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EVALUATION OF A DIABETES SELF-MANAGEMENT PROGRAM FOR HISPANICS IN LEXINGTON KENTUCKY: A PILOT STUDY

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HISPANICS IN LEXINGTON KENTUCKY: A PILOT STUDY

THESIS

A thesis submitted in partial fulfillment of the
requirements for the degree of Master of Science in the
College of Agriculture, Food, and Environment
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By

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Lexington, Kentucky

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ABSTRACT OF THESIS

EVALUATION OF A DIABETES SELF-MANAGEMENT PROGRAM FOR
HISPANICS IN LEXINGTON KENTUCKY: A PILOT STUDY

Hispanics are more affected by diabetes than non-Hispanic whites and they tend to experience more severe complications. Research shows that although self-management is poor among ethnic minorities, it is even more so among Hispanics. The *"Taking Ownership of Your Diabetes"* (TOYD) program has been shown to be successful in helping individuals manage their diabetes. However, no work has been conducted with Hispanic audiences in Kentucky. TOYD program allows individuals to modify lifestyle risks and solve problems related to diabetes management. The program was translated from English to Spanish. Hispanics males and females between ages 19 to 75 years with type 2 diabetes were invited to participate in the study. A one group pretest-posttest design with a six-month follow-up was used in this study. McNemar tests, a paired *t*-test and Wilcoxon Signed Rank Tests were used for appropriate variables. This pilot study was shown to be effective in helping participants to move through the Stages of Change. This pilot study lasted for three weeks and it was observed that most of these gains were lost at the six-month follow-up time frame. It seems that interventions need to be of longer duration and that follow-up contact must be made with participants.

Miguel A. Gamboa Oropeza

November, 2016

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<u>November, 2016</u>
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DEDICATIONS

To my wife,

Luisyana

For her patience, support and love

&

My father, for his influence in health science and his amazing support

ACKNOWLEDGEMENTS

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CHAPTER 1

Background

Diabetes is a disorder of metabolism—the way the body uses digested food for energy (National Science Library, 2015). Diabetes is a condition primarily defined by the level of hyperglycemia giving rise to risk of microvascular damage (retinopathy, nephropathy and neuropathy). It is generally associated with reduced life expectancy, significant morbidity due to specific diabetes related microvascular complications, increased risk of macrovascular complications (ischemic heart disease, stroke and peripheral vascular disease), and diminished quality of life (WHO/IDF 2006).

Globally, diabetes affects 387 million individuals and causes 5.1 million deaths annually. Every six seconds a person dies from diabetes (IDF Diabetes Atlas, 2013). In the U.S., 29.1 million people of all ages are affected by diabetes. Of these, 21 million have been diagnosed while 8.1 million people are undiagnosed. The incidence of diabetes is higher among the aging population. Within the 45 to 64-year age group, there are 13.4 million individuals diagnosed with diabetes whereas among younger individuals the number diagnosed is 4.3 million. Higher incidences of diabetes also occur among men (15.5 million) versus women (13.4 million). Diabetes is the 7th leading cause of death in U.S.

The number of individuals with diabetes in Kentucky has more than tripled in the past 15 years. In 1995, 116,000 individuals in Kentucky were diagnosed with diabetes compared to 370,000 in 2010 (Kentucky Cabinet for Health and Family Services, 2011). The prevalence and impact of diabetes may be larger than we realize if we consider that an additional 127,200 individuals are undiagnosed, making a total of 497,200 with diabetes (Kentucky Diabetes Network, 2008). The problem is further exacerbated due to a high incidence of obesity and physical inactivity, which are major risk factors for the development of type 2 diabetes. An estimated 40 percent of all Kentuckians ages 40 to 74 are currently overweight or obese and can be classified as having pre-diabetes, and are likely to develop diabetes in the future (Kentucky Cabinet for Health and Family Services, 2011). Present statistics show Kentucky to have the 4th highest rate of diabetes in the nation (Trust for America's Health, 2016).

The rate of diagnosed diabetes is higher among minorities. For example, the National Diabetes Statistics Report showed that 13.2 % of Hispanics have diabetes compared to 7.6 % of non-Hispanic whites. Hispanics make up about 17% of the U.S population (54 million) and this number is expected to increase to 31% (128.8 million) by the year 2060, making the health of Hispanics a great concern for public health professionals, researchers, and policy makers alike.

Diabetes complications are responsible for 19% (114,977) of all hospitalizations with a total cost of 2,043,000,000 U.S. dollars in medical expenses and loss of productivity (Kentucky Cabinet for Health and Family Services, 2011). These costs and the impact of diabetes on the population can be reduced through modification of lifestyle risks, early diagnosis, appropriate health care, and self-management education (Kentucky Department of Public Health, 2005 p. 7). Recent statistics show Kentuckians falling short in the area of self-management education (Kentucky Cabinet for Health and Family Services, 2011). Research shows that although self-management is poor among ethnic minorities, it is even more so among Hispanics (Fortman, Gallo & Phillis-Tsimikas, 2011). In addition, Hispanics tend to have more severe complications from diabetes that many other minority groups (American Diabetes Association, 2013) and there is need for interventions that would improve self-management among Hispanic populations.

In order to reduce the impact of diabetes and to fill the gap in self-management education, the University of Kentucky Cooperative Extension developed a program, "*Taking Ownership of Your Diabetes*" (TOYD) to provide diabetes information in a format that is easy to understand and that allows individuals to modify lifestyle risks and solve problems related to diabetes management. A team of multi-disciplinary reviewers that included registered dietitians, an endocrinologist, and certified diabetes educators, reviewed the program for accuracy and a team of Family and Consumer Sciences (FCS) agents and individuals with type 2 diabetes ensured validity and relevance. This program was implemented among individuals in Kentucky and has shown success. However, there have been no interventions conducted using this program specifically among Hispanics. This research is conducted as a pilot study to fill the gap in this area and also to provide information as to the adequacy, strength and weaknesses of the "*Taking Ownership of Your Diabetes"* program among Hispanics. The goal of the project was to determine the effectiveness of the Taking Ownership of Your Diabetes program in diabetes self-management among a group of Hispanics living in Lexington, Kentucky.

Research Questions

(i) How effective is the "*Taking Ownership of Your Diabetes"* program in increasing awareness of type 2 diabetes and the problems associated with not managing the disease among Hispanics in Lexington?

(ii) Does taking part in the "*Taking Ownership of Your Diabetes"* program improve knowledge and attitudes related to managing type 2 diabetes among Hispanics in Lexington?

(iii) Does taking part in the "*Taking Ownership of Your Diabetes"* program increase the following behaviors among Hispanics:

a. Engaging in the recommended amount of physical activity

b. Seeing a health care provider and following the prescribed regimen as a means of managing diabetes

c. Implementing healthy eating practices

d. Setting and accomplishing goals

Hypotheses

(i) *"Taking Ownership of Your Diabetes"* program will increase awareness of type 2 diabetes and the problems associated with not managing the disease among Hispanics in Lexington, KY.

(ii) *"Taking Ownership of Your Diabetes"* program will improve knowledge and attitudes related to managing type 2 diabetes among Hispanics in Lexington.

(iii) Taking part in the "*Taking Ownership of Your Diabetes"* program increases the following behaviors among Hispanics:

a. Engaging in the recommended amount of physical activity

b. Seeing a health care provider and following the prescribed regimen as a means of managing diabetes

c. Implementing healthy eating practices

d. Setting and accomplishing goals

Significance: Hispanics have diabetes in much higher numbers than non-Hispanic whites and they tend to experience more severe complications. Kentucky research shows deficits in the area of self-management education among Hispanics. Research shows that although self-management is poor among ethnic minorities, it is even more so among Hispanics. The "*Taking Ownership of Your Diabetes"* program has been shown to be successful in helping individuals manage their diabetes. However, no work has been conducted with Hispanic audiences in Kentucky. This study will provide valuable information on self-management education with a group that is increasing in Kentucky. In addition, it stands to improve the health of Hispanics.

CHAPTER 2

Literature Review

  The goal of the project was to determine the effectiveness of the "*Taking Ownership of Your Diabetes"* program in diabetes self-management among a group of Hispanics living in Lexington, Kentucky.

Diabetes Self-management education among Hispanics: Community Health Workers approach

  Several studies have shown self-management education to be effective among Hispanics. Some of these studies were conducted using community health workers (CHW) and others have used peer support groups. Prezio *el al* (2013) used a randomized control design to examine the impact of a culturally tailored diabetes education program on the HbA1c, blood pressure, body mass index (BMI) and lipid status of uninsured Mexican-Americans with diabetes. The intervention group received a tailored diabetes program (CoDE) plus the usual medical care and the control group received usual medical care. One year later, the control group participants were asked if wanted to join the CoDe program. Neither researchers, participants, nor community health workers were blinded. The protocol was based on social cognitive theory where participants obtain knowledge and develop strategies to cope with different scenarios of diabetes management. Education material was offered in either English or Spanish for low-literacy population. This program consisted of three modules that were delivered individually in one hour sessions during eight weeks. Topics were: blood glucose self-monitoring, 24-hour diet recall, meal planning, use of medications, how to deal on sick days, information on ways to stop smoking, exercise and education about issues related to diabetes complications. At baseline, clinical measures were performed: HbA1c, blood pressure, height, weight, these measures were also collected quarterly for 12 months. Demographic characteristics and clinical outcomes were compared with independent samples t-tests and χ^2.

  Results showed that most of the subjects were married, non-smokers and middle age women with type 2 diabetes mellitus, who had this condition for less than 5 years and who had HbA1C $\geq$ 8%. Participants also had low levels of education. Intervention and control groups shown HbA1c improvement levels until first quarter, but beyond this point only the intervention group kept going with HbA1c improvement levels (1.6% p = <0.001). The improvement in HbA1c levels in the CoDE group indicates that this program is effective in improving glucose levels in Mexican-American women. There is evidence that diabetes education interventions should last over 6 months in order to produce significant changes in HbA1c levels. This is

supported when groups improved HbA1c levels after 6 months. Diabetes education benefits tend to disappear after 6 months, therefore CoDE program is designed to last over a year as maintenance.

Castillo, *et al* (2010) examined the effectiveness of a diabetes education program in improving the glycemic control and self-management skills in Hispanics/Latinos with type 2 diabetes. This program was also conducted by CHWs who recruited participants, delivered educational sessions and gathered data at two community self-care centers in a pilot study. They gave a 10-week diabetes self- management program to participants with the main outcome being the change in HbA1c before and after treatment. Secondary outcomes were self-efficacy, diabetes knowledge, consumption of fruits and vegetables, carbohydrates use, weight, physical activity and depressive symptomatology. Quantitative assessment measured short-term changes in diabetes. A qualitative assessment was performed also to further explain quantitative assessment.

The Diabetes Education Empowerment Program (DEEP) has two components. 1) The training of the community health workers and 2) The diabetes education program, which empowers people living with type 2 diabetes mellitus (T2DM) or who are at risk of developing the disease. The curriculum covered nutrition, physical activity, psychosocial issues designed for people with low-literacy. Measures were taken before and after treatment. Diabetes knowledge was measured by a Diabetes Knowledge Questionnaire (DKQ-24). Self-care behaviors were measured by the Summary of Diabetes Self-Care Activities (SDSCA). In order to better understand the quantitative data, participants were recruited into two focus groups. Pre and posttests were performed to determine participants' diabetes knowledge. Two bilingual Hispanic investigators who were not involved with the study led the focus group. A questionnaire was given to participants related to diabetes knowledge, diabetes self-care, diabetes management, and glucose changes.

Significant results were observed on several measures: HbA1c levels between pretest (8.39) and posttest (7.79) (P=<.001);   systolic blood pressure pretest (146) and posttest (137) (P=.006); Diabetes knowledge, percent correct pretest (68.8) and posttest (86.4) (P=<.000); Healthy eating plan pretest (3.3) and posttest (4.9) (P=<.000);   Spacing carbohydrates through the day pretest (2.9) and posttest (4.8) (P=<.000) and; More than five servings of fruits and vegetables pretest (3.7) and posttest (5.7) (P=<.001). Significant results were also observed in behaviors such as; blood glucose self-monitoring pretest (3.6) and posttest. (5.1) (P=<.000) and; Checking feet pretest (3.8) and posttest (5.4) (P=.005). It was shown in this study that it is possible to perform a diabetes self-management program in a community with positive effects in glucose control. This program is based in the diabetes self-management curriculum and

instructions of Diabetes Self-Management Education (DSME) standards and it was patient-centered, developed to solve problems and provide skills needed to make diabetes-related decisions, and included bilingual Hispanic educators. Groups were motivated during the 10-week intervention. Community health workers made easier the changes in behavior, social support and stress relief, CHWs were a positive influence. It is important to note that one main limitation was a lack of a comparison group. The authors also mentioned that there was missing data and attrition that could have affected the results of the study.

Metghalchi *et al* (2008) also used health professionals (registered nurses, physicians, and nutrition students whose first language was Spanish) in a diabetes intervention. They studied whether a culturally sensitive education program will improve the clinical outcomes in a Hispanic population. Participants' ages ranged from 37 to 69 years. They were screened via telephone and interviewed by researchers to obtain medical histories, medications, physical activity, and diet histories. A total of 44 participants were enrolled, but 34 completed the study. The main outcomes were changes in fasting blood glucose and serum HbA1c levels.

Assessment of fasting blood glucose, dietary assessments, and body measurements were conducted at baseline and 3 months. Classes were given in Spanish once a week in a 3-month period. Educators were Hispanic Registered Dietitians, registered nurses, physicians, and nutrition students and their first language were Spanish. Moreover, educators were able to sympathize with participants due to cultural affinity. Participants received classes about managing glycemic control and aspects of managing diabetes and its complications and a free glucose monitor and log for daily blood glucose measurements. Serum insulin, glucose, and HbA1c levels, Plasma lipids were all assessed. Data were presented in mean ±SD. Log transformations were used to improve normality of some variables. Univariate analyses, means and standard deviations were computed for outcomes. Pearson's correlations were performed for changes in body composition related to changes in plasma lipids, glucose and insulin concentrations

There were 25 women and 9 men who participated in the study. Results showed the mean age of participants was 52 years with a range of 37 to 69 years. Moreover, mean weight was between 49 to 122 kg, and BMI from 21.0 to 47.00 kg/m^2 at baseline. There was a significant reduction in means for fasting blood glucose (23.20 mg/dL, P<.001), HbA1c (0.82%, P<.001), HDL (-4.20 mg/dL, P<.001), and cholesterol/HDL ratio (0.48%, P<.001) after 3 months of the intervention compared with baseline. Significant reductions in weight (0.94 kg, P<.02), total fat (0.92 kg, P<.001), percent in fat (3.83, P<.001), trunk fat (0.61 kg, P<.001), and waist-to-hip ratio (0.02%, P=.03) were observed compared with baseline. There was no significant reduction in BMI and fat-free mass compared to baseline. Significant correlations between plasma insulin,

plasma lipids, and body composition changes were observed and at three months later, significant positive correlations between changes in insulin and BMI (r=0.522, P<.01), weight, (r=0.550, P<.01), total fat (r=0.480, P<.01), trunk fat (r=0.468, P<.01) and fat-free mass (r=0.440, P<.01) were also seen. Positive correlations after 3 months for changes in BMI and triglycerides (r=0.342, P<.05) and percent of fat and total cholesterol (r=0.377, P<.05).

Several positive outcomes were observed from baseline to the three-month follow-up period. For example, at the beginning of the study 15 percent of participants had a fasting blood glucose of ≤105 mg/dL compared to 30 percent at 3 months. Moreover, at the beginning of the study 24% of the participants had HbA1c levels ≤5.9% compared to 33% at 3 months. Insulin levels improved going from 27% at baseline to 33% at 3 months (≤17.8 µg/L). There was also improvement in blood lipids. At baseline, 70% of participants had a total cholesterol level ≤199 mg/dL versus 68%; Additionally, 30% had HDL level ≤40 mg/dL vs 21% at 3 months; At baseline 29% had LDL level >99 mg/dL vs 44% at 3 months; At baseline 27% had cholesterol/HDL ratio ≤3.5 vs 38% at 3 months; and at baseline 38% had triglycerides ≥150 mg/dL versus 47% at 3 months. There was improvement in metabolic control related to the increased knowledge in diabetes and self-management strategies. A mean of 1 kg of body weight, 4% of total fat, 0.61 kg of trunk fat, and 0.03 cm of waist-to-hip ratio was decreased (DXA evaluation). Moreover, increases in HDL cholesterol (4%) and cholesterol/HDL ratio (0.5%).

The study showed clinical benefits in the diabetic Hispanic population after 3 months' interval, where after this period the participants reduced 23% in FBG and 0.82% reduction in HbA1c from the beginning of the study. Researchers concluded that a community health worker being bicultural improves the rates of a diabetic education program for Hispanic patients and this approach could have further improvements in patient knowledge, self-care behaviors, and glycemic control.

Thompson, Horton, and Flores (2007) studied the effectiveness of health promoters in providing diabetes management to Mexican-Americans in a primary care setting and used CHWs and the Trans-Theoretical Model to develop a well-designed strategy for diabetes self-management purposes. Their main purpose was to determine the most effective strategy to improve diabetes care, reduce disparities, and bring a closer relationship between providers and Hispanic patients. La Clinica a community health center provides access to CHWs through the Advancing Diabetes Self-Management program that uses the trans-theoretical model of change. The ADMS program consisted of the usual care (medical visits, dietitian or health educator) plus 2 new features: one-on-one with patient's approach and counseling using the Trans-Theoretical Model. Participants were stratified had their usual care approach and was assigned to a specially

trained CHW. Brochures were designed for low-literacy population and featured four behaviors expected to be modified: 1) meal planning, 2) exercise, 3) blood glucose self-monitoring and 4) use of medications. These behaviors were adapted to each of the Stages of Change of the Trans-Theoretical Model. Health workers provided activities for the patients: one-on-one counseling, support groups, walking club, diabetes classes and education about depression. The community health care workers evaluated whether participants were ready to move to the next Stage of Change and were ready to set goals by conducting short interview with each participant using specific questions. Measurements of HbA1c, blood pressure and body weight were done at baseline and each 6 months' period. LDL cholesterol was measured at baseline and a year later. Patients also were their own controls. A paired-sample t-test was used to determine changes in HbA1c at baseline, 6 months and a year later.

Results showed that HbA1c values had significant changes from baseline (8.73) to 6 months (8.37) (-0.36 $P<.015$) and from baseline to 1 year (8.25) (-.048 $P<.004$). Women showed greater reduction than men in HbA1c levels when sample was stratified at year 1. (−0.78 vs 0.11, $P < .01$). Blood pressure, LDL cholesterol, and BMI did not have significant changes. A dose effect was seen; when participants had more contact with CHWs a significant change was observed on HbA1c levels over the first year of treatment.

The program supported the hypothesis that a culturally appropriate diabetes self-management education given by CHWs leads to significant improvement in HbA1c levels. The increase in participants' BMI was thought to be due medication used to control glucose levels. One limitation of the study was that participants were their own controls before and after the intervention which led to confusion as to whether the effects came from the intervention or environmental factors. Selection bias could also have been a limitation on participant's decision when choosing form part of the program or not.

Kamimura, A; *et al* (2014) investigated whether diabetes self-efficacy among diabetic free clinic patients could be developed to improve diabetes health education programs to promote diabetes self-management. Subjects were included if they were below the 150th percentile of poverty, unemployed, and not receiving help from government.

The Diabetes Empowerment Scale Short Form (DES-SF) measured the self-efficacy of a diabetic person, it consisted of an eight item questionnaire and measured overall self-efficacy using a five-point scale. Three aspects were considered: a) managing the psychological aspects of diabetes, b) assessing dissatisfaction and readiness to change, c) setting and achieving diabetes goals.

Patients with diabetes had poorer physical ($P<0.01$), mental ($P<0.05$), and perceived health ($P<0.01$) compared to patients without diabetes and their family members. Moreover, patients with diabetes reported higher levels of anxiety ($P<0.01$), depression ($P<0.01$) and pain ($P<0.05$) compared to patients without diabetes and their family members. Average score of diabetes self-efficacy among patients with diabetes was 2.8 % (SD=1.2). The levels of self-efficacy of participants of this study (mean=2.8) seems to be low compared with previous studies (mean=3.73 or 3.78). Results indicated that attending diabetes education program or visiting the diabetic clinic, was not related to higher levels of diabetes self-efficacy. These patients needed to receive education on increasing knowledge about diabetes as well as diabetes self-efficacy. Low level of self-efficacy may be related with low level of health literacy. Because free clinic patients with diabetes have a low level of diabetes self-efficacy, diabetes educational programs for free clinic patients should have a component to increase diabetes empowerment as well as the knowledge of treatment and management of diabetes.

Gender and Diabetes Self-Management Studies

The incidence of diabetes tends to be greater among Hispanic men (American Diabetes Association, 2014). Some researchers have studied diabetes self-management by gender. For example, Ramos, Boerner, He, and Travera-Garcia. (2013) studied whether a culturally-tailored education program improves health literacy among male Hispanics in Shelbyville, Kentucky. The health education program consisted of two phases where there was a 9-month in-between period to assess knowledge retention and the impact of the educational at follow-up. Presentations were given in Spanish. Phase I of the program consisted of six modules that included health promotion in cardiovascular disease, nutrition, diabetes, metabolic syndrome and sexually-transmitted diseases. The diabetes module was about the different types of diabetes, insulin, signs and symptoms of the disease and dietary guidelines for diabetics. The diabetes module had 24/32 reenrolled participants.

Phase II included a follow-up on cardiovascular disease and diabetes, and this phase was used to assess long term knowledge of the participants. Moreover, it tested performance before and after the intervention as well as knowledge retention in order to compare the impact of the educational program. Paired t-tests were used to compare effects before and after the intervention. Pre-test performance in Phase I was between the of 20 to 60% range. Post-test had an improvement showing ≥80% in score. Phase II was focus on cardiovascular diseases and diabetes and given after nine months of finishing Phase I. Phase II was useful to assess and identify differences in short and long-term knowledge retention. Results demonstrated that participants who enrolled in the program showed improvements in cardiovascular disease and diabetes. Paired

t-tests were statistically significant (<.0001) which meant that the educational intervention improved knowledge. Results show that health education programs adapted culturally are effective. A limitation of this pre/post-test design study was the chance of occurring "maturation" from taking the test rather than gaining knowledge. Therefore, a Phase II was developed and added to the intervention to determine knowledge retained over nine months.

Toobert *et al* (2011) examined the extent to which the ¡Viva bien! intervention helped Latinas with type 2 diabetes improve HbA1C and quality of life outcomes at 6 and 12 months. It was conducted among Hispanic women. Participants were randomized either to have the usual care or usual care plus intervention. The smoking variable was stratified to make sure there were same amount of smokers in the two conditions. The program consisted of a 2.5-day retreat and meetings once a week where participants were motivated to choose a Mediterranean diet adapted to Latin cultures, include stress management activities on a daily basis, engage in 30 minutes of physical activity, quit smoking and participate in problem-solving groups. There was a cultural adaptation phenomenon which was well received by the participants due to the modified Mediterranean recipes and involvement of family members. This was confirmed in a preliminary test.

The results showed that, the ¡Viva bien! Intervention had significant impact on behavioral changes at 6 months on percent of calories from fat, stress management, days of exercise per week and social-support activities. The dietary outcomes had greater impact. In addition, the ¡Viva bien! Intervention had a better outcome on HbA1C levels comparing on the intervention than the control group. It represented a moderate effect at 6 months from 0.23 and 0.48 but, the treatment effect started to disappear at 12-months. Hispanic women reduced their risk of diabetes complications by decreasing HbA1C levels from 8.5% to 7.7% at the end of the 12th month. Moreover, this change was statistically significant when comparing with the control group. (7.7 vs 8.1 at 6 months).

Social Support and Diabetes Self-Management Education

Haltiwanger and Brutus (2011) conducted a mixed-method study design where Mexican-American peer mentors with type 2 diabetes were used to lead a diabetes self-management program. Mentees were also Mexican-American with type 2 diabetes divided into a control and intervention groups. HbA1C was significant at Post-test 1 (*P*<0.05) and Post-test 2 (*P*<0.002) for the Sustaining group. Group logs shown at baseline that 60% of mentees had one non-adherent behavior, while40% had two or more. These changes in adherence were achieved because peer mentors were able to provide.

Individuals having more support resources for disease management controlled their diabetes more effectively than individuals that had less support. Fortmanm, Gallo, and Philips-Tsimikas. (2011) examined how social-environmental support resources for disease management affects glycemic control in Latinos with type 2 diabetes by examining two potential mediators of this relationship; diabetes self-management and depression.

Baseline assessment was performed and clinical evaluation with fasting blood draw were measured psychologically. Participants were randomized to a treatment condition that consisted on diabetes self-management classes and monthly support groups, or to usual care. Labs and psychological assessment were collected at the end of the intervention and six months later. Surveys were available on Spanish and English. A 13-items Chronic Illness Resources Survey was used to measure *support resources* for disease management and a 6-items survey from the Summary of Diabetes Self-Care Activities Scale was used to measure diabetes self-management. Individuals reported the days of the week they completed self-management behaviors. Moreover, individuals took the PHQ-9, which measured depression in populations using a 4-point scale. Glucose control was evaluated by HbA1c and values <6.5% were considered appropriate. Individuals self-reported socio-demographic characteristics. Age, gender and education attainment were controlled due to their relationship with depression. *Two simple mediation models* were used to determine if depression and/or self-management forms the relationship between support resources for disease management and HbA1c. A *multiple mediator model* was used to assess all the indirect pathways from support resources.

Results revealed that 25% of the sample showed PHQ-9 scores more or equal than 10, which demonstrated sensitivity and specificity to major depression. Correlations were statistically significant, where self-management and depression r= -.15 and self-management and support resources for disease management r= .41. The two simple mediation models were researched to find if the relationship between support resources for disease management and HbA1c was due to those mediators. Having greater support resources for disease management meant that individuals were better at diabetes self-management (p<0.001) and less depression (<.01). Moreover, better glycemic control was associated with better diabetes self-management (<.05) and less depression (<.05). This study showed that people who documented having greater support resources for disease management, also documented better adaptive behaviors and less depression, which leads to lower levels of HbA1c.

Mansyur, Rustveld, Nash, and Jibaja-Weiss (2015) conducted a randomized control trial intervention related to diabetes management among Hispanics with type 2 diabetes characterized for having poor glycemic control (≥ 8%). Two scales from the Diabetes Care profile were used to

measure perceived support. One measured support wanted, coming from the family and friends and another measured support received from family and friends. The results showed that women perceived lower levels of support than men, also that women's families gave them less support to follow a healthy diet. Also, women had more exercise barriers than men. According to the regression results, exercise barriers was the variable related with self-efficacy for both men and women (p ≤.001); where the greater the value, the lower the self-efficacy. Moreover, it was also related with self-care adherence in men and women. For women, independently associated with self-efficacy were support received (p = .005) and exercise participation (p = .012). This meant that if support received and exercise participation increased, self-efficacy would also increase.

HbA1c primary outcome.

The HbA1c test measurement is devised to calculate the probability of patients aging 18 to 75 years with type 1 or 2 diabetes that had a most recent HbA1c greater than nine percent. Knowing the number of individuals above this HbA1c level is of great importance and opportunity to focus on people who have uncontrolled glucose and are at higher risk. (NCQA/NQF/PQRI/PCPI, 2009). In a randomized trial conducted by Philis-Tsmikas*et al* (2011) it was demonstrated that it is possible to achieve improvements in glucose and metabolic control among Mexican-Americans with type 2 diabetes using Project Dulce as a model and leaded by peer-led educator. A total of 207 participants with type 2 diabetes and HbA1c >8%, between 21 and 75 years old were selected from health centers in San Diego County.

Participants were assessed at baseline using a fasting blood draw and completed questionnaires at baseline, after intervention (month 4) and at month 10. Participants were also given a blood glucose monitor, testing strips at the time of assessment. They were randomly assigned to the control group (n =103) and to the Project Dulce group (n = 104). A trained peer educator led the self-management classes and the program for eight weekly, two hour classes of diabetes self-management. A support groups met once a month. Among participants, natural leaders were selected and trained to become promotoras.

The curriculum was based on the standards of the American Diabetes Association for improvement in HbA1c, blood pressure, lipids and improvement of self-management. In order to examine for different rates of change over time for HbA1c and secondary outcomes, multilevel models were performed. More analyses were conducted to look for within-group changes over time. Lastly, a dosage-effect was assessed on HbA1c in the intervention group where attendance was the predictor of month 4 and 10. A total of 156 participants completed at least one follow-up evaluation and included analyses to look for differences in rates of change over time. Significant time by- group interaction effects were observed for HbA1c (p = 0.02).

Within group analyses found that from baseline to month 4 (- 1.7%, P =0.001) a significant decrease in HbA1c was found in HbA1c and again from baseline to month 10. (-1.5%, P = 0.01). At month 4, attendance was a significant predictor of HbA1c (β = -0.29, P < 0.01) and month 10 (β = -0.42, P < 0.01), suggesting a dose-response effect. The intervention group achieved 1.5% reduction in HbA1c at month 10, this has been achieved with oral diabetes medications. A dose-effect was seen in participants who attended more classes this was confirmed by higher HbA1c reductions.

In another study carried out by Rosal *et al* (2011) it was tested whether a tailored self-management intervention can improve glycemic control among low-income Latinos with type 2 diabetes. Mean changes for HbA1c were observed at the 4 and 12-month follow-ups for both groups. Results from a linear mixed-model showed a mean change in HbA1c in the intervention group -0.88 (range -1.15 to -0.60) post-intervention (at 4 months) and -0.46 (-0.77 to -0.13) at the 12-month. However, mean changes in HbA1c levels of the control group were also observed. In the intervention group there was a significant improvement in diet quality regarding reduction of total calories (P<0.01) at 4 and 12 months, and reduction of % of saturated fat of total calories at 12 months (P=0.04) The participants in the intervention group reported glucose self-monitoring two or more times per day, results showed that this increased significantly (59% at baseline to 84.2% at 4 months and 81.5% at 12 months) compared to the control group (55.7% at baseline to 62.1% at 4 months and 63.6% at 12 months) (P=0.02 and P=0.023 for change comparisons at 4 and 12 months respectively). HbA1c decrease at12 month in the intervention group was related to improvements in diet quality (P = 0.036) and decreased percentage of saturated fat (P = 0.003), increased blood glucose self-monitoring (p =0.07), increased diabetes knowledge (0.001), and increased self-efficacy (P = 0.026). The intervention was successful in the areas of diabetes knowledge, self-efficacy, and self-management behaviors. These improvements were related with HbA1c at 12 months.

Gold (2008) assessed the efficacy of a multidisciplinary diabetes self-management program focused on improving blood glucose by adding scheduled providers visits. Two groups were formed, the Standard Management Program (SMG) where patients were encouraged to participate in self-care classes one per week at UCLA Medical Center. and the Intensive Management Program (IMP) that included diabetes self-management education classes and visits from an educator. The intervention lasted 6 months and both groups of patients (IMG and SMG) continued followed-up with physicians at 3 months' intervals. Before a visit to occur with a provider, the diabetes nurse-educator evaluated each IMG patient for baseline features: dietary, diabetes self-care knowledge, self-perceived barriers to

dietary/medication compliance, and exercise frequency. These patients were referred to a dietitian and a diabetes educator. The first IMG visit included an assessment of psychological barriers, personal support system, motivational level, and health literacy. The IMG intervention included education classes on diabetes self-care skills, adherence to diet, use of medication, exercise and monitoring of blood glucose. Chi-square (χ^2) was used for categorical variables and t tests for continuous variables. In addition, a paired t test was performed separately for each group to assess the changes in HbA1c levels before and after intervention. A mixed-effects regression model was performed to address whether a synchronous management approach could improve glycemic control compared to the standard management care. The IMG had a significant decline in HbA1c levels from baseline (P<0.001), but no significant decline in HbA1c levels was found for SMG (P=0.09). Approximately 89% of patients in the IMG had decreases in HbA1c level from baseline compared with < 60% of patients in the SMG (X2 test, P=0.04).

The mixed-model regression results showed that a decrease in HbA1c level was significantly greater in the IMG than in the SMG (P<0.001). A significant improvement in HbA1c level was found over a 6-month intervention in patients selected to the IMG compared to the SMG in the pilot intervention. It was evident that adding organizational interventions, plus an intensive multidisciplinary patient diabetes self-management education with physician visits and telephone reminders, resulted in significant improvements in HbA1c level. Although, there was some limitations: 1) there was no randomization of patients from SMG to IMG; 2) providers were not blinded to patient's assignments; 3) small sample size and 4) short duration of post-intervention.

Brown. *et al* (2005) decided to compare two diabetes self-management interventions designed for Mexican Americans: 1) Extended (24 hours of education, 28 hours of support groups) and compressed version (16 hours of education, 6 hours of support groups). In addition, both interventions were culturally competent. The researchers hypothesized that the compressed version would be a better fit to clinical and community settings. A total of 170 subjects (50% for the compressed and other 50% for the extended group) were recruited. Participants were between 35-70 years old and diagnosed with type 2 diabetes, and where two measurements of fasting blood glucose results $\geq$ 140 mg/dl or taking or have taken insulin or hypoglycemic agents for $\geq$ 1 year. The extended original intervention was 1-year long consisting of 12 weeks with each week, 2-h session consisting of nutrition, glucose monitoring, physical activity, and self-management topics followed by support sessions. The compressed intervention was eight weeks long and consisted of 2-h educational sessions followed by support sessions that took place at three, six, and 12 months. Three main clinical outcomes were measured: HbA1c, FBG, and diabetes

knowledge. ANCOVAS were conducted and found that measures decreased from baseline to three months and from baseline to 12 months in both interventions. The baseline to 12-month change in HbA1c for the compressed group was -0.7% and for the extended group, the change was -1.0%. At 3 months, no intervention group difference in HbA1c levels was detected. Men on average had lower HbA1c levels (t= -3.11, P = 0.002), and men who had greater attendance at the educational component of intervention achieved lower HbA1c levels. For the extended intervention, greater overall attendance at both educational and support sessions was related to greater reductions in HbA1c over time (B = -0.08, t = -6.51, P <0.001). Results indicate a decrease in both interventions, but a better result resulted in the extended intervention for individuals who received the maximum "dose", that is, those who attended ≥ 50% of the intervention sessions. Diabetes self-management programs should be prescribed as diabetes medications do.

Mauldon, Melkus, and Cagganello (2006) conducted pilot project for Spanish speakers with type 2 diabetes to test the feasibility, acceptability and efficacy of an appropriate culturally diabetes program. A total of 16 Latino patients with diagnosed type 2 diabetes were recruited to participate in a one-group pretest-posttest pilot study. Data collected included demographic, physiologic (HbA1c, BMI, lipids), psychosocial (diabetes-related distress and health beliefs), and diabetes mellitus (DM) knowledge and acculturation variables at baseline. Questionnaires were administered again, and lipids and HbA1c levels were obtained at 3 and 6 months' post-intervention. Descriptive univariate summary statistics were used to describe demographic and physiologic variables as well as response variables of HbA1c, lipid levels, and psychological outcomes. Paired-samples t tests, one-way ANOVA, and repeated measures were conducted to assess the significance of changes of measures during time and by gender. The six-week intervention study consisted of 3 hours of cognitive behavioral education classes given in Spanish. Classes included the clinical aspects of diabetes, nutrition, dyslipidemia hypertension and behavioral aspects of self-management. Initial HbA1c measurements showed suboptimal glycemic control for men and women, with an average of HbA1c level of 8.9%; women had better glycemic control than men. Statistically significant reduction in mean HbA1c from 0 to 3 months and from 0 to 6 months for men and women combined was observed (2.8% average reduction in HbA1c, P=0.001). A total of 82% of participants showed an improvement in HbA1c. Results showed a gender difference with women coping better than men in the study.

Parchman, Flannagan, Ferrer, and Matamoras (2009) reported that patients whose doctors showed higher levels of communication competence during meetings reported higher levels of self-care and better glucose control, measured as HbA1c. Patients having T2DM were asked to

join the study. Observation and audio-recordings were conducted with 10 participants in each clinic. A communication score was developed to measure physician's communication competence. Surveys were distributed to each participant to assess self-care behaviors and medical records were screened to look for HbA1c levels. Patients' self-care behaviors for diet, exercise, medication use were evaluated using questions related to Stage of Change of the Trans-Theoretical Model. Patients reported to be in maintenance stage, also matched with compliance of diet or exercise for the last 6 months. For analysis purposes, X2 and t-tests were performed to compare demographic features and other features among Hispanics and non-Hispanics whites. Overall communication competence (OCC) and HbA1c levels were evaluated and t-tests were performed to compare OCC and HbA1c values among each ethnic group was used to predict whether participants were in the maintenance phase.

If divided in two categories, high OCC scores (4 or 5) and low OCC scores (3 or less) patients whose physicians had high OCC showed HbA1c levels of 7.15 and those with lower OCC had HbA1c levels of 7.88. This was independent of ethnicity. (t-test = 2.62, p=0.01). In meetings with Hispanics, higher levels of OCC were associated with lower levels of HbA1c (r= -.22, p= .04). But, this didn't apply to non-Hispanic white patients (r= -0.16, p= .25). Hispanics patients who were at the maintenance Stage of Change for diet and had lower levels of HbA1c had physicians with higher OCC scores. This didn't apply for non-Hispanic white patients. Higher levels of OCC were related to lower levels of HbA1c after controlling for age, ethnicity and diet.

In this study, the results confirm that physician's communication competence has a relationship with glucose control and diet self-care behaviors. These behaviors were not found to be statistically significance in communication competence of physicians when meeting Hispanic patients and non-Hispanic patients. Communication competence from physicians might be more important for Hispanics because they may not be English proficient and as a consequence this leads to misinterpretations. However, the small sample size of the Hispanics which resulted in a lack of power might have been a limitation in this study. Other limitations might have been that communication competence was measured at the time of the encounter between physician and patient. However, the HbA1c levels were measurements taken before physician-patient encounters. Physician's communication competence is related with HbA1c levels in patients with type 2 diabetes and it might be more significant for Hispanics than for non-Hispanics.

Physical activity

It is documented that physical activity improves glucose control and may prevent or delay type 2 diabetes and may lead to improvements in insulin action. However, most people with

type 2 diabetes do not stay active (Colberg, 2010). Hu, *et al* (2015) investigated the effects of an 8-week intervention for Hispanics adults with type 2 diabetes along with their family members. A quasi-experimental design was used in this diabetes self-management program to determine improvements in physical activity among participants. Physical activity data were collected before and after intervention on participants with type 2 diabetes and their family members. In total, 131 participants were included in the study, 65 were patients and the rest family members. Two interventions were conducted and eight modules were developed to improve diabetes knowledge, deal with barriers of self-management, lifestyle behavioral changes and the development of self-efficacy. In addition, participants received a pedometer for their personal use. The material was developed and tailored to low-literacy participants. To measure physical activity, a questionnaire, (IPAQ) was administered before and after intervention to assess the time participants spent when walking, or involved in moderate and sedentary activity. Multivariable regression models were used to analyze data and a two-sided p-value of <.05 was considered significant. IPAQ scores improved before and after intervention, but not MET-min/week for vigorous activities. Additionally, family members showed significant increases in moderate activity MET-min/week over time (Exp (b) =1.053; p= 0.004). What was more important is that the percentage of patients who had < 5,000 steps decreased during the intervention, from 38% in week one to 17% in week eight. Both patients and family members had a significant increase in MET-min/week and family members had greater increase in moderate MET-min/week. One explanation for family members showing greater increase in moderate physical activity could be the fact that they were 10 years younger and most of them did not have diabetes. The study concluded that a10% increase in physical activity or steps per day can change the course of diabetes and improve quality of life.

Vincent (2009) reported in this pretest post-test study, that pedometers were used to measure physical activity where participants recorded their steps taken each day on logs. Results showed that mean number of steps increased from 4175 to 7238 per day, which was considered significant (t = 2.51, p =.03). In a randomized control trial of a community health worker intervention for Mexican American with type 2 diabetes conducted by Rothschild *et al* (2014) participants reported increased physical activity from an average of 1.63 days per week at baseline to 2.64 days per week after two years while participants in the control group had decreased self-reported physical activity at year two. Moreover, the increased in physical activity in the CHW intervention could have resulted in weight loss in this group.

Dietary Fat and Cholesterol.

Salto et al (2011) examined the effectiveness of the *En balance* program in improving glycemic levels, changes in dietary habits, and increases in physical activity among Hispanics with type 2 diabetes in San Bernardino County. A total of 39 Hispanic adults between 25 and 75 years old who self-reported having type 2 diabetes completed the three-months *En Balance* program. Data were collected at baseline and at three-months, this included fasting blood samples, bioelectrical impedance analysis, anthropometric measurements, and dual energy X-ray absorptiometry. Blood samples were tested to establish blood fasting glucose, HbA1c, insulin, and lipid profile. After measurements and data collection, participants took the diabetes educational program which was culturally specific for the Hispanic population. In this study participants were their own controls. Sample t-tests, independent sample t-test, and Wilcoxon test were used to compare means at baseline and at 3 months. Also, X2 was used to compare categorical data. To determine a linear relationship between blood serum changes and dietary changes, Spearman's correlation coefficient was used. At baseline 39 participants had 167.9 mg/dL of fasting blood glucose, HbA1c mean of 8.5%, and insulin mean of 13.7 uU/mL. After three months' participants improved three markers: HbA1c mean 7.63 (P=.008), insulin mean 16.73 uU/mL (P=.050). Total cholesterol was 177.94 (P=.005), LDL 110.38 (P=.030) and HDL 46.90 (P=.012). But, body weight and BMI had no changes from baseline to 3 months' follow-up. After the 3-month period, participants reduced total dietary intake. The group reduced the mean intake of protein from 105.38 to 89.32 (P=.058) and cholesterol from mean338.63 to 259.41 (P=.033) Dietary fat intake in participants was compared by sex and was aligned to the recommended national guidelines. After 3 months, both men and women met the recommended national guidelines. Men were able to meet the recommended national guidelines for saturated fat intake. Both men and women had low DHA and EPA dietary intakes compared to the Recommended Dietary Intakes of Omega 6 and Omega 3 Fatty Acids. After the 3-month period of intervention, men were able to meet the recommendation of less than 10% of calories coming from saturated fat. Antioxidant levels were above the Recommended National Guidelines for both women and men, but vitamin E was not. Women and men reduced their antioxidant dietary intakes after 3 months. The dietary intake reduction of Vitamin C was significant for women after the intervention. After the intervention, HbA1c serum levels were positively correlated with changes in calories from saturated fat(P=.036), while changes in serum total cholesterol were negatively correlated with changes in calcium, phosphorus, zinc, vitamin A, and vitamin C. In addition, it was negatively correlated with LDL changes and changes in calcium, phosphorus, zinc, vitamin A, vitamin C, and arachidonic acid consumption as well as energy, linoleic acid,

and arachidonic acid intake. The intervention group showed significant improvements in HbA1c levels in only 8 hours of education program. One explanation of the reduction of HbA1c levels could be the decrease intake of carbohydrates when the group changed to one tortilla per meal. Also, there was a correlation between increased intakes of vitamin C, from the beginning of the study to the 3-month period, with reduction in LDL, HDL, and total cholesterol serum levels. The group showed that their diet content was overabundant in saturated and total fat, this was shown after an analysis demonstrated above recommended intakes of these nutrients. In order to lower the risk of coronary heart disease, the Dietary Guidelines for Americans recommend a range of DHA+EPA of 246 mg per day to 919 mg per day. This is equal to having servings of fish high in omega 3 FA per week. On the other hand, the Academy of Nutrition and Dietetic and the Dieticians of Canada recommended 500 mg of DHA+EPA per day particularly for men at high risk for nutrition deficiencies because their low intake of α-linoleic acid. What is more, a high calorie, high fat, high cholesterol and high-sodium diet, and low DHA and EPA intakes while having type 2 diabetes and obesity puts this minority group at possible risk for future diabetes complications and cardiovascular events. But, the program *En balance* demonstrated improved glycemic levels, serum lipid profiles, and dietary intake among Hispanics.

Some limitations were found. First, the results may not be applied to large population due to small sample size. Second, a 3-months period was not enough to see changes beyond that period of time. Third, diet was assessed by a FFQ, that is generally not free of response bias and errors while reporting intakes.

Diabetes Self-Management Programs

The Diabetes Prevention Program (DPP) was a major multicenter clinical research study having the goal of finding out whether behavioral modification changes or treatment with metformin, a diabetes drug, could delay or prevent type 2 diabetes. Participants in the study were overweight and had prediabetes, a risk factor for type 2 diabetes. Risk factors for developing prediabetes include being obese, 45 years or older, and having a parent, brother or sister with diabetes. Approximately 45 percent of participants came from minority groups including Hispanics. The participants of the DPP were able to lose weight by dieting and increasing their physical activity levels. As a consequence, participants of DPP reduced their probability of having type 2 diabetes. Also, the diabetes drug metformin reduced the likelihood of developing type 2 diabetes, but not as significantly as with behavioral modification changes (Diabetes Prevention Program Research Group, 2002)

The Stanford Chronic Disease Program

This program uses a community-based self-management approach. It was developed by the Division of Family and Community Medicine in the School of Medicine at Stanford University to help individuals with chronic illness. The program is conducted in workshop format where individuals meet for two and a half hours once a week (time frame cannot be changed), for a total of six weeks. The program is conducted in various community settings such as churches, worksites, senior centers, and also in clinics and hospitals. Two leaders, generally conduct the program, it is required that one of the two leaders must have a chronic condition. Based on the Stanford Chronic Disease Self-Management Manual, topics generally include: 1) techniques to deal with problems such as frustration, fatigue, pain and isolation, 2) appropriate exercise for maintaining and improving strength, flexibility, and endurance, 3) appropriate use of medications, 4) communicating effectively with family, friends, and health care professionals, 5) nutrition, and, 6) how to evaluate new treatments.

The program focuses on developing skills in three main areas, problem solving, action planning and decision making. Specific measures, such as a program coordinator, master trainers, trained leaders, systematic participant recruiting (marketing) effort, professional backup, community sites, program materials, program license, and quality assurance/fidelity strategies, must be in place before implementing this program (Loriq, 2014)

The Stages of Change

The Stages of Change Model was developed by Prochaska and colleagues. The Stages of Change Model was used as the basis for implementing the Taking Ownership of you Diabetes Curriculum. Table 2.1 shows The Stages of Change Model.

Table 2.1: The Stages of Change Model	
STAGE	ATTRIBUTES
1. Pre-contemplation	The individual has no intention of changing behavior in the next six months.
2. Contemplation	The individual has intention to change but not soon
3. Preparation	Individual has intention to change within the next six months
4. Action	Individual has made recent changes in terms of their diabetes self-management and care

5. Maintenance	The changes that the individual made has been maintained for 6 months
6. Termination	The individual has maintained the changes for 5 years.

In a study conducted by Prochaska and Velicer (1997), they found that basic research has generated a rule of thumb for at-risk population. They found that 40% of individuals are in pre-contemplation, 40% in contemplation, and 20% in preparation. In the area of diabetes, it may be that the larger percentage of individuals we plan to work with may be at the stages of pre-contemplation and contemplation meaning that they have no intention of changing behaviors that lead to poor management of blood glucose and their diabetes in the next six months or that they have intention to change but not soon. The goal of the *Taking Ownership of Your Diabetes* curriculum was to move individuals from pre contemplation and contemplation to the stages of action and maintenance in terms of the management and control of their diabetes.

CHAPTER 3

Methodology

Participants

Hispanics males and females in Lexington, Kentucky with type 2 diabetes were invited to participate in the study. Participants between the ages of 19 to 75 years were included. Individuals up to 75 years were included because research shows that as individuals get older the prevalence of type 2 diabetes rises dramatically. Other inclusion criteria included participants must have lived in Lexington for at least the past 3 years. Participants were excluded if they had type 1 diabetes, or were 18 years or younger.

Recruitment

Several means were used to recruit participant. Flyers with information on the study were placed in food establishments, Hispanic grocery stores, churches, and in free clinics in Lexington, Kentucky. In addition, an interview on the Hispanic Radio, La Vida, was done in collaboration with one of the partnering doctors at the Hispanic Medical Centers where we talked about diabetes among Hispanics and the diabetes self-management program that was conducted at the Hispanic Medical Center. The "*Taking Ownership of Your Diabetes*" program was implemented at the Centro Hispano Urgencias Medicas which was an urgent care clinic in Lexington, Kentucky. n. The Centro Hispano Urgencias Medicas was opened from August 2015 through August 2016. The "*Taking Ownership of Your Diabetes*" program started on April 4th of 2016 and ended on April 25th of 2016 and two consequent lessons were given weekly.

Design

A one group pretest-posttest design with a six-month follow-up was used in this study (Gravetter & Forzano, 2012). The same questionnaire was completed by participants at all three time periods. The University of Kentucky Institutional Review Board approved the study.

$$O_1 \quad X \quad O_2 \quad X \quad O_3$$

1- Pretest   2-   Posttest   3- Three-month Follow-up   X = treatment

Data Collection

Data was collected using a questionnaire consisting of two sections, a demographic and a diabetes self-management section. The demographic section elicited information on age, gender,

education, and income. The self-management section contained questions related to the participants' involvement in physical activity, whether or not they were seen by a health professional one or more times during the year, whether they checked their blood glucose, A1C, used diabetes meal planning, implemented three healthy eating practices, set one or more goals in the last month, accomplished at least one goal they set for themselves in the last month, and whether they were able to solve problems in their daily life as they deal with their diabetes. Participants were asked to respond with yes or no answers to these questions.

Outcome Measures included BMI, self-reported A1C, physical activity involvement, last checked blood glucose level, use of a meal plan and the ability to set and accomplish goals related to diabetes management.

Operational Definition of Variables

Physical activity- The National Institutes of Health, National Heart Lung Blood Institute's definition of physical activity was used. That is, physical activity was determined as any body movement that works your muscles and requires more energy than resting. Walking, running, dancing, swimming, yoga, and gardening are a few examples of physical activity. In order to meet the requirement for physical activity, individuals have to be involved in 30 or more minutes of moderate physical activity on five or more days of the week. In addition, intervals of three-10 minutes' segments of activity was also counted as meeting the requirement. Research shows that physical activity benefits could be achieved in 10-minute segments.

Anthropometric Measures: Participants' weight and height were recorded at the beginning and end of the study. To collect normal height measurement: Participants were asked to:

1. Remove their shoes, heavy outer garments, and hair ornaments.
2. Stand with his/her back to the height rule. The back of the head, back, buttocks, calves and heels were touching and upright, feet together. The top of the external auditory meatus (ear canal) were level with the inferior margin of the bony orbit (cheek bone). The participant was asked to look straight. The head piece of the stadiometer or the sliding part of the measuring rod were lowered so that the hair (if present) is pressed flat.
3. Height was recorded to the resolution of the height rule (i.e. nearest millimeter/half a centimeter). If the participant is taller than the measurer, the measurer should stand on a platform so that he/she can properly read the height rule.

Participants self- reported whether they were seen by a health professional. Participants were asked to visit their health care provider at the beginning of the study to get their A1C, blood pressure and lipid profile evaluated. Participants were also asked if they used carbohydrate

counting, the diabetes plate method or a meal plan developed for them by a registered dietitian as a meal plan. They were asked to select healthy eating practices they followed, namely : eat vegetables and fruit with their meal, eat vegetables for snacks, choose brown rice, whole wheat bread over processed products, include dried beans and lentils into their meals, choose non-fat dairy products, included fish two-three times a week in their meals, choose water and calorie-free drinks instead of regular soda, fruit punch, sweet tea and other sugar-sweetened drinks, or cut back on high calorie snack foods and desserts like chips, cookies, cakes and full-fat ice cream. In addition, participants were asked if they scheduled a foot and dilated eye exam.

Taking Ownership of Your Diabetes Curriculum
The Diabetes Program

In order to reduce the impact of diabetes and to fill the gap in self-management education, the University of Kentucky Cooperative Extension developed an evidence-based curriculum, "*Taking Ownership of Your Diabetes*" to provide diabetes information in a format that is easy to understand and that allows individuals to modify lifestyle risks and solve problems related to diabetes management. A multi-disciplinary team of reviewers that included registered dietitians, an endocrinologist, and certified diabetes educators reviewed the curriculum for accuracy. Family and Consumer Sciences (FCS) agents and individuals with diabetes type 2 diabetes in the community ensured relevance and further stakeholder input. The curriculum was piloted in 15 counties in Kentucky and revisions were made on the content, activities, format, and assessment tools.

The curriculum is based on the National Diabetes Education publication (NDEP) "*4 Steps to Control Your Diabetes. For Life*." The Stages of Change Model (Prochaska & DiClemente, 1983) was used as the theoretical model. Lessons were structured to move individuals from pre-contemplation to actions. The curriculum contains four units: (1) Understanding diabetes; (2) The ABCs of Diabetes; (3) Nutrition for Diabetes; and (4) Getting Routine Care; with each unit containing three lessons, making a total of 12 lessons. Several lessons address the American Association of Diabetes Educators 7 Self-care behaviors such as physical activity, healthy eating, monitoring of blood glucose and provide opportunities for individuals with diabetes to modify lifestyle risks. However, the curriculum used in this study consisted of four lessons that combined information from each of the units. See Tables 3.1,3.2, and 3.3.

At the beginning of each lesson basic information on diabetes was presented. During the lesson, stories about people who were successful in managing their diabetes were presented and questions were asked to encourage participants to reflect on their behavior. A problem scenario was also shared during each lesson and participants were asked to identify the problem, identify

alternative courses of action, and suggest the best situation based on the context. Problem solving was shown to be the core aspect of effective diabetes and chronic illness self-management and it was included in the lessons. After each lesson, participants were asked to set SMART (specific, measurable, attainable, realistic, and timely) goals they could achieve in the next week. A $25 gift card was given at the pre-test, posttest, and at 6-month follow-up. The program was translated from English to Spanish. It was back-translated and piloted to ensure accuracy and cultural validity.

Table 3.1: Original Taking Ownership of Your Diabetes Curriculum						
Introduction	**Introductory Lesson**	**Unit One**	**Unit Two**	**Unit Three**	**Unit Four**	**Final Lesson**
Diabetes information Note to Agents Agents' Role Lesson Content **Outcomes** Curriculum Theory and Approach	Introduction to the curriculum Facilitator's Guide Power Point **Evaluation (Pre-Test)**	**Lesson 1:** Diabetes Basics **Lesson 2:** Managing Diabetes **Lesson 3:** Physical Activity and Diabetes	**Lesson 4:** A1C **Lesson 5:** Blood Pressure **Lesson 6:** Cholesterol	**Lesson 7:** The Diabetes Food Guide Pyramid **Lesson 8:** Carbohydrate Counting **Lesson 9:** Think Your Plate	**Lesson 10:** Monitoring Blood Glucose **Lesson 11:** Foot Care **Lesson 12:** Working with Your Health Care Team	Introduction to the curriculum Facilitator's Guide **Evaluation (Post-Test)** Power Point PowerPoint Outline

Table 3.2: Four-Lesson Taking Ownership of Your Diabetes Curriculum			
Unit One	**Unit Two**	**Unit Three**	**Unit Four**
Lesson 1: Diabetes Basics Managing Diabetes Physical Activity and Diabetes	**Lesson 2:** A1C Blood Pressure Cholesterol	**Lesson 3:** The Diabetes Food Guide Pyramid Carbohydrate Counting Think Your Plate	**Lesson 4:** Monitoring Blood Glucose Foot Care Working with Your Health Care Team

Table 3.3: Four-Lesson Taking Ownership of Your Diabetes Curriculum in Spanish			
Unit One	**Unit Two**	**Unit Three**	**Unit Four**
Lesson 1: Las Bases de la Diabetes Controlando la Diabetes Actividad Física y Diabetes	**Lesson 2:** A1C Presión Arterial Colesterol	**Lesson 3:** Guía Alimentaria para la Diabetes: Pirámide Alimentaria Contanto Carbohidratos Piensa en Tu Plato	**Lesson 4:** Monitoreo de Niveles de Glucosa en Sangre Cuidado del Pie Colaborando con el Equipo del Cuidado de

			la Salud

The lessons were conducted in a Hispanic Medical Center and lasted 90 minutes. The sessions were very interactive and participants asked questions throughout the session. One of the doctors at the Medical Center collaborated during the implementation and also answered questions asked by participants. In addition, one of the doctors took the anthropometric measures such as height, weight, and blood pressure.

Data Analysis

Descriptive statistics were run for all demographic variables. The data were analyzed using SPSS computer software (version 23.0). A p-value less than or equal to .05 was used as the level of significance.

McNemar tests were used for dichotomous variables and a paired t-test was used for weight at pretest and posttest. live alone, marital status. Wilcoxon Signed Rank Tests were used for stages of change and poor mental health and mental health restriction variables.

Table 3.4: Mcnemar Tests, Paired t-test and Wilcoxon Signed Ranks Tests		
Mcnemar Tests	**Wilcoxon Signed Ranks Tests**	**Paired t-test**
Seen by a doctor	Stages of change	Participants' weight
Normal HbA1c	Poor mental health	
Physical activity	Mental health restrictions	
Normal blood pressure		
Check blood glucose		
Check HbA1c		
Compliance with diabetes regimen prescribed by doctor		
Set goals		
Accomplish goals		
Diabetes meal plan		
Non starchy vegetables		
Whole grains		
Fish		
Lean meats		
Dairy		
Water		
Oils		
Portion size		
Solve problems related with diabetes		
Control diabetes		

CHAPTER 4

Results

   The purpose of this study was to determine the effectiveness of the "*Taking Ownership of Your Diabetes"* program in diabetes self-management among a group of Hispanics living in Lexington, Kentucky. This was a pilot study with 7 individuals participating at the beginning of the study, four males and 3 females. At the follow-up, 4 individuals, all males, continued in the study, thus five participants were lost to attrition. At the six-month follow-up four participants were in the study, two males and two females. The analysis was therefore conducted with the four individuals who completed both pre and posttest measures. Not all participants answered all the questions, therefore the total number of participants varied by the questions.

Table 4.1: Participants Enrolled at Stage of the Study			
	Pretest	Posttest	6-month Follow-up
Male	4	4	2
Female	3	0	2
Total	7	4	4

Table 4.2: Participant's demographics taken at the end of the study

Demographic	Total participant	Percent
Gender		
Male	4	100
Female	0	0
Marital Status		
Single	1	25
Married	3	75
Age		
18-39	2	25
40-49	1	25
50-65	1	25
65 and over	0	0
Education		
<high school	4	100
High school/GED	0	0
College	0	0
Other	0	0
BMI		
Underweight (18.5 – 24.9)	0	0
Normal (25 – 29.9)	0	0
Obese (30 – 34.9)	4	100
Live Alone		
Yes	3	75
No	1	25
Years with diabetes		
< 1year	1	25
5-8 years	1	25
>8 years	2	50

A total of four individuals completed both the pretest and the posttest questionnaire and were entered into the analysis. All four of the participants were males (100%), most were married (75%), and all had less than a high school education (100%). Half (50%) was between 18 to 39 years old while one was in the age group 40-49 years of age and the other in the 50 to 65-years group. None of the participants who were entered into the analysis was within the 65 years and over group. All of the participants who were entered into the analysis were obese, that is, within the 30-34.9 BMI categories. Most (75%) lived alone and half (50%) had diabetes for more than eight years. See Table 4.2.

Table 4.3: Participants' Stages of Change

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Stages of change pretest	4	2.0000	.81650	1.00	3.00
Stages of change posttest	4	3.0000	.81650	2.00	4.00

Wilcoxon Signed Ranks Test

Ranks

		N	Mean Rank	Sum of Ranks
Posttest - Pretest	Negative Ranks	0[a]	.00	.00
	Positive Ranks	4[b]	2.50	10.00
	Ties	0[c]		
	Total	4		

a. After program < Before program
b. After program > Before program
c. After program = Before program

Test Statistics[a]

	After program - Before program
Z	-2.000[b]
Asymp. Sig. (2-tailed)	.046

a. Wilcoxon Signed Ranks Test
b. Based on negative ranks.

The ranks table showed that all participants moved from one stages of change from pretest to a higher level of change at posttest. The Wilcoxon signed-rank test showed that the diabetes self-management program induced a statistically significant change in terms of the stages of change among participants who completed both pre and posttests (Z = -2.000, p = 0.046). But, a small effect size was detected using Cohen (1988) criteria. Moreover, there was an increased mean from 2.00 at pretest to 3.00 at posttest. See Table 4.3.

Table 4.4: Participants seen by Doctor as means of a diabetes self-management

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum	Percentiles		
						25th	50th (Median)	75th
Pretest	4	.7500	.50000	.00	1.00	.2500	1.0000	1.0000
Posttest	4	1.0000	.00000	1.00	1.00	1.0000	1.0000	1.0000

Pretest	Posttest		
	No	Yes	**Total**
No	0 (0%)	1 (25%)	**1 (25%)**
Yes	0 (0%)	3 (75%)	**3 (75%)**
Total	**0 (0%)**	**4 (100%)**	**4 (100%)**

At pretest, three (75%) participants mentioned that they had been seen by a doctor one or more times during the year as a result of managing their diabetes. Only one participant (25%) mentioned that he was not seen by a doctor. At posttest, all (100%) participants were seen by a doctor one or more times during a year as a result of managing their diabetes. McNemar test showed an asymptomatic p-value (1.00), indicating that the change in the number of individuals seen by their doctor as a results of managing their diabetes from pretest to posttest was non-statistically significant. However, the mean increased 25% from pretest to posttest. See Table 4.4.

Table 4.5: Participants Involvement in Physical Activity

Descriptive Statistics

			Std.				Percentiles	
							50th	
	N	Mean	Deviation	Minimum	Maximum	25th	(Median)	75th
Before program	4	.2500	.50000	.00	1.00	.0000	.0000	.7500
After program	4	.7500	.50000	.00	1.00	.2500	1.0000	1.0000

Pretest	Posttest		
	No	Yes	**Total**
No	1	2	**3**
	(25%)	(50%	**(75%)**
Yes	0	1	**1**
	(0%)	(25%)	**(25%)**
Total	**1**	**3**	**4**
	(25%)	**(75%)**	**(100%)**

Participants were asked whether they took part in physical activity for 30 or more minutes on five or more days of the week. At pretest, three (75%) participants answered "no" to this question and only one (25%) participant answered "yes". At posttest, the revered occurred where three (75%) out of the four participants reported that they met the recommended level of physical activity while only one (25%) participant mentioned that he was not physically active. McNemar test showed a non-significant *p*-value (.500) however, an increase in the mean from pretest to posttest by 75% was observed.

Table 4.6: Participants with Normal Blood Pressure

Descriptive Statistics

| | | | Std. | | | | Percentiles | |
	N	Mean	Deviation	Minimum	Maximum	25th	50th (Median)	75th
Pretest	4	.75	.50	.00	1.00	.25	1.00	1.00
Posttest	4	1.00	.00	1.00	1.00	1.00	1.00	1.00

	Posttest		
Pretest	No	Yes	**Total**
No	0 (0%)	1 (25%)	**1 (25%)**
Yes	0 (0%)	3 (75%)	**3 (75%)**
Total	**0 (0%)**	**4 (100%)**	**4 (100%)**

Participants were asked whether they have been told by a doctor that their blood pressure was within range (140/90). At pretest most of the participants (75%) mentioned that they were told that their blood pressure was within normal range. At posttest, all (100%) participants mentioned that they were told by their doctor that their blood pressure was within normal range. McNemar test showed a non-significant *p*-value (1.00) An increase in the mean of 25% was reported from pretest to posttest for this variable.

Table 4.7: Participants who checked Blood Glucose at least once a day

Descriptive Statistics

						Percentiles		
	N	Mean	Std. Deviation	Minimum	Maximum	25th	50th (Median)	75th
Pretest	4	.2500	.50000	.00	1.00	.0000	.0000	.7500
Posttest	4	1.0000	.00000	1.00	1.00	1.0000	1.0000	1.0000

	Posttest		
Pretest	No	Yes	**Total**
No	0 (0%)	3 (75%)	**3 (75%)**
Yes	0 (0%)	1 (25%)	**1 (25%)**
Total	**0 (0%)**	**4 (100%)**	**4 (100%)**

At pretest, three (75%) out of four participants mentioned that they did not checked their blood glucose at least once a day, however, at posttest, all (100%) participants stated that they checked their blood glucose at least once a day. McNemar test showed a non-significant *p*-value (.2500). An increase in mean of 75% was reported from pretest to posttest.

Table 4.8: Participants who checked HbA1c twice a year

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum	Percentiles		
						25th	50th (Median)	75th
Pretest	4	.5000	.57735	.00	1.00	.0000	.5000	1.0000
Posttest	4	1.0000	.00000	1.00	1.00	1.0000	1.0000	1.0000

	Posttest		
Pretest	No	Yes	**Total**
No	0	2	**2**
	(0%)	(50%)	**(50%)**
Yes	0	2	**2**
	(0%)	(50%)	**(50%)**
Total	**0**	**4**	**4**
	(0%)	**(100%)**	**(100%)**

Participants were asked whether they had their HbA1c checked two or more times in the last year. At pretest, half (50.0%) of participants answered "yes" to this question. At posttest, all (100%) participants stated they had their HbA1c checked. McNemar test was run and showed a non-significant *p*-value (.500) however, an increase in the mean of 50% was observed.

Table 4.9: Use of Diabetes Meal Plan for Diabetes Self-Management

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum	Percentiles 25th	Percentiles 50th (Median)	Percentiles 75th
Pretest	4	.5000	.57735	.00	1.00	.0000	.5000	1.0000
Posttest	4	.7500	.50000	.00	1.00	.2500	1.0000	1.0000

	Posttest		
Pretest	No	Yes	**Total**
No	1 (25%)	1 (25%)	**2 (50%)**
Yes	0 (0%)	2 (50%)	**2 (50%)**
Total	**1 (25%)**	**3 (75%)**	**4 (100%)**

At pretest, half (50.0%) of the participants stated they had used a diabetes meal plan to manage their diabetes. At posttest, three (75.0%) participants mentioned they were using a diabetes meal plan. McNemar test showed a non-significant p-value (1.000) however, there was an increase in the mean of 25% from pretest to posttest.

Table 4.10: Participants in Compliance with Diabetes Regimen Prescribed by Doctor

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum	25th	50th (Median)	75th
						Percentiles		
Pretest	4	.7500	.50000	.00	1.00	.2500	1.0000	1.0000
Posttest	4	1.0000	.00000	1.00	1.00	1.0000	1.0000	1.0000

	Posttest		
Pretest	No	Yes	**Total**
No	0	1	**1**
	(0%)	(25%)	**(25%)**
Yes	0	3	**3**
	(0%)	(75%)	**(75%)**
Total	**0**	**4**	**4**
	(0%)	**(100%)**	**(100%)**

Participants were asked whether they complied with a diabetes regimen prescribed by their doctor. At pretest, three (75%) participants mentioned that they complied with the diabetes regimen prescribed by their doctor. At posttest, all (100%) participants stated they complied with the diabetes regimen prescribed by their doctor. McNemar test showed a non-significant p-value (1.000) however, there was an increase in the mean of 25% from pretest to posttest.

Table 4.11: Number of Participants who set Diabetes Self-Management Goals within the last Month

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum	Percentiles		
						25th	50th (Median)	75th
Before Program	4	1.0000	.00000	1.00	1.00	1.0000	1.0000	1.0000
After Program	4	1.0000	.00000	1.00	1.00	1.0000	1.0000	1.0000

McNemar test was not possible to be performed for setting goals variable since the values were all 1.00, indicating that all participants were able to set goals at pre and posttest.

Table 4.12: Number of Participants Who Accomplished Diabetes Self-Management Goals within the last Month

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum	25th	50th (Median)	75th
							Percentiles	
Pretest	4	.5000	.57735	.00	1.00	.0000	.5000	1.0000
Posttest	4	1.0000	.00000	1.00	1.00	1.0000	1.0000	1.0000

	Posttest		
Pretest	No	Yes	**Total**
No	0 (0%)	2 (50%)	**2 (50%)**
Yes	0 (0%)	2 (50%)	**2 (50%)**
Total	**0 (0%)**	**4 (100%)**	**4 (100%)**

At pretest, half (50%) of the participants stated that they accomplished at least one of the diabetes self-management goals they set for themselves. At posttest all (100%) of the participants mentioned they had accomplished at least one of the diabetes self-management goals they had set for themselves. McNemar test showed a non-significant p-value (.500) however, there was an increase in the mean of 50% from pretest to posttest. See Table 4.12.

Participants were asked to check all of the following behaviors they had done in the last month: Eaten non-starchy vegetables (spinach, carrots, broccoli, etc.) with their meals; Chosen whole-grain foods over processed grain products; Included dried beans (i.e., kidney, pinto beans) and lentils with their meals; Included fish each week with their meals; Chosen lean meats, such as cuts of beef and pork; Chosen nonfat or reduced fat dairy; Chosen water and calorie-free "diet" drinks instead of regular soda and sweetened drinks; Chosen liquid oils for cooking instead of solid fats; and Controlled their portion sizes. The results are shown in Tables 4.13 to Table 4.21.

Table 4.13: Participants Eating Non-Starchy Vegetables with meals

Descriptive Statistics

| | | | Std. | | | | Percentiles | |
	N	Mean	Deviation	Minimum	Maximum	25th	50th (Median)	75th
Pretest	4	.7500	.50000	.00	1.00	.2500	1.0000	1.0000
Posttest	4	1.0000	.00000	1.00	1.00	1.0000	1.0000	1.0000

	Posttest		
Pretest	No	Yes	**Total**
No	0 (0%)	1 (25%)	**1 (25%)**
Yes	0 (0%)	3 (75%)	**3 (75%)**
Total	**0 (0%)**	**4 (100%)**	**4 (100%)**

At pretest, three (75%) participants mentioned that they had eaten non-starchy vegetables with their meals. At posttest, all (100%) participants shared that they had eaten non-starchy vegetables with their meals. McNemar test showed a non-statistically significant p-value (1.000) however, the mean increased by 25% from pretest to posttest.

Table 4.14: Participants Choosing Whole Grain Foods over Processed Grain Products

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum	25th	50th (Median)	75th
							Percentiles	
Pretest	4	.7500	.50000	.00	1.00	.2500	1.0000	1.0000
Posttest	4	1.0000	.00000	1.00	1.00	1.0000	1.0000	1.0000

	Posttest		
Pretest	No	Yes	Total
No	0 (0%)	1 (25%)	**1 (25%)**
Yes	0 (0%)	3 (75%)	**3 (75%)**
Total	**0 (0%)**	**4 (100%)**	**4 (100%)**

At pretest, three (75%) participants chose whole-grain foods over processed foods. At posttest, all (100%) participants stated they chose whole-grain foods over processed products. McNemar test showed a non-significant *p*-value (1.000) however, the mean increased a 25% from pretest to posttest.

Table 4.15: Participants who included Dried beans and Lentils with Meals

Descriptive Statistics

| | | | Std. | | | | Percentiles | |
	N	Mean	Deviation	Minimum	Maximum	25th	50th (Median)	75th
Pretest	4	.7500	.50000	.00	1.00	.2500	1.0000	1.0000
Posttest	4	1.0000	.00000	1.00	1.00	1.0000	1.0000	1.0000

| | Posttest | | |
Pretest	No	Yes	**Total**
No	0 (0%)	1 (25%)	**1 (25%)**
Yes	0 (0%)	3 (75%)	**3 (75%)**
Total	**0 (0%)**	**4 (100%)**	**4 (100%)**

At pretest, three (75%) participants included dried beans and lentils with their meals. At posttest, all (100%) participants had included dried beans and lentils with their meals. McNemar test showed a non-significant *p*-value (1.00) however, the mean increased a 25% from pretest to posttest.

Table 4.16: Participants who included Fish each week with their Meals

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum	25th	50th (Median)	75th
							Percentiles	
Pretest	4	.5000	.57735	.00	1.00	.0000	.5000	1.0000
Posttest	4	1.0000	.00000	1.00	1.00	1.0000	1.0000	1.0000

Pretest	Posttest		
	No	Yes	**Total**
No	0 (0%)	2 (50%)	**2 (50%)**
Yes	0 (0%)	2 (50%)	**2 (50%)**
Total	**0 (0%)**	**4 (100%)**	**4 (100%)**

Participants were asked whether they had included fish in their meals each week. At pretest, half (50.0%) participants had included fish and the other half (50.0%) had not included fish in their meals each week. At posttest, all (100%) participants had included fish in their meals each week. McNemar test showed a non-significant *p*-value (.500) however, the mean increased a 50% from pretest to posttest.

Table 4.17: Participants who included Lean Meats in their Meals

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum	Percentiles		
						25th	50th (Median)	75th
Pretest	4	.7500	.50000	.00	1.00	.2500	1.0000	1.0000
Posttest	4	.7500	.50000	.00	1.00	.2500	1.0000	1.0000

	Posttest		
Pretest	No	Yes	**Total**
No	0 (0%)	1 (25%)	**1 (25%)**
Yes	1 (25%)	2 (50%)	**3 (75%)**
Total	**1 (25%)**	**3 (75%)**	**4 (100%)**

Participants were asked whether they had chosen lean meats, such as cuts of beef and pork. At pretest, three (75%) participants had chosen lean meats, such as cuts of beef and pork. At posttest, three (75%) participants had chosen lean meats, such as cuts of beef and pork. McNemar test and showed a non-significant *p*-value (1.000) and also the mean did not increase at all from pretest to posttest.

Table 4.18: Participants who included nonfat or reduced fat dairy

Descriptive Statistics

			Std.				Percentiles	
							50th	
	N	Mean	Deviation	Minimum	Maximum	25th	(Median)	75th
Pretest	4	.5000	.57735	.00	1.00	.0000	.5000	1.0000
Posttest	4	.5000	.57735	.00	1.00	.0000	.5000	1.0000

	Posttest		
Pretest	No	Yes	Total
No	1	1	2
	(25%)	(25%)	(50%)
Yes	1	1	2
	(25%)	(25%)	(50%)
Total	2	2	4
	(50%)	(50%)	(100%)

Participants were asked whether they had chosen nonfat or reduced fat dairy. At pretest, half (50.0%) of participants had chosen nonfat or reduced fat dairy and the other half (50.0%) of participants had not chosen those. At posttest, participants had the same behavior as pretest. McNemar test was run and showed a non-significant *p*-value (1.000) while also the mean did not increase from pretest to posttest.

Table 4.19: Participants who chosen water instead of regular and sweetened drinks

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum	25th	50th (Median)	75th
							Percentiles	
BP	4	.7500	.50000	.00	1.00	.2500	1.0000	1.0000
AP	4	1.0000	.00000	1.00	1.00	1.0000	1.0000	1.0000

	Posttest		
Pretest	No	Yes	**Total**
No	0	1	**1**
	(0%)	(25%)	**(25%)**
Yes	0	3	**3**
	(0%)	(75%)	**(75%)**
Total	**0**	**4**	**4**
	(0%)	**(100%)**	**(100%)**

Participants were asked whether they had chosen water and calorie-free "diet" drinks instead of regular soda and sweetened drinks. At pretest, three (75%) participants had chosen water and calorie free "diet" drinks instead of regular and sweetened drinks. At posttest, all (100%) participants had chosen water and calorie free "diet" drinks instead of the regular and sweetened drinks. McNemar test and showed a non-significant p-value (1.000) however, the mean increased 25% from pretest to posttest.

Table 4.20: Participants who chosen oils for cooking instead of solid fats

Descriptive Statistics

						Percentiles		
	N	Mean	Std. Deviation	Minimum	Maximum	25th	50th (Median)	75th
Pretest	4	.5000	.57735	.00	1.00	.0000	.5000	1.0000
Posttest	4	.7500	.50000	.00	1.00	.2500	1.0000	1.0000

		Posttest		
Pretest		No	Yes	**Total**
No		1	1	**2**
		(25%)	(25%)	**(50%)**
Yes		0	2	**2**
		(0%)	(50%)	**(50%)**
Total		1	3	4
		(25%)	**(75%)**	**(100%)**

Participants were asked whether they had chosen liquid oils for cooking instead solid fats. At pretest, half (50.0%) of participants had chosen liquid oils for cooking instead solid fats and the other half (50.0%) of participants had not chosen liquid oils for cooking over solid fats. At posttest, three (75.0%) participants out of four (100%) participants had chosen liquid oils over solid fats and only one (25.0%) participant had not chosen liquid oils over solid fats. McNemar test was run and showed a non-significant p-value (1.000) however, the mean increased 25% from pretest to posttest.

Table 4.21: Participants who controlled their portion sizes

Descriptive Statistics

						Percentiles		
	N	Mean	Std. Deviation	Minimum	Maximum	25th	50th (Median)	75th
Pretest	4	.5000	.57735	.00	1.00	.0000	.5000	1.0000
Posttest	4	1.0000	.00000	1.00	1.00	1.0000	1.0000	1.0000

	Posttest		
Pretest	No	Yes	**Total**
No	0 (0%)	2 (50%)	**2 (50%)**
Yes	0 (0%)	2 (50%)	**2 (50%)**
Total	**0 (0%)**	**4 (100%)**	**4 (100%)**

Participants were asked whether they had controlled their portion sizes. At pretest, half (50.0%) of participants had controlled their portion sizes and the other half (50.0%) had not controlled their portion sizes. At posttest, all (100%) participants had controlled their portion sizes. McNemar test was run and showed a not significant .500 *p*-value however the mean increased from pretest to posttest.

Table 4.22: Solving daily life problems as participants deal with their diabetes

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum	Percentiles		
						25th	50th (Median)	75th
Pretest	4	.7500	.50000	.00	1.00	.2500	1.0000	1.0000
Posttest	4	1.0000	.00000	1.00	1.00	1.0000	1.0000	1.0000

	Posttest		
Pretest	No	Yes	**Total**
No	0	1	**1**
	(0%)	(25%)	**(25%)**
Yes	0	3	**3**
	(0%)	(75%)	**(75%)**
Total	**0**	**4**	**4**
	(0%)	**(100%)**	**(100%)**

Participants were asked whether they thought to be able to solve problems that come about in their daily life as they deal with their diabetes. At pretest, three (75.0%) participants out of four (100%) participants answered "yes" to this question and only one (25.0%) participant answered "no" to this same question. At posttest, all (100%) participants answered "yes" to the previous question. McNemar test was run and showed a non-significant p-value (1.000) however, the mean increased 25% from pretest to posttest.

Table 4.23: Participants perception in their control diabetes of their diabetes

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum	Percentiles		
						25th	50th (Median)	75th
Pretest	4	.7500	.50000	.00	1.00	.2500	1.0000	1.0000
Posttest	4	1.0000	.00000	1.00	1.00	1.0000	1.0000	1.0000

	Posttest		
Pretest	No	Yes	**Total**
No	0	1	**1**
	(0%)	(25%)	**(25%)**
Yes	0	3	**3**
	(0%)	(75%)	**(75%)**
Total	**0**	**4**	**4**
	(0%)	**(100%)**	**(100%)**

Participants were asked whether they thought they were in control of the management of their diabetes. At pretest, three (75%) participants thought they were in control of the management of their diabetes. At posttest, all (100%) participants thought they were in control of the management of their diabetes. McNemar test and showed a non-significant asymptomatic p-value (1.000) however, the mean increased 25% from pretest to posttest.

Table 4.24: Participants' poor mental health related with diabetes

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Pretest	4	2.0000	1.82574	.00	4.00
Posttest	4	1.5000	1.00000	1.00	3.00

Wilcoxon Signed Ranks Test

Ranks

		N	Mean Rank	Sum of Ranks
Posttest - Pretest	Negative Ranks	2[a]	2.25	4.50
	Positive Ranks	1[b]	1.50	1.50
	Ties	1[c]		
	Total	4		

a. Pretest < Posttest

b. Pretest > Posttest

c. Pretest = Posttest

Test Statistics[a]

	Posttest - Pretest
Z	-.816[b]
Asymp. Sig. (2-tailed)	.414

a. Wilcoxon Signed Ranks Test

b. Based on positive ranks.

Participants were asked to think about their mental health, which includes stress, depression, and problems with emotions, and also they were asked for how many days during the past 30 days their mental health were not good. The ranks table showed that from pretest to posttest two (Negative Ranks 2) participants experienced to have less days of poor mental health, one (Positive Ranks 1) participant experienced to have more days of poor mental health, and one (Ties 1) participant did not experience any change at all. A Wilcoxon signed-rank test showed that a 3 week, twice weekly diabetes self-management program did not induce a statistically significant change in less days of poor mental health in Hispanic participants with type 2 diabetes ($Z = -8.16$, $p = 0.414$). However, the mean decreased 50% in days of poor mental health showing less days of poor mental health from pretest to posttest.

Table 4.25: Participants' mental health restriction related with diabetes

NPar Tests

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Pretest	4	1.0000	2.00000	.00	4.00
Posttest	4	1.0000	1.41421	.00	3.00

Wilcoxon Signed Ranks Test

Ranks

		N	Mean Rank	Sum of Ranks
Pretest - Posttest	Negative Ranks	1[a]	1.50	1.50
	Positive Ranks	1[b]	1.50	1.50
	Ties	2[c]		
	Total	4		

a. Pretest < Posttest

b. Pretest > Posttest

c. Pretest = Posttest

Test Statistics[a]

	AP - BP
Z	.000[b]
Asymp. Sig. (2-tailed)	1.000

a. Wilcoxon Signed Ranks Test

b. The sum of negative ranks equals the sum of positive ranks.

Participants were asked that during the past 30 days, for how many days they had poor physical or mental health that kept them from doing their usual activities, such as self-care, work, or recreation. The ranks table showed that from pretest to posttest one (Negative Ranks 1) participant experienced to have less days of mental health restrictions, one (Positive Ranks 1) participant experienced to have more days of mental health restrictions, and two (Ties 1) participants did not experience any change at all. A Wilcoxon signed-rank test showed that a 3 week, twice weekly diabetes self-management program did not induce a statistically significant change in less days of mental health restrictions in Hispanic participants with type 2 diabetes (Z = .000, p = 1.000). Moreover, the mean did not change from pretest to posttest.

Table 4.26: T-Test ran on participant's weight at posttest

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Weight pretest	202.0500	4	36.70981	18.35490
	Weight posttest	198.0000	4	38.75564	19.37782

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Weight pretest & Weight posttest	4	.985	.015

Paired Samples Test

Weight of participants		Paired Differences			95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1	Weight pretest - Weight posttest	4.05000	6.83203	3.41602	-6.82129	14.92129	1.186	3	.321

t (3) =1.186, $p > 0.0005$. Because the means of the weight in the pretest and posttest and the direction of the t-value, we can conclude that there was not a statistically significant change in the weight of this group of participants from pretest to posttest.

CHAPTER 5

Discussion

The goal of the project was to determine the effectiveness of the "*Taking Ownership of Your Diabetes"* program in a diabetes self-management group of Hispanics living in Lexington, Kentucky

Worldwide, the number of individuals living with diabetes continues to increase. This number also continues to increase in Kentucky where those living with diabetes have more than tripled in the past 15 years. The incidence of diabetes is even higher among Hispanics and they tend to experience more severe complications due to poor glycemic control (Schneiderman et al 2014). It also seems that the prevalence of risk might vary among different groups of Hispanics. Schneiderman et al (2014) stated that "the differences in diabetes and obesity prevalence among Latino subgroups are masked when all individuals are combined into a single group." The Hispanic Community Health Study/Study of Latinos was conducted to examine the prevalence of diabetes and other chronic diseases among sub-groups of Hispanics. Diabetes prevalence was higher for Mexicans (18.3%) and lower for South American descendent (10.2%). Research shows that although self-management is poor among ethnic minorities, it is even more so among Hispanics. The University of Kentucky Cooperative Extension Program "*Taking Ownership of Your Diabetes"* (TOYD) was implemented among a Hispanic population in Lexington, Kentucky who were diagnosed as having type 2 diabetes as a means of meeting the need for self-management education among Hispanics.

In this study, all of the participants were obese. According to the National Health and Nutrition Examination Survey (NHANES, 2015) Hispanics adults are 1.1 times more likely to be overweight or obese than non-Hispanic White. Obesity is a precursor for diabetes and several other chronic diseases and conditions. In addition, obesity reduces a person's quality of life since this condition leads to a higher probability of high blood pressure, high levels of cholesterol and triglycerides in blood. Hispanics adults have almost twice the chances of being diagnosed with diabetes than non-Hispanic Whites and have 40% more chances to die from diabetes than non-Hispanic whites. (CDC, 2016). Moreover, Hispanics who are more acculturated have higher risk of developing diabetes (O'Brien, 2014). Several studies have identified factors such as the impact of migration, urbanization, stress, and physical inactivity, inequities in access to healthcare and lack of opportunity to make healthy choices where people live, work, and play as contributors in the high incidence of obesity and the resulting type 2 diabetes among Hispanics (Cusi & Campo, 2011; National Council of La Raza, 2014; Salud America, 2014). Whatever the

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reason, strategies that increase access to affordable healthy foods and reduce barriers due to language, culture and immigration status must be adopted to curb the high incidence of obesity among Hispanics and the resulting type 2 diabetes (The State of Obesity, 2014).

All of the participants in this study did not have a high school education. Data Collected from the Current Population Survey showed that Hispanics had the lowest education in all education categories, from high school graduate or to more advanced degrees. Borrell, Dallo, and Kellee (2006) used the aggregated data from the National Health Interview Survey (1997–2002) to examine the association between education and the prevalence of diabetes in US adults and whether this relation differs by race/ethnicity. They found that level of education was inversely related to the prevalence of diabetes among Whites, Hispanics and women. Results of The Hispanic Community Health Study/Study of Latinos (HCHS/SOL), a study of 16,415 women and men 18 to 17 years of age, recruited from four main cities or counties during 2008-2011, showed that women and men with more than a high school education had a lower prevalence of diabetes than their lower education counterparts. A higher prevalence of diabetes was found in households with low education and a similar correlation was seen in low-income households (Schneiderman et al, 2014). Additionally, Hu et al (2013) reported that that more than half of Hispanic patients with diabetes had low health education, compared to 15% of non-Hispanics with diabetes. Also, greater diabetes complications were correlated with low education and poorer glycemic control while patients with more diabetes knowledge had more chances to execute diabetes self-management activities. Some authors have suggested that low education was associated with harmful behaviors, inefficacy to act on prevention and treatment choices to control chronic disease, and the adoption of health behaviors such as adequate nutrition and compliance with medications (Borrell, Dallo, and Kellee, 2006; Ramos, et al, 2013). It is important to take into consideration the educational status of participants when conducting interventions in order to tailor interventions to target these groups and decrease health disparities among the Hispanic population (Ackermann, Milam, Goodman, & Colditz, 2016).

Most of the participants in this study mentioned that they were married (75.0%) but that they lived alone (75%). Seeing that most of the participants that completed both pre and posttest surveys and who were entered into the analysis were males it could be that they were married in their home country but their wives were not living in the US. Because these men were living alone it may could mean that they did not have some of the social support needed to manage their diabetes.   In order for diabetes self-management education programs be effective, social support is needed (Ingram, Torres, Redondo, Bradford, and O'Toole, 2007; Mensing et al., 2007).

According to Haltiwager and Brutus (2011) participants with more support resources to control their diabetes were more effective than participants who had less support resources. Moreover, Fortmanm, Gallo and Philis-Tsimikas (2011) study demonstrated that participants with more support resources for diabetes self-management also had greater adaptive behaviors, less depression and as a consequence lower HbA1c levels. In a randomized control trial study conducted by Mansyur, Rustveld, Nash and Jibaja-Weiss (2015) found that women had less support than men and families were less supportive of women's desire to comply with a healthy diet. Researchers should be aware that even though Hispanic men might be married their wives might not be with them in the US and as a result they might lack the social support needed to manage their diabetes.

There is a relationship between modifiable risk factors and the development of chronic diseases and one way to address behavior change is through the Trans-theoretical model of change or stages of change model. This model describes that a successful behavior change is when an individual go from one and each of the five stages of change and thus finishing in maintenance stage. Individuals can move from one stages of change to the next one and also can revert to an earlier stage of change. This model has comprehensive functions to improve behaviors related with diabetes. The New Hampshire Minority Health Coalition designed a program that applies the stages of change model called Change for Life, Cambia tu vida, which was made for minority groups to change behaviors and reduce risk factors related with the development of diabetes. In Change for Life, Cambia tu vida program that served black and Hispanic population where both populations share the same physical environment (neighborhoods) that provide health disparities as lack of access to healthy foods. The Change for Life program intervention is given by a Spanish speaker. At the first class individuals have to choose which modifiable risk factors they would like to change. In this curriculum participants are taught about stages of change through group exercises and at the end they share their experiences. Moreover, they are taught to identify triggers for unhealthy behaviors, identify barriers to change and be able to request for support if needed. Setting goals are an important part of this curriculum to improve behavior change and more important recompense themselves for the movement through the stages of change. The participants' stages of change were compared at baseline and at the end of the program, and at baseline with the 3-month follow-up. Most participants in this study moved from early stages of contemplation and preparation to the action stage for diet, exercise, and stress behaviors. Moreover, participants kept progressing to the more advanced stages of change (preparation and action) at the 3-month follow-up. In the participants' feedback, almost stated that the program was beneficial and more than half stated they made improvements regarding their behavioral

health habits in this 3-month follow-up. The Change for Life program supported participants to advance towards the achievement of their goals on behavior change (Smith and Ryan, 2006).

Similarly, in the Taking Ownership of your Diabetes lessons were created for participants to move from stages of pre-contemplation, contemplation, and preparation to stages of action and maintenance. The person at the pre-contemplation stage is generally aware of their condition but is not interested in making the necessary change needed to manage the disease. This person is presented with activities to raise consciousness of the disease. At contemplation the person might be aware of the problem and has plan to change in the future but at this stage their knowledge, thoughts and feelings must be assessed as they are generally struggling mentally with the cost, energy and effort needed to be made to manage their diabetes. Additionally, the person at the preparation stage is more determined to change, may have examined what is needed to make the change and is ready to do so within the next 30 days but needs help with decision making and self-efficacy. In a study conducted by Prochaska and Velicer (1997), they found that basic research has generated a rule of thumb for at-risk population where approximately 40% of individuals are in pre-contemplation, 40% in contemplation, and 20% in preparation. In this study, results of the Wilcoxon signed-rank test showed that the diabetes self-management program induced a statistically significant change in participants moving to a higher level of change. Although the stages of change have not been used much in group settings with minority population, the results of the *Change for Life/Cambia tu vida* (Smith and Ryan, 2006) and the results from this study shows that it offers promise for designing behavior change interventions among Hispanics and other minority populations who experience racial and ethnic disparities related to the risk for diabetes and other chronic diseases.

Managing diabetes through daily blood glucose monitoring, regular physical activity, and eating healthy, working with health care provider to keep blood pressure and cholesterol under control, and taking medication as prescribed can reduce the complications associated with not managing diabetes and can lead to fewer emergency room visits and shorter hospital stays, as well as a reduction in diabetes related costs (CDC, 2016). The American Association of Diabetes Educators proposed seven self-care strategies to help individuals manage their diabetes. In this pilot study most of the participants mentioned that they had seen their doctor, had an HbA1c test, had been told by their doctor that their blood pressure was within normal range, and that they were in compliance with the regimen prescribed by their doctor. This could be due to the fact that this intervention was conducted in a Hispanic Medical Center and that some of these measures were taken as part of the study. The results of this pilot study contradict other studies in the literature. For example, Lopez-Class and Jurkowski (2010) used an ecological framework

consisting of intrapersonal factors (knowledge, attitudes, to understand self-management); interpersonal processes (social support and social relationships); community level influences (access to healthy foods, clinics, and the built environment); and public policy-level (local, state, and national regulation or policies related to health care funding) to understand diabetes management among Latinos. It was concluded that many diabetes self-management challenges occur for individuals residing in limited resource neighborhoods. Hu, Amirehsani, Wallace, and Letvak (2013) conducted focus groups among Hispanics immigrants with diabetes and their family members. They found three main barriers to diabetes self-management among this group, namely. Difficultuies in managing the disease, lack of resources and family support, and suggesting from diabetes.   Although the participants in this pilot study mentioned that they were taking the necessary diabetes self-management steps and precautions, it is important to remember that Hispanics experience several challenges in the area of diabetes self-management and creative approaches to remove barriers as well as culturally appropriate interventions and education where family members are involved so as to provide support for their family members with diabetes are needed (Hu, Amirehsani, Wallace, & Letvak, 2013).

Healthy eating and following a diabetes meal plan is an integral part of diabetes self-management. The goals of Medical Nutrition Therapy are to achieve and maintain blood glucose levels, lipid and lipoprotein profile, and blood pressure levels that are as close to normal range as possible (American Diabetes Association, 2008). In this pilot study participants were asked to check all of the following behaviors they had done in the last month: Eaten non-starchy vegetables (spinach, carrots, broccoli, etc.) with their meals; Chosen whole-grain foods over processed grain products; Included dried beans (i.e., kidney, pinto beans) and lentils with their meals; Included fish each week with their meals; Chosen lean meats, such as cuts of beef and pork; Chosen nonfat or reduced fat dairy; Chosen water and calorie-free "diet" drinks instead of regular soda and sweetened drinks; Chosen liquid oils for cooking instead of solid fats; and Controlled their portion sizes. Generally, most of the participants (50-75%) indicated that they were making these healthy choices to manage their diabetes. However, this is a small study and only data from four men were analyzed. However, several studies have shown that the dietary intake of Hispanic adults and children tend to be poor and lacking in fruit and vegetables, with high intakes of high fat and sugar food, sugar-sweetened beverages and high caloric intake (Wilson, Adolph, Butte, 2009). Mattei et al, 2016 studied the diet quality of 12,406 US Hispanics and Latinos aged 18-74 years old using the 2010 Alternate Healthy Eating Index with scores ranging from 0 to 110 from lowest to highest quality. This study showed low scores for sugar-sweetened beverages and fruit juices, whole grains, and fruit. Favorable scores were

observed for trans fats and nuts and legumes. In addition, diet quality varied by Hispanic or Latino background. Cross sectional data from the National Health and Nutrition Examination Survey found that of the 1930 calories consumed by Mexican American youth more than 40% account for "empty" calories in the form of solid fats and added sugar coming from Mexican mixed dishes, soda, desserts, and other baked goods (Wilson, Adolph, Butte, 2009; Taveras, Gillman, Kleinman K, et al 2010).

Lack of physical activity along with unhealthy diets are environmental and lifestyles factors that contribute to obesity (Surgeon General's vision for a Healthy and Fit Nation report). Also, low levels of physical activity along with poor diet are among the main causes of high rates of obesity and diabetes among Hispanics (Gordon, Larsen, Adair, & Popkin, 2003). According to Crespo et al (2000), Mexican American women are more physically active than men due to acculturation, and that also physical inactivity was more associated with individuals for English speakers than for Spanish speakers, or both bilingual. Dolash, He, Yin and Sosa (2015) found that park characteristics are related with physical activity among Hispanics. A focus group study about Hispanics and their perceptions, barriers and knowledge related to the Physical Activity Guidelines for Americans made the following questions. The participants of this study were asked to describe moderate physical activity and their answer was strongly related to playing with their kids at the park. Some others stated that they preferred playing at the park instead of watching T.V. and fewer described moderate physical activity as having a walk, dancing, biking, playing soccer (Gamboa, 2015). Also, participants were asked if they practice any type of moderate physical activity three topics were found: 1) Participants thought that activities such as construction, cleaning, unloading truck was counted as physical activity. 2) Some others thought that moderate physical activity was taking their kid or grandkids to the park. 3) Others thought that dancing, like Zumba counted as moderate physical activity. The principal investigator asked participants in this focus group study what the benefits of physical activity were and they had the following answers: 1) Most participants answered that the benefits of physical activity were associated with mental health, 2) participants stated that physical activity benefits were linked to prevention of diseases and 3) others thought the importance was in weight control.

Several studies have found that Hispanics face higher rates of stress and mental problems than other races and these outcomes could come from depression, anxiety and post-traumatic stress disorder coming from family problems, isolation, and violence. Hispanics also have disadvantage because the lack of access to mental health services. Higher proportions of Whites compared with Hispanics reported that they take daily antidepressants for emotional issues. Also, Hispanics feel more uncomfortable talking about mental problems compared to Whites and

therefore Hispanics reported they did not visit a mental health professional. Moreover, a same proportion of Hispanics and Whites stated they did not go to visit a doctor due to stigmatization if others found out about their mental issues. Furthermore, Hispanics find themselves having inconvenience making appointments due to mental health issues. Among other mental facts, one study found that long-period of time living in United States increased rates in mental problems (Hispanic Health Profile, 2013). According to the Status of Latino Hispanic Health, 2012 report, diet and physical activity have and influence on physical and mental health. On the contrary, having regular physical activity reduces the risk of cardiovascular problems, diabetes and mental issues as depression and anxiety. Therefore, there is an increased importance to understand lifestyle and behavior risk factors among Hispanics in order to come with solutions to these current problems.

Kamimura *et al* (2014) analyzed perceived health status between diabetic and non-diabetic patients and family members. Physical and mental health was also investigated in this study. Free clinic patients are at a higher risk for developing physical and mental health conditions and the importance is that these patients who are diagnosed with diabetes encounter more obstacles and problems to succeed on diabetes self-management programs. Around 30% of these free clinic patients experience depression and this condition is related to low diabetes self-efficacy. Patients with diabetes revealed inferior physical health ($p<0.01$), and mental health ($p<0.05$) contrasted to patients without diabetes and their family members. Moreover, patients with diabetes reported greater levels of anxiety ($p<0.01$), depression ($p<0.01$) and pain ($p<0.05$) compared to patients without diabetes and their family members.

In this study, a high percentage (55.5%) of participants were lost due to attrition. Although studies have shown that having culturally appropriate interventions conducted by Hispanics helps. However, several diabetes self-management studies among Hispanics also mentioned loss of subjects by attrition up to 30% Philis-Tsimikas, et al (2011); 41% at 18-month. Tang. et al (2014); 55.5%, Ryan, J. et al (2013); 32.86%, Castillo. et al (2010). In this study, a high percentage (55.5%) of participants were lost from pretest to the six-month follow-up period. Gucciardi, Demelo, Offenheim and Stewart (2008) mentioned several reasons for attrition in diabetes self-management programs. For example, incompatibility between job schedules and place's business hours, person's skills to control diabetes, distance to the place, apathy towards the program. Moreover, some other factors collaborate to attrition like having a part-time or full time job, ageing more than 65, having a primary care doctor or having a small number of symptoms. Therefore, in the "Tomando Control de tu Diabetes" study, individuals who made it through the end of the study and follow-up were more interactive and gave more examples of

diabetes symptoms than those who dropped out the study. Here again, Gucciardi, Demelo, Offenheim and Stewart (2008) pointed out the importance of Diabetes Education Centers (DECs) in giving information regarding their assistance straight to patients before the beginning of the DESM program. DECs that give this information to their patients reduce the first non-appearance rate. The Hispanic Clinic chosen for purposes of the "Tomando Control de tu Diabetes" study was a brand new clinic and owned by a physician who just recently moved in to Lexington, Kentucky where having few patients with type 2 diabetes mellitus so, no previous method just mentioned above was implemented to reduce attrition. Some studies mentioned that interventions that are culturally appropriate and that include Spanish speaking workers tend to overcome such losses by attrition. 14.4% at 12-month CoDE study. Prezio. et al. (2013); 25% attrition Helduser. J. et al (2013) and in this later study low attrition was due to better adherence physical activity and better eating habits.

In order to reach acceptable numbers of participants from any minority group, researchers need to oversample to reach desired levels of minority population representation (Yancey, Ortega & Kumanyika, 2006). In "*Taking Ownership of Your Diabetes Program*", the original plan was to get a sample size of 100 Hispanic participants with diabetes. However, inclusion variables such as residing in Lexington Kentucky for at least 3 years limited the availability of Hispanics who lived in the surrounding areas of the city to join this intervention. What is more, passive recruitment which is the distribution of information targeting the population across several means (flyers, mailings, announcements) was selected in "*Taking Ownership of Your Diabetes Program*" however, the active recruitment process which is getting the staff (in this case health care team) straight into interaction with potential participants (health care team meeting future participants) might have worked better for this specific group since some portray lack of motivation.

Additionally, retention efforts should be addressed since the Hispanic population tends to skip meetings or get late to their appointments. Therefore, and according to Yancey., *et al.* (2006) strategies must be developed to increase retention throughout the intervention like the benefits and positive outcomes of having control of their diabetes and the importance of 30 minutes of physical activity for 5 or more days per week to regulate their glycaemia. In addition, incentives should be given in a timely fashion as well as monetary compensations to make them feel that their participation and attendance are important. In "*Taking Ownership of Your Diabetes Program*", participants were given a well-balanced small meal per class and they were taught how to prepare it. Some barriers were encounter due to culture and personal situations while trying to reach them for a follow-up like two specific cases where participants did not answer

their phones neither tried to call back since they did not have the principal investigator's phone number.

Lesson Learned

In this pilot study there were many challenges in recruiting participants. Recruitment was done using flyers that were distributed to free clinics, Hispanic supermarkets, churches, groceries stores and food establishments. As part of the recruitment efforts for this study we attempted partnerships and collaborations with Diabetes Centers and Clinics at the University of Kentucky but were unsuccessful. Recruitment via the Hispanic radio station was by far the most effective approach in this pilot study. Researchers must plan to oversample by at least 25% of the original sample size in order to account for attrition of participants that is common with Hispanic populations. The use of bilingual recruiters, physicians, and staff was advantageous in the recruitment process. Chasan-Taber, Fortner, Hasting, and Markenson (2009) also agreed. They found that the use of bilingual recruiters, a flexible recruitment process, training recruiters to be culturally sensitive, use of culturally tailored materials, prescreening participants, participant compensation, seeking the cooperation of clinic staff, and continuous monitoring of recruitment goals emerged as important issues influencing recruitment. Classes were conducted two sessions a week for a total of three weeks. Many of the participants agreed that this format was best for their schedules. They mentioned that it was easier to commit to the program for three weeks than for a six-week period. Many studies in the literature however were conducted for much longer periods and it seems like studies that were longer in duration were more successful in helping participants manage their diabetes. Brown. et al (2005) compare two diabetes self-management interventions designed for Mexican Americans. The extended original intervention was 1-year long consisting of 12 weeks with a two-hour session each week. The compressed intervention was eight weeks long and consisted of two-hour educational sessions followed by support sessions that took place at three, six, and 12 months. For the extended intervention, greater overall attendance at both educational and support sessions was related to greater reductions in HbA1c over time. Results indicate a decrease in both interventions, but a better result resulted in the extended intervention for individuals who received the maximum "dose", that is, those who attended ≥ 50% of the intervention sessions. In addition, Prezio el al (2013) used a randomized control design to examine the impact of a culturally tailored diabetes education program on the HbA1c, blood pressure, body mass index (BMI) and lipid status of uninsured Mexican-Americans with diabetes. The intervention group received a tailored diabetes program (CoDE) plus the usual medical care and the control group received usual medical care. One year later, the control group participants were asked if wanted to join the CoDe program.

There is evidence that diabetes education interventions should last over 6 months in order to produce significant changes in HbA1c levels. This is supported when groups improved HbA1c levels after 6 months. Diabetes education benefits tend to disappear after 6 months, therefore CoDE program is designed to last over a year as maintenance.

Finding ways to keep participants committed to long program is essential. Participants in this study were provided with a $25 gift certificate at pretest and $30 at posttest. Small incentives such as pedometers, water bottles, cutting boards, stretch bands, and snow scrapers were also provided after each lesson. Some studies mentioned the use of incentives.

Having the materials in Spanish and tested to ensure cultural appropriateness was important. In this study all the materials, flyers, informed consent forms, questionnaires, handouts, PowerPoints and lesson activities were all in Spanish.

CHAPTER 6

Conclusions and Implications

The goal of the project was to determine the effectiveness of the "*Taking Ownership of Your Diabetes"* program in a diabetes self-management group of Hispanics living in Lexington, Kentucky. There is a need for diabetes self-management education among Hispanics because the population is growing, and Hispanics tend to have more severe diabetes symptoms and generally have low glycemic control. More culturally appropriate studies need to be conducted among Hispanics in Lexington, Kentucky.

This pilot study was shown to be effective in helping participants move from the pre-contemplation and contemplation Stages of Change to the Preparation and Action Stages. In addition, changes were observed in terms of participants engaging in the recommended level of physical activity, checking blood glucose at least once a day, complying with their doctor's regimen, goal setting and accomplishing goals, problem solving and diabetes self-management and in experiencing fewer day of poor mental health. However, this pilot study lasted for three weeks and it was observed that most of these gains were lost at the six-month follow-up time frame. It seems that interventions need to be of longer duration and that follow-up contact must be made with participants.

It seems that the men in this pilot study experienced more days of poor mental health. Future interventions should include a mental health component to improve self-efficacy of diabetes self-management skills and strategies. In addition, social support needs to be included in future interventions as some research shows social support to be an important aspect in terms of diabetes self-management for the Hispanic population.

Limitations

This study was a pilot study and it is not without limitations such as the small sample size that reduced the potential to detect significant changes from pre to posttest and at the six-month follow-up period. This small group does not allow for generalizations to be made except to those who participated in the pilot study. The design was a one, group, pretest posttest design. The inability to randomized participants and used a control group limited the reliability of the findings and the ability to generalize to Hispanics in Lexington, Kentucky who did not participate in the study. Nonetheless, this pilot study provided information and indication that it is possible to realize change in diabetes self-management behavior among Hispanics.

Future Studies

Future studies should focus on recruiting larger sample sizes. Several authors have suggested increasing cultural competence, building relationships with existing service providers and with the Hispanic community (Allen, Gudiño, & Crawford, 2011). In this pilot study collaboration was initiated with a Hispanic Medical Center in order to recruit participants. We also recruited through a Hispanic radio station. However, these efforts did not increase the number of individuals participating in the pilot. Some of the participants that were recruited were lost and future studies would have to strategize on both recruitment and maintaining participation.

APPENDICES

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ENCUESTA DE INTRODUCCION

TOME EL TIEMPO NECESARIO PARA RESPONDER LAS SIGUIENTES PREGUNTAS. PROVEERAN INFORMACION ACERCA DEL PROGRAMA Y DEL PROGRESO QUE USTED HA ALCANZADO.

INFORMACION GENERAL

1. Nombre:_____

2. Sexo: _____Hombre _____Mujer

3. Edad:_____18-39 _____40-49 _____50-65 _____65 y más

4. ¿Vive usted sólo (a)? ___SI _____No

5. Estado civil: _____Soltero ____Casado   Divorciado ___Viudo _____Otro

6. Educación: ___No graduado de la Preparatoria _____Graduado de la preparatoria _____Universidad

7. Peso en libras_____   Estatura_____

8. ¿Ha sido usted informado (a) por medio de su doctor acerca de sus niveles de hemoglobina glucosilada A1C, si se encuentran dentro del rango normal? (7 porciento)? ____SI _____No

9. ¿Ha sido informado (a) por medio de su doctor si su presión sanguínea se encuentra dentro del rango (140/90)? ____SI _____No

INFORMACION ACERCA DE DIABETES

10. ¿Ha sido usted informado (a) por su doctor si usted tiene diabetes? _____SI _____No

11. ¿Hace cuánto tiempo que usted ha sido diagnosticado (a) con diabetes?

____Menos de 1 año ____1-4 años ____5-8 años ____más de 8 años.

12. Realizo actividad física (caminar, aerobics, nadar, bailar, u otros deportes) por 30 minutos o más, desde cinco o más días a la semana.

____SI   ____No

13. He visitado a mi doctor una o más ocasiones durante el año como resultado del manejo de mi diabetes.
____SI   ____No

14. Checo mis niveles de azúcar en sangre de una o más veces al día.

____SI   ____No

15. Mis niveles de hemoglobina glucosilada A1C han sido checados durante dos o más ocasiones en este último año.

____SI   ____No

16. Cumplo con el régimen de diabetes prescrito por mi doctor.

____SI   ____No

17. He usado un plan alimentario para el manejo de mi diabetes.

___ Sí   ___ No

18. Me he propuesto una o más metas durante el último mes relacionado con el manejo de mi diabetes.

___ Sí   ___ No

19. I have accomplished at least one of the goals I set for myself in the last month that relates to diabetes management.

___ Yes   ___ No

20. ¿Has incluido al menos tres de las siguientes opciones en este último mes?

____ Ingerido vegetales sin almidón (espinacas, zanahorias, brócoli, etc.) en mis comidas.

____ Escogido alimentos de grano entero en lugar de productos de grano procesado.

____ Incluido frijoles secos (ej., frijoles, frijoles pintos) y lentejas en mis comidas.

____ Incluido pescado en mis tiempos de comida cada semana.

____ Escogido carnes bajas en grasa, como cortes de carne de res y puerco.

____ Escogido productos lácteos sin grasa o reducidos en grasa.

____ Escogido agua y bebidas sin calorías "dieta" en lugar de bebidas gaseosas y bebidas azucaradas.

____ Escogido aceites líquidos para cocinar en lugar de grasas sólidas.

____ Controlado las porciones de mis alimentos.

Total _____

21. ¿Considera usted tener la capacidad de resolver problemas que suceden en la vida diaria conforme usted trata con su diabetes?

___ Sí ___ No

22. ¿Piensa usted tener bajo control el manejo de su diabetes?

___ Sí ___ No

CALIDAD DE VIDA/SALUD MENTAL

23. ¿Pensando en este momento acerca de su salud mental, que incluye estrés, depresión, y problemas emocionales, por cuantos días durante los últimos 30 días su salud mental no fue buena?

24. Durante el último mes, por alrededor de cuantos días usted se encontró con salud física o mental deteriorada que le impidiera realizar actividades cotidianas, tales como el cuidado de sí mismo, trabajo, o recreación?

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APPENDIX B

Research Flyer published in Hispanic newspaper "La Prensa"

Hispanic newspaper "La Prensa"

Are you Hispanic and Spanish speaker? Do
you have type 2 diabetes?

Example of diabetes powerpoint introduction lesson

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LECCION 4

TAKING OWNERSHIP OF YOUR DIABETES

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HOJA DE FIJACION DE METAS

ANOTA TUS METAS RELACIONADAS AL CONTROL DE DIABETES	MARCA SI ES COMPLETADO
META#1:	
Pasos que tomare para lograr esta meta:	
META#2:	
Pasos que tomare para lograr esta meta:	
META#3:	
Pasos que tomare para lograr esta meta:	

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UNIDAD 2 LECCION 4
Problemas de la Vida Real

RESPUESTAS A PREGUNTAS DE POWERPOINT

Manuel ha estado enfermo de diabetes por varios años. Él sabe que ha estado enfermo, pero dice que no le importa. El tiende a comer porciones grandes de comida en casa. El trabaja manejando una camioneta por casi todo el día y llega a casa por ahí de las 6 p.m. Podría llegar a casa más temprano, pero se queda con sus amigos pasando tiempo la mayoría de las tardes donde toma dos a tres cervezas. Manuel cena con su esposa como a las 7 pm. Ella no trabaja afuera de la casa. La semana pasada se preocupó bastante cuando visito al doctor. Le dijo el doctor que su A1C es del 9%, y su presión sanguínea y colesterol estaban altos. Su doctor le recomendó que comiera más saludable y que realice ejercicio

PREGUNTAS:

1. ¿CUAL ES EL PROBLEMA DE MANUEL?

Manuel esta: a) no controlando su diabetes; b) experimentado algunos de los síntomas relacionados con las complicaciones de la diabetes, tales como presión arterial alta y colesterol; c) tomando malas elecciones de alimentos

2. ¿POR QUE ESTE ES UN PROBLEMA PARA MANUEL?

La diabetes que no es controlada puede llevar a serias complicaciones tales como enfermedad renal, enfermedad del corazón, accidente cerebrovascular, ceguera y amputación.

3. ¿QUE OTRAS COSAS MANUEL NECESITA HACER PARA RESOLVER SU PROBLEMA? (ENLISTA SUGERENCIAS)

Manuel podría: a) trabajar con un dietista o educador de diabetes certificado para desarrollar un plan que se ajuste a sus necesidades, b) hacer mejor elección de alimentos para incluir más vegetales, frutas, y granos enteros en su dieta, c) tomar tiempo para realizar actividad física y preguntarle al doctor si puede realizar actividad física antes de empezar un programa de ejercicios, d) incluir más pescado en la dieta, e) comer porciones de 3 onzas de carne, y e) limitar su ingesta de carnes rojas.

4. ¿CUAL PODRIA SER LA MEJOR MANERA PARA RESOLVER ESTE PROBLEMA HASTA ESTE MOMENTO? ¿POR QUE?

Manuel puede que quiera: a) visitar a su doctor para hablar de su A1C, colesterol, y presión arterial alta, o b) trabajar con su dietista para crear un plan de alimentación.

El necesita tomar el primer paso para tener su diabetes bajo control.

Los participantes deben dar razón por la sugerencia que escogieron.

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UK
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UNIDAD 2 LECCION 4
Problemas de la Vida Real
EVALUACION DEL PARTICIPANTE

Manuel ha estado enfermo de diabetes por varios años. Él sabe que ha estado enfermo, pero dice que no le importa. El tiende a comer porciones grandes de comida en casa. El trabaja manejando una camioneta por casi todo el día y llega a casa por ahí de las 6 p.m. Podría llegar a casa más temprano, pero se queda con sus amigos pasando tiempo la mayoría de las tardes donde toma dos a tres cervezas. Manuel cena con su esposa como a las 7 pm. Ella no trabaja afuera de la casa. La semana pasada se preocupó bastante cuando visito al doctor. Le dijo el doctor que su A1C es del 9%, y su presión sanguínea y colesterol estaban altos. Su doctor le recomendó que comiera más saludable y que realice ejercicio

PREGUNTAS:

1. ¿QUE ES A1C?

2. ¿QUE COMPLICACIONES PODRIA TENER MANUEL SI NO TIENE SUS ABCs BAJO CONTROL?

3. ¿COMO ES DIFERENTE EL A1C CON RESPECTO AL CHEQUEO DE LA GLUCOSA SANGUINEA DIARIA?

4. ¿CUALES SON LOS RIESGOS QUE MANUEL TIENE SI SE QUEDA EN LA ETAPA DE NEGACION Y NO TRATA SU DIABETES?

5. ¿QUE METAS MANUEL PUEDE QUE SE FIJE PARA EL?

Mi meta para controlar mi diabetes es:
_____
_____
_____
_____
_____
_____
_____

Esta semana trabajare para lograr mi meta:
_____
_____
_____
_____
_____
_____

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