresco de Dieta_____ Bistec_____ Queso_____

2. Cuales de los siguientes alimentos incrementarían el azúcar en la sangre? (marque todas las que correspondan)

   __Manzana __Pollo Asado
   __Leche Entera __Queso
   __Tortilla __Leche (Libre de Grasa) Descremada
   __Pasta __Dulce Libre de Azúcar
   __Pescado Asado __Tocino
   __Refresco de Dieta __Jugo de Naranja

3. Falso o Verdadero: Si usted tiene diabetes, usted NUNCA debe comer alimentos con carbohidratos.

4. Si usted tiene diabetes, cuantas porciones de carbohidratos debe de incluir en una comida tipica?

5. Si usted quiere comer una porción de arroz en su comida, cuanto arroz debería de comer (use
   cualquier de las medidas comunes o describa como se vería la cantidad de arroz)?

6. Falso o Verdadero: Si usted tiene diabetes, usted debe comer alimentos que contengan una combinación de carbohidratos, proteína, y algo de grasa.

7. Falso o Verdadero: Dieta, ejercicio, y medicación pueden ayudarle a mantener buenos niveles deazúcar para evitar serias complicaciones de diabetes en su salud.

Quiz Version B

Instructions: This is an anonymous quiz; please do not put your name on this quiz. Participation is voluntary. Results from this quiz will be used to evaluate the efficacy of nutrition education programs and to improve future nutrition education programs.

1. Which ONE of the following foods is MOST LIKELY to make blood sugar rise?
   Bacon_____ Rice_____ Sugar-Free Candy_____
   Diet Soda_____ Peppers_____ Grilled Fish_____

2. True or False: If you have diabetes, you should NEVER eat foods with carbohydrates.

3. If you have diabetes, how many servings of carbohydrates should you aim for in a typical snack?

4. If you want to eat one serving of beans with your meal, how much beans should you eat (use either household measurements such as teaspoon, tablespoon, or cup, or describe what the amount of beans looks like)?

5. True or False: If you have diabetes, you should eat meals which contain only protein.

6. Which of the following can help you manage diabetes to prevent serious complications (mark all that apply)?

   Diet___ Exercise___ Medications___

7. Which of the following foods will increase blood sugar (mark all that apply)?
   __Lettuce __Cucumber
   __Cheese __Whole Milk
   __Tortilla __Skim (Fat-free) Milk
   __Cookie __Grilled Chicken
   __Bacon __Pasta
   __Diet Soda __Apple Juice

Cuestionario Versión B

Instrucciones: Esta es una prueba anónima. Por favor no ponga su nombre en esta prueba. La participación es voluntaria. Los resultados de esta prueba serán usados para evaluar la eficacia de programas educacionales de nutrición y para mejorar los programas de nutrición en el futuro.

1. Cual de los siguientes alimentos es MAS PROBABLE que eleve los niveles de azúcar en la sangre?
   Tocino_____ Arroz_____ Dulce Libre de Azúcar _____
   Refresco de Dieta_____ Pimientos_____ Pescado Asado_____

2. Falso o Verdadero: Si usted tiene diabetes, usted NUNCA debe comer alimentos con carbohidratos.

3. Si usted tiene diabetes, cuantas porciones de carbohidratos debe de incluir en una refrigerio tipica?

4. Si usted quiere comer una porción de frijoles en su comida, cuanto frijoles debería de comer (use cualquier de las medidas comunes o describa como se vería la cantidad de frijoles)?

5. Falso o Verdadero: Si usted tiene diabetes , usted debe comer comidas que contienen sólo proteínas

6. Cuál de las siguientes puede ayudarle a controlar la diabetes para evitar complicaciones graves? (marque todas las que correspondan)
   Dieta___ Ejercicio___ Medicación___

7. Cuales de los siguientes alimentos incrementarían el azúcar en la sangre? (marque todas las que correspondan)
   __Lechuga __Pepino
   __Queso __Leche Entera
   __Tortilla __Leche (Libre de Grasa) Descremada
   __Galleta __ Pollo Asado
   __Tocino __Pasta
   __Refresco de Dieta __Jugo de Manzana

APPENDIX C

Post-Class Survey

Survey

Instructions: Please circle the number which is closest to how much you agree or disagree with each statement

		Strongly Disagree	Slightly Disagree	Neutral	Slightly Agree	Strongly Agree
1.	The handouts were easy to read and understand	1	2	3	4	5
2.	The instructor was easy to understand	1	2	3	4	5
3.	The material presented was useful to me	1	2	3	4	5
4.	I understand how to make healthy food choices for managing diabetes	1	2	3	4	5
5.	I plan on making at least one change in what I eat based on what I learned in class	1	2	3	4	5

Estudio

Instrucciones: Marque con un círculo el número que más se aproxime a qué tan de acuerdo o en desacuerdo con cada declaración

		Muy de Desacuerdo	Algo en Desacuerdo	Neutral	Partcialmente de Acuerdo	Muy de Acuerdo
1.	Los folletos eran fáciles de leer y entender	1	2	3	4	5
2.	El instructor era fácil de entender	1	2	3	4	5
3.	El material presentado fue útil para mí	1	2	3	4	5
4.	Entiendo cómo hacer la elección de alimentos saludables para controlar la diabetes	1	2	3	4	5
5.	Mi plan es hacer al menos un cambio en lo que como en base a lo que aprendí en la clase	1	2	3	4	5

APPENDIX D

IRB Exemption Approval

TWU
TEXAS WOMAN'S UNIVERSITY
DENTON DALLAS HOUSTON

Institutional Review Board
Office of Research
6700 Fannin, Houston, TX 77030
713-794-2480
mjackson3@twu.edu
http://www.twu.edu/irb.html

DATE: March 31, 2015

TO: Ms. Erikka Woods
Nutrition & Food Sciences - Houston

FROM: Institutional Review Board - Houston

Re: Exemption for Measuring acceptability and efficacy of culturally sensitive peer-taught diabetes nutrition education for a low-income, low-literacy, Spanish-speaking Hispanic population (Protocol #: 18071)

The above referenced study has been reviewed by the TWU Institutional Review Board (IRB) and was determined to be exempt from further review.

If applicable, agency approval letters must be submitted to the IRB upon receipt PRIOR to any data collection at that agency. Because a signed consent form is not required for exempt studies, the filing of signatures of participants with the TWU IRB is not necessary.

Although your protocol has been exempted from further IRB review and your protocol file has been closed, any modifications to this study must be submitted for review to the IRB using the Modification Request Form. Additionally, the IRB must be notified immediately of any adverse events or unanticipated problems. All forms are located on the IRB website. If you have any questions, please contact the TWU IRB.

cc. Ms. Rose Bush, Nutrition & Food Sciences - Houston
Dr. Carolyn Moore, Nutrition & Food Sciences - Houston
Graduate School