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Exploring the Needs and Preferences for a Diabetes Self-Management Program in Hispanics Living in the Central Valley of California

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EXPLORING THE NEEDS AND PREFERENCES FOR A DIABETES SELF-MANAGEMENT PROGRAM IN HISPANICS LIVING IN THE CENTRAL VALLEY OF CALIFORNIA

Diabetes mellitus type 2 is an ever increasing threat to the health of people living in the United States, especially those of Hispanic ethnicity. This ethnic group is disproportionately afflicted with the chronic condition and is also more likely than non-Hispanic whites to suffer from serious complications of diabetes. This project examines this growing problem among Hispanics living in the Central Valley of California by exploring how best to structure diabetes self-management education in a network of community health centers.

The Social Cognitive Theory provides a theoretical basis for investigation into motivation for diabetes self-management. This needs assessment specifically explored data on barriers to diabetes care, patient education preferences, and existing diabetes knowledge by asking subjects to complete two low-literacy bilingual surveys. Ninety-four completed survey packets from two health center locations were received.

Data analysis revealed that the sample was relatively homogenous demographically. Education preferences showed strong support for individual education sessions with certified diabetes educators or patients' regular medical providers, preferably Hispanic individuals. The need for diabetes education is supported by an average score of roughly 50% correct on the diabetes knowledge surveys. Recommendations resulting from this data center on utilizing diabetes educators within the health centers.

Emily Lane Kimble
April 2016

EXPLORING THE NEEDS AND PREFERENCES FOR A DIABETES SELF-MANAGEMENT PROGRAM IN HISPANICS LIVING IN THE CENTRAL VALLEY OF CALIFORNIA

by

Emily Lane Kimble

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CHAPTER 1: INTRODUCTION

According to the Centers for Disease Control and Prevention (2014), over 29 million people (12%) in the United States (US) have developed type 2 diabetes mellitus (T2D). This chronic condition can have potentially devastating effects on individuals' mortality and morbidity and is particularly prevalent in those with Hispanic descent. However, substantial evidence suggests that individuals who are able to self-manage their condition through self-regulation of diet and exercise have the power to delay or avoid complications (S. A. Brown et al., 2005; Li, Zhang, Barker, Chowdhury, & Xuanping, 2010; Rosal et al., 2011). This project will explore the both barriers to and the needs and preferences for enhanced self-efficacy and self-management in Hispanic diabetics utilizing the primary care services of a large network of community health centers in the Central Valley of California. Bandura's social cognitive theory (SCT) will serve as a theoretical framework to support the integration of self-management education.

Impact of Diabetes

T2D and its sequelae can cause substantial harm to individual quantity and quality of life. For those diagnosed by age 40, T2D results on average in a 5.8 years and 6.8 years loss of life expectancy for men and women respectively (Gregg et al., 2014). Quality adjusted life expectancy loss (combining mortality and quality of life) is estimated to be 11.1 years for those with T2D compared to persons without T2D (Jia, Zack, & Thompson, 2013). Also, when compared to nondiabetics, those diagnosed with diabetes by age 40 will spend an average of $124,600 (discounted for inflation) more on healthcare in their lifetimes despite a decreased total life expectancy (Xiaohui et al., 2014).

These adverse consequences related to T2D can be especially impactful to Hispanics living in the US due to the many health care disparities they face. Rates of poverty among Hispanics (23.2%) significantly exceed those of the general population (14.3%) (Macartney, Bishaw, & Fontenot, 2013). Living in poverty adversely impacts self-care in T2D by decreasing the availability of nutritious food, safe housing, reliable transportation, and steady employment (Chaufan, Davis, & Constantino, 2011). Many Hispanics have limited to no knowledge of English, hindering their ability to seek information for diabetes care. Basic literacy and also health care literacy can be barriers to good health and both of these measures are disproportionately low in the US Hispanic population (Koskan, Friedman, & Messias, 2010). Finally, one of the biggest health care disparities faced by many Americans, especially those of Hispanic descent, is a lack of basic health insurance. For the estimated 30% of Hispanics without health insurance (M. A. Kaplan & Inguanzo, 2011), self-financing diabetes care can be an overwhelming burden.

Social Cognitive Theory

SCT explores motivators for human behavior and how humans create goals and model behavior based on previous experiences and their observations of the world around them (Glanz, Burke, & Rimer, 2015). The origins of SCT date back to the 1960's when it began as psychologist Albert Bandura's elucidation of social learning. SCT was an attempt to distinguish learning theory from the works of early behavior theorists like Skinner (Denler, Wolters & Benzon, 2014). Over the past several decades Bandura has published many works evolving the theory, which he referred to as social learning theory until the 1980's.

SCT's first assumption is the existence of reciprocal determinism, or an individual's ability to both create change and also react to change. A second assumption, building on reciprocal determinism is that by observing and evaluating interaction between personal, behavioral and environmental factors humans can then employ agency, or the unique human ability to moderate behavior in response to changing times, evolving personal aspirations and shifting relationships with others (Bandura, 2001). Another important assumption of SCT is that learning does not have to be immediately displayed with behaviors, but instead can be stored for later cognition and application (Denler, Wolters & Benzon, 2014).

Four additional concepts defined by Bandura (2001) as essential to understanding SCT include intentionality, forethought, self-reactiveness, and self-reflectiveness. An intent is a conceived notion of what a person would like to achieve through his or her upcoming actions; acting on intents demonstrates intentionality. Forethought represents a longer-term goal-setting process where an individual identifies actions that are consistent with his or her intent to pursue and avoids actions incongruous with the intent. The cognitive ability to evaluate our environment and actions quickly, allows humans to engage in self-reactiveness. In addition to forethought, persons also look backwards to examine past actions and their utility. By looking for lessons from past behavior, we self-reflect (Bandura, 2001).

With its emphasis on forethought and self-reflection, SCT blends well with the idea of diabetes self-management. An individual changes his or her disease state status by creating goals and following behaviors that assist him or her in achieving them. A proposition crucial to SCT, self-efficacy, combines the previous mentioned four concepts with the idea that humans have the ability to motivate themselves to achieve goals, in the process tracking progress and modifying actions when needed (Glanz, Burke & Rimer, 2015). Thus, it can be proposed that the greater an individual's self-efficacy in regards to facing a health or personal challenge, the more likely this individual's actions will result in his or her desired outcomes.

Applications of Social Cognitive Theory

A quick entry of the term social cognitive theory into an academic journal article database (Academic Search Complete) returns over 1800 articles, mostly from the fields of health and education. Some of these studies explore relationships between self-efficacy and other variables. For instance, Pina-Watson, Jimenez & Ojeda (2014) discovered that for Mexican-American young women with greater career-determined self-efficacy, fewer perceived educational barriers, and higher scores of independent construal of life satisfaction were more highly correlated to life satisfaction than socioeconomic status and generational status variables. The relationship between SCT concepts and dietary intake was examined in a group of Finnish military men (Hankonen, Absetz, Kinnunen, Haukkala, & Jallinoja, 2013), where it was determined that social self-efficacy influenced the decision to eat more fruits and vegetables. Self-efficacy and planning were both positively related to number of minutes spent engaging in physical activity among single mothers of young children (Dlugonski & Motl, 2014).

More commonly, SCT is used in experimental studies as the basis of an intervention. An experiment conducted among 60 long-time smoking adults in Iran, showed that those who quit using an intervention based on SCT were less likely to relapse than those assigned to the control group, and also those in the experimental group had higher self-efficacy scores (Heydari, Dashtgard, & Moghadam, 2014). Australian males in two interventions groups using either an online or face-to-face program based on SCT were able to lose significantly more weight than a control group and half of both groups were able to fully achieve the diet and nutrition goals they had set (Morgan et al., 2014). One of the more common applications of SCT is to increase physical activity among subjects; evidence from multiple studies support the effectiveness of these interventions (Hatchett, Hallam, & Ford, 2013; Joseph et al., 2013; Plotnikoff, Lubans, Penfold, & Courneya, 2014).

While studies exploring the role between physical activity and SCT or dietary choices and SCT can be extrapolated to T2D, literature directly exploring self-efficacy and its determinants in those with T2D is needed. Shen, Edwards, Courtney, McDowell, and Wu (2012) have published an experimental design to test a diabetes self-management program to seniors in China, but to date no results are available. This intervention can add to existing literature by exploring barriers to self-efficacy including lack of diabetes knowledge and barriers such as lack of resources, time, understanding of disease pathophysiology, etc. Also, by their completion of the questionnaires, participants are actively engaging in intent, forethought, and self-reflection, concepts critical to SCT.

Applicability of SCT for T2D Self-Management

The American Diabetic Association strongly recommends diabetes self-management education and support for all individuals diagnosed with T2D. The *Standards of Medical Care in Diabetes—2014* (American Diabetic Association, 2014) cited numerous trials that provided evidence of improved outcomes for those with better self-management. Evidence by Rosal et al. (2011), suggested that an intervention to improve diabetes self-management with Latino adult diabetics by providing culturally relevant, low literacy education was successful in improving glycemic control after four months. A study comparing the effectiveness of two different levels of diabetes education (24 hours education and 28 hours group support with 16 hours of education and six hours of support group) for Mexican-Americans showed that both levels of education and support for diabetes self-management were statistically effective at reducing subjects' glycosylated hemoglobin A1C (HbA1C) (S. A. Brown et al., 2005). Though these interventions might sound costly, in a meta-analysis of the cost-effectiveness of diabetes treatment Li, et al. (2010), found that lifestyle interventions showed strong evidence for cost-effectives in persons with impaired fasting glucose and newly diagnosed diabetics.

The American Diabetic Association did not make recommendations about how and when this education should be delivered or whether or not the delivery should be adjusted according to patients' cultural preferences. Intervention suggestions generally included instruction on basic diabetes pathophysiology, dietary changes, role of physical activity, and how to prevent and/or manage potential complications. In the 2013 version of their "National Standards for Diabetes Self-Management Education and Support" the American Diabetic Association (2013) strongly suggested an organized, ongoing approach for patient education. The organization also recommended that plans be individualized but generally a curriculum should include:

- sharing knowledge of disease process and treatment options;
- making nutritional management part of lifestyle;
- integrating regular physical activity;
- understanding safe and optimal medication use;
- understanding how blood glucose monitoring can be used to self-regulate;
- preventing and recognizing complications of T2D; and
- creating strategies to reduce psychosocial barriers to optimal blood glucose.

Clearly, these guidelines suggest that all individuals should be encouraged to rely on both agency and reciprocal determinism in order to improve their states of health.

Guidelines are clear about what should be taught, but teaching methods, particularly discussion geared toward motivating those with a history of diabetes noncompliance are not detailed. The concepts of intentionality, forethought, self-reactiveness and self-reflectiveness, key to making the deliberate behavior changes strongly advised to individuals not meeting their diabetic goals, are not easily attained for many diabetics, especially without encouragement from others. For many diabetics, stressors like poor health, lack of diabetes knowledge, poverty, and limited time can interfere with their mastery of these four concepts. Without intentionality, forethought, self-reactiveness, and self-reflection, it is impossible to achieve self-efficacy, i.e. the confidence and skill required to set realistic goals, monitor progress, and change course when necessary to achieve these goals. Perhaps, no medical condition more requires this skill than T2D, a condition where individual commitment to diet, physical activity, stress management, and seeking routine medical care are indispensable.

Relevance to Enhancing Diabetes Self-Management in the Central Valley

Hispanic diabetics in the Central Valley are an especially vulnerable to the many adverse effects of their condition. Factors such as poverty, limited knowledge of English, poor literacy, low health literacy, and insufficient health insurance coverage are all substantial barriers faced by a disproportionate share of residents, especially those of Hispanic ethnicity. In Kern County 40% of households speak a language other than English (United States Census Bureau, 2012). Poverty is also high, with an estimated 22% of county residents falling under the federal poverty guidelines (United States Census Bureau, 2012). Additionally, Kern County has one of the highest rates of illiteracy in California, with nearly a quarter (24%) of adults unable to read basic English written materials (California Postsecondary Education Commission, 2011). To improve outcomes for Hispanic diabetics within the existing structure rife with health disparities it is crucial to provide education in a culturally appropriate, low literacy format.

Adopting the theoretical framework of SCT for this plan to increase disease knowledge and self-management skills reinforces the importance of engaging patients in discussions of behavior change. Before creating an organization-wide educational plan, it is important to explore what societal and cultural factors may be influential in determining individual’s self-efficacy. The Diabetes Knowledge Questionnaire-24 (DKQ) will explore existing self-efficacy by judging basic disease knowledge. Then, the Diabetes Education Preferences of Hispanics Living in the United States (DEPHLUS) will ask participants to self-reflect on their own experiences with diabetes control. The DEPHLUS was designed to seek input from a population who may not have many opportunities to express preferences for medical guidance. Additional questions seek insight into what barriers may be preventing Hispanic diabetics from realizing the vital importance of diet choices and physical activity to achieving longevity while maintaining quality of life. Evidence also suggests that interventions based on SCT can be successful in eliciting planned behavior changes (Hatchett et al., 2013; Heydari et al., 2014; Joseph et al., 2013; Morgan et al., 2014; Plotnikoff et al., 2014). This project seeks to go a step further by utilizing the SCT framework in all phases of diabetic education, beginning with a needs assessment.

CHAPTER 2: LITERATURE REVIEW

Type 2 diabetes mellitus (T2D) and its substantial sequelae pose a growing threat to all Americans, but especially those of Hispanic descent. Among Hispanic Whites, an individual's lifetime risk of developing T2D is now estimated at over 50% (Gregg et al., 2014b). This increasing incidence of T2D in Hispanics will have significant implications for the health and well-being of this growing population. Currently, Hispanics living in the United States face various health disparities that can compound the detrimental effects of a diagnosis of T2D on an individual's health. Also, many in this population are less aware of their diabetes status and are often less knowledgeable about how to control diabetes than non-Hispanic US residents (S. Arora, Marzec, Gates, & Menchine, 2011; Ceballos, Coronado, & Thompson, 2010; Coffman, Norton, & Beene, 2012). Many research projects have explored methods to improve diabetes education access and lessen knowledge gaps among Hispanics. The following section will discuss these disparities in health access and knowledge and explore types of diabetes education programs that sought to improve T2D outcomes.

Healthcare Disparities

Health and health care disparities faced by Hispanic diabetics are numerous and collectively contribute to significantly worsened outcomes compared to non-Hispanic white diabetics (Coberley et al., 2007; S. Kaplan, Billimek, Sorkin, Ngo-Metzger, & Greenfield, 2013; Wendel et al., 2006). Knowledge of English language can be one of the most impactful disparities; of the nearly 49 million Hispanics in the US 36 million speak fluent Spanish and over nine million speak little or no English (United States Census Bureau, 2013). The majority of non-English speaking Hispanics with diabetes receive their health care from non-Spanish speaking providers and this language discordance has been shown to negatively affect diabetes outcomes (Fernandez et al., 2011).

For Hispanic immigrants to the US, acculturation is another variable that plays a complicated role in the development and control of T2D. Compared to Hispanics born in the US, immigrants are less likely to smoke and have lower blood pressure, blood sugar and percentage of body fat. However, they are more likely to live in poverty and have limited access to healthcare. The longer immigrants live in the US and the more their socioeconomic statuses improve, the less likely they are to remain healthy (Pérez-Escamilla, 2011). In focus group interviews of 26 Latina immigrants in the Philadelphia area, O'Brien, Shuman, Barrios, Alos, and Whitaker (2014) found that these participants were drinking substantially more sugar-sweetened beverages, spending less time on food preparation, and consuming more take out and high-calorie meals than they had in their native countries. This "Hispanic health paradox" (Castro, 2013) where immigrants are physically and mentally healthier than US born Hispanics does not correlate with diabetes risk. Foreign and native born Hispanics do not have a significant difference in lifetime risk of T2D (Perez-Escamilla, 2011).

The financial burden of T2D can be overwhelming for anyone diagnosed with the chronic health condition. The average annual cost of diabetes care for an individual in 2012 was $7900 (American Diabetes Association, 2013). In the US roughly 14.3% of the population lives in poverty; this rate jumps to 23.2% when only Hispanic residents are surveyed (Macartney, Bishaw & Fontenot, 2013). While many living in poverty rely on government insurance programs, illegal immigrants and those who have recently immigrated are generally ineligible for Medicare and Medicaid services. An estimated 30% of Hispanics in the US do not have any type of health insurance to help finance the extensive cost of care for their chronic illness (M. A. Kaplan & Inguanzo, 2011). Uninsured individuals often look for ways to cut costs, including foregoing medical treatment and medication use. In a study of adult diabetics, Tseng et al., (2008) found that Hispanics were more likely than adults from other ethnic groups to forego medication in an effort to reduce costs.

A family's finances also affect access to health care for it members. Due to their ineligibility for government health insurance programs, disproportionate poverty, and perhaps fear of deportation, undocumented immigrants and their children use fewer health care resources than US citizens (López-Cevallos, 2014). In a 2004 survey of Hispanic adults, 70% of those without insurance did not have a regular primary care provider. Furthermore, among adults aged 40 or older, over 40% of women and 70% of men did not undergo regular preventative health screenings (M. A. Kaplan & Inguanzo, 2011). Reininger et al., (2014) found in a qualitative study of Mexican-Americans that in addition to a lack of health insurance, socio-ecologic factors such as fear of diagnosis with a chronic disease, embarrassment related to invasive health examinations, denial of chronic conditions, and also unwillingness to incur debt keep many adults from accessing regular care.

Diabetes Knowledge

To successfully manage a chronic condition as complicated as T2D, an individual must have adequate health care access and also possess significant knowledge about diabetes symptomatology, pathophysiology, nutrition, and physical activity. Among many US residents, particularly those of Hispanic ethnicity, this knowledge is often lacking. Health literacy or basic understanding of health, disease, and how individual actions affect body processes (National Network of Libraries of Medicine, 2013), is often substantially lower in Hispanics born outside the United States (Koskan et al., 2010). Coffman, Norton, and Beene (2012) interviewed 144 Hispanics adults at a community health fair and found that nearly half (46.6%) had low health literacy levels. They also encountered 17 adults identifying as non-diabetic who were in fact most likely diabetic (HgA1C > 7.0%). Hispanics often judge their likelihood of having T2D based on the presence of subjective physical symptoms rather than biophysical measurements. However, 87.5% of the sample surveyed had experienced a symptom suggestive of T2D within the previous two weeks, and only 30% had sought out a primary care provider to evaluate these symptoms.

Though Coffman, Norton, and Beene (2012) suggested that a majority of Hispanics are aware of diabetes symptoms, other researchers have discovered gaps in general knowledge about T2D. Arora, Marzec, Gates, & Menchine (2011) surveyed 291 Latino adults who were either diabetic or caregivers of diabetic family members using the DKQ-24. The average numbers of correct scores out of 24 were low in both those with diabetes (13.9) and caregivers (12.3). A similar study was conducted in a sample of Hispanic adults in Yakima County, Washington, this time using five questions from the full Diabetes Knowledge Questionnaire (Ceballos et al., 2010). Nearly 1300 adults answered questions about the cause of diabetes, family history as a risk factor, ability to cure diabetes, how diabetes is diagnosed, and types of diabetes. Over 70% of those surveyed answered at least four questions correctly, however, only 17% correctly answered the question about the cause of diabetes. Unlike Arora et al. (2011), Ceballos, Coronado, and Thompson (2010) did not find greater knowledge scores in participants who were diabetic versus those who were not.

One important aspect of diabetes self-knowledge is awareness of objective clinical measures. In 1997 the National Diabetes Education Project began the ABC campaign to encourage diabetics to be aware of their HbA1Cs, blood pressure, and blood cholesterol measures (Stark Casagrande et al., 2012). Data from the 2005-2008 National Health and Nutrition Examination Survey (NHANES) was used by Stark Casagrande et al. (2012) to discover how many diabetic adults knew their numbers. Among Mexican-American diabetics, knowledge of recent HbA1C, systolic and diastolic blood pressures, and low density lipoprotein serum levels were 22.2%, 39.6%, and 11.8% respectively. These numbers were significantly lower in all categories than those for non-Hispanic whites who scored 56.7%, 68.9%, and 25.0% respectively.

Concepts of diabetes self-management including diet and exercise modifications, using medications correctly, self-monitoring of blood glucose and making regular follow-ups with a primary care provider, while generally accepted by the medical community, are often not understood or not followed by Hispanic diabetics. Focus groups conducted among low-income Hispanic diabetics using Chicago and San Francisco area safety net health centers found that self-glucose monitoring and minimizing diabetes complications were rarely mentioned as self-management strategies (Lynch, Fernandez, Lighthouse, Mendenhall, & Jacobs, 2012). The importance of using medications was emphasized in all groups, but many participants admitted noncompliance with prescribed therapies due to difficulty obtaining them. Furthermore, some believed that alternative therapies like consuming cactus and aloe were as effective as or more effective than prescriptions. Dietary modifications, increased exercise, and weight loss were mentioned in focus groups as ways to control diabetes that participants were both aware of and had discussed with healthcare providers.

Diabetes Outcomes

Increased incidence of T2D is leading to a greater prevalence of the disease nationwide, particularly among Hispanics who are 66% more likely to develop T2D in their lifetimes than non-Hispanic Whites (Campbell, Walker, Smalls, & Egede, 2012). A systematic review of diabetes outcomes among minorities found that in all 17 studies comparing HbA1C among different racial/ethnic groups, Hispanics had higher HbA1Cs than white non-Hispanics. The differences ranged from 0.28 to 0.76 of a percentage point (Campbell et al., 2012). S. Kaplan, Billimek, Sorkin, Ngo-Metzger & Greenfield (2013) examined the health records of patients serviced by a large academic-affiliated primary care network to create a sample of 1484 Mexican-American (n=782), Vietnamese-American (n=313), and non-Hispanic white (n=389) diabetics. Results from the analysis showed that Mexican-Americans had significantly higher HbA1C values than Vietnamese-Americans or non-Hispanic Whites. However, after controlling for factors affecting access to care, quality of care, and interpersonal care, these differences were no longer significant.

Osborn, de Groot, and Wagner (2013) explored whether socioeconomic status might explain why Hispanics have two and one-half times the rate of early and late-stage renal disease, three times the rate of retinopathy, and twice the rate of blindness compared to non-Hispanic whites. Their hypotheses about socioeconomic status indicators like income, amount of education, owning a home, having a checking account, and difficulty paying bills were supported as these indicators did indicate a lower socioeconomic status on average for Hispanics than non-Hispanic whites. Also, the former group was more likely to indicate diabetes complications than the latter.

Certainly the higher rate of diabetes complications among Hispanics is related to healthcare disparities. However, Pu and Chewning (2013) have also documented that Hispanics are least likely of all ethnicities studied to receive the recommended number of annual HbA1Cs, diabetic foot exams, and diabetic eye exams—care measures aimed at preventing diabetes complications. Not surprisingly, given their poor diabetes control and greater prevalence of complications from diabetes, data compiled from four national health surveys concludes that Hispanics are also 51% more likely to die from diabetes than non-Hispanic Whites (Dominguez et al., 2015).

Diabetes Education Strategies

Health disparities and knowledge gaps among Hispanic diabetics are not new problems. When Vaccaro, Feaster, Lobar, Baum, Magnus, and Huffman (2012) explored disparities for diabetic patients they chose to examine differences in medical advice related to diabetes self-management among Mexican-American, non-Hispanic White, and non-Hispanic Black Americans using data from the 2008 NHANES. Results showed that there was no difference in the likelihood of receiving diabetes self-management advice related to ethnicity or race. However, those who received medical advice were more likely to implement positive changes in behaviors such as decreasing caloric intake and performing regular physical activity. Also, the authors documented significant disparities in access to health care and insurance status for Mexican-Americans compared to the other two groups. The American Diabetes Association (2013) strongly encourages the inclusion of self-management education into routine visits for all patients with T2D, however, they do not advocate a specific strategy or approach. This section will explore the commonly used approaches of group education classes, community lay health workers, and assistance from technology programs.

Group education classes

A program to enhance diabetes self-management entitled Mediterranean Lifestyle Program (Toobert, Strycker, Glasgow, Barrera & Angell, 2005) was adapted for a Hispanic population by Toobert et al. (2011). A randomized, controlled, partially blinded trial was designed to test the efficacy of this adapted group education program with 280 Hispanic subjects recruited from the Denver, Colorado area. Specifically, the authors hypothesized that their intervention would result in improved problem-solving, social support, and self-efficacy and that these improvements would engender better objective outcomes of diabetes and cardiovascular disease risk control. Data consisted of the biometric measures of height, weight, and HgA1C; heart disease risk profiles; and survey responses pertaining to quality of life, physical activity, social support, self-efficacy, problem-solving and self-management. On measures of psychosocial changes, results from the experimental group were significantly more improved than control group. On measures of behavior changes and diabetes outcomes/quality of life, differences were significantly more improved for experimental group at six months; by 12 months' time differences between treatment and control group were no longer significant.

Rosal et al. (2011) also discovered in their study testing the influence of an education program based on SCT that initial positive gains in diabetics' outcomes were not significant at later follow-up. The authors devised a low-literacy, intensive group intervention with adaptations to make it well-suited for Hispanic diabetics. They then conducted a trial with 252 Hispanic diabetics recruited from five community health centers. Subjects were divided into a usual diabetes care control group and an intervention group invited to attend 12 weekly and then eight monthly group education sessions at a community health center. Data was composed of biological markers collected from laboratory draws and office visits, behavioral measures collected from telephone interviews with a dietician, and measures for diabetes knowledge and self-efficacy from survey tools collected at baseline diagnosis, after four months and finally one year after initial diabetes diagnosis. Linear regression analysis demonstrated that declines in HbA1C were significantly different for the intervention group from the control group at four months, but not at 12 months. Also, those who attended more group sessions had significantly better outcomes.

Ramal, Petersen, Ingram, and Champlin (2012) conducted a grounded theory study to identify factors and attitudes that influence diabetes self-management in limited English speaking Hispanic diabetics residing in low socioeconomic status neighborhoods. Focus groups were conducted with a total of 27 subjects who were recruited from persons attending diabetes education group courses in the community. Four distinct themes affecting diabetes self-management emerged from coded responses: access to resources, struggles with diet, self-efficacy, and social support. Additionally, a separate theme of family emerged, though it could be related to each of the other four themes.

Hu, Wallace, McCoy, and Amirehsani (2014) also conducted a group education program for Hispanic diabetics, with family members also included in this study. Thirtysix Hispanic diabetics and 37 of their family members all residing in North Carolina, participated in eight weekly education classes conducted in Spanish. Scores from biometric exams, a physical activity questionnaire, a dietary survey, a diabetes knowledge spoken scale, the Diabetes Family Support Behavior Checklist, diabetes self-efficacy and self-management questionnaires, and a health quality-of-life survey were compared pre and post intervention. Several significant improvements occurred among the diabetic participants including a 4.9% average decrease in HbA1C, decreased systolic blood pressure, and better diabetes self-efficacy, diabetes knowledge, and higher overall health related quality of life. Diets improved as did the performance of diabetes self-monitoring such as blood glucose tests and foot inspections. Interestingly, the family members who participated also demonstrated weight loss and improved diabetes knowledge.

The importance of the role of the family on young individuals with T2D was further explored in a qualitative series of interviews of eight Hispanic young adults and 11 of their family members (Pyatak, Florindez, Peters, & Weigensberg, 2014). Researchers in particular were searching for a legacy of diabetes knowledge and influence passed down between family members. What they found in their small sample were themes of shared meal preparation and eating, activity participation that depends on other’s participation, diabetes knowledge and disease expectations influenced by family, hindrances by well-meaning family members, and reciprocal support among intergenerational families. The importance of family and their involvement in individuals’ self-care discussions among Hispanic diabetics suggests that group education classes that can accommodate family members may be an approach with strong utility for improving diabetes self-management.

Community lay health workers

Many interventions aimed at improving health outcomes for minorities, particularly HAs, have attempted to lessen the cultural divide between clinicians and Hispanics by using lay health workers or promotoras from within the local community. A randomized control trial of Hispanic-American diabetics living in Dallas supported the effectiveness of education from a promotora in addition to clinicians at reducing subjects HbA1C. Prezio et al. (2013) recruited 180 subjects and divided them into a control or usual care group and an intervention group who received eight one hour weekly individual sessions with a community health worker during the first 8 weeks and one hour of individualized follow-up each quarter for an additional year. Comparing final HbA1Cs to the subjects' baseline data proved that there was an intervention effect of a 0.7 drop in HbA1C compared to control.

Another quasi-experiment supporting the use of community health workers was conducted among patient populations of three community-based health organizations in Texas, California, and Washington, D.C (Cruz, Hernandez-Lane, Cohello, & Bautista, 2013). Researchers trained community health workers or promoters over three days and created a curriculum with a training manual and tools for community health workers to use with study subjects. From the three health centers, a total of 1413 diabetic and non-diabetic adults over the age of 45 were recruited and participated in one 90-minute group intervention session conducted by a community health worker. Participants' pre and post-intervention diabetes knowledge was tested using a 20-question assessment created by the researchers. Diabetic participants' scores improved from an average of 13.7 to 18.6 after the education session, while non-diabetic participants' knowledge increased from average scores of 12.9 to 18.2.

From 2007 to 2010 the National Heart, Lung, and Blood Institute sponsored a program to use community health workers to provide culturally tailored education designed to improve participants' heart health knowledge and behaviors (Hurtado et al., 2014). Community health workers were trained on the curricula and then led interventions of ten group sessions within their communities. Pre and post intervention analysis addressed participants' heart health knowledge, cardiovascular disease related food risk factors, physical activity, confidence in preparing heart healthy food, and stage of change. Approximately 50% of 1004 program participants were Hispanic. Comparison of pre to post intervention measures demonstrated that group programs resulted in positive changes in all five outcomes including more than two-fold increases in the number of participants engaging in physical activity, confidence to prepare healthy food for themselves and their families, and being in the active or maintenance stage of change. Clearly, this community health worker intervention was successful in not just increasing participant's knowledge of health, but also had a significant effect on their motivation to make behavior change.

Interventions conducted by community health workers have the potential to be costly as they require the addition of staff to a health center and are often focused on individual interactions with diabetic patients. Nonetheless, evidence has supported their cost-effectiveness. A sophisticated statistical analysis of the University of Texas' Community Outreach Program which included home visits by community health workers as well as group education classes at a clinic with community health workers, nutritionists, and a Zumba instructor, showed that the program was cost-effective at a 20-year threshold (H. S. Brown, 3rd et al., 2012). The annual cost of a quality-adjusted life year (QALY) for 20 years was $33,319 putting it below the threshold of $50,000 per QALY which is deemed cost-effective. The figures for five and ten years of the intervention at $130,272 and $56,009 respectively, did not meet that criteria. A smaller experiment was conducted in another border county in Texas, this time comparing an intervention group to an intervention where participants received monthly home visits from community health workers for two years (Ryabov, 2014). This sample had only 15 in each the intervention and control groups and used a different statistical method to gauge cost-effectiveness. The authors of this study, concluded that the two-year program of home visits by community health workers resulted in a $13.810 QALY cost-effectiveness ratio.

Health information technology/mobile technology

With increasing use of smart phones and access to internet, many patients may be interested in using technology tools to help them manage their diabetes. This is an area for which evidence is still developing, however some researchers have already pioneered the use of technology tools with Hispanic diabetics.

Researchers in Detroit, Michigan, studied the effects of using a tablet program called iDecide to educate diabetics about their medications versus using traditional paper handouts (Heisler et al., 2014). Both groups had a single individual session with a community health worker who either reviewed paper handouts or helped facilitate the participant’s completion of the interactive iDecide program. The study used 188 African-

American and Hispanic-American participants. Data analysis conducted three months after the interventions showed that both groups had similar objective outcomes, however the group using iDecide rated the information with greater clarity and helpfulness and also had significantly lower scores on diabetes-related distress measures.

Arora, Peters, Burner, Lam, and Menchine (2014) conducted the Trial to Examine Text Messaging for Emergency Department patient with Diabetes (TExT-MED) with 124 adults with poorly controlled T2D who were recruited from the emergency department of a large hospital in Los Angeles. The TExT-MED trial consisted of a six-month randomized controlled trial where participants received either standard treatment or twice daily text messages with educational/motivational challenges, medication reminders, trivia questions, and healthy living challenges. After six months, HbA1C did decline more in the intervention group, though the difference was not statistically significant. Medication adherence did improve more significantly in the group receiving text messages. The majority (87%) of participants recruited in this trial were Hispanic-American and differences in HbA1C were significantly improved among Spanish-speaking participants. A follow-up focus group of participants involved in the trial, showed that patients found the intervention helpful and welcome, though there was a frequently expressed desire for the text messages to be personalized (Burner, Menchine, Kubicek, Robles, & Arora, 2014).

Certainly, the most common use for health information technology in healthcare is the use of electronic patient medical records. While these are generally used to document care in medical terminology, many electronic medical record systems also come with a portal through which patients can access their individual information and potentially receive health information. Lopez and Grant (2012) theorized that for Spanish-speaking patients, particularly those without home access to the internet, there may be a role for eNavigators to help patients access their health information online. A trial was created to test this theory, but no results have been published to date.

Implications of the Evidence

Literature suggests that Hispanic diabetics have worsened outcomes compared to non- Hispanic Whites (Campbell et al., 2012; M. A. Kaplan & Inguanzo, 2011; Osborn et al., 2013). M. A. Kaplan et al. (2013) found much of the inequity is explained by health care disparities such as reduced access to care, lesser quality of care, and lack of health insurance. However, diabetes knowledge is another variable where US Hispanics appear to be lacking (S. Arora et al., 2011; Ceballos et al., 2010; Coffman et al., 2012). This lack of knowledge interferes with individual diabetes self-management and also can lead to worsened outcomes.

Researchers and clinicians have tried various strategies in recent decades to lessen this growing area of health concerns for our nation's fastest growing demographic. Both Toobert et al. (2011) and Rosal et al. (2011) contributed significant evidence that group programs designed especially for low-literacy Spanish-speaking diabetics are successful in enhancing diabetes self-management skills. Ramal et al. (2012) and Pyatak et al. (2014) explored how important including family members can be to the success of any intervention. Language and cultural differences between non-Hispanic clinicians and Hispanic patients can create communication barriers that might be reduced by the involvement of community health workers; this tactic proved successful in several experiments (Cruz et al., 2013; Hurtado et al., 2014; Prezio et al., 2013). Some of the latest innovations in teaching diabetes self-management include the use of mobile health devices (Sanjay Arora et al., 2014; Heisler et al., 2014); potential success of these types of interventions should only increase as more and more Americans are using smart phones and have home access to internet.

However, exploring the literature does not provide specific information about the particular preferences of these patients in California's Central Valley. In fact, there seems to be a gap in the literature in regards to asking patients what type of educational methods they would prefer. It may be that some US Hispanics would prefer to receive diabetes education individually or at times more convenient for working adults; the preferences and needs of patients warrant further investigation. Also, as access to care and lack of health insurance have been identified as especially negatively impactful for Hispanic diabetics, this project will explore the additional difficulties limited financial resources impose on caring for diabetes. The goal of this project is to create and implement a detailed assessment plan in a specific sample of Hispanic diabetics in the Central Valley. The assessment plan will yield data as to the most preferred and appropriate methods to use in diabetes self-management education for this population.

CHAPTER THREE: METHODOLOGY

This project’s goal is to improve the quality of diabetes-related self-management education provided to Hispanic patients cared for by providers in a network of community health centers. This needs assessment project is the first step in an effort to improve diabetes self-management support in a large network of community health centers. Since it is being conducted prior to any intervention, the SPIDER tool for qualitative research (Cooke, Smith, & Booth, 2012) is a more appropriate frame than the traditional PICOT format utilized in evidence-based clinical research (Fineout-Overholt & Stillwell, 2015). Specifically, this descriptive study explored diabetes self-management education in Hispanics by conducting survey research to determine diabetic patients’ pre-existing knowledge and preferences for format and delivery of education.

Method

The sample this project surveyed was one of volunteers. Patients presenting to two community health centers who met the inclusion criteria of being an adult, of Hispanic ethnicity and having a diagnosis of T2D were offered an opportunity to participate. Data was collected over a five-month timeframe from two health care clinics where approximately 500-1000 Hispanic-Americans with diabetes presented to the clinics for routine primary care appointments. Paper surveys were passed to eligible patients as they checked in or when they were put in exam rooms by medical assistants; an average patient spends 30 minutes in the waiting room and 30 minutes in the exam rooms of these health centers. It was hoped that offering the survey when patients had ample time to complete it would increase the response rate. A goal of 300 completed surveys was initially sought for a projected response rate of 30-60%.

Setting

The study was conducted within the physical spaces of two community health centers belonging to a larger system of 27 Federally-Qualified Health Centers (FQHCs). One of these health centers is located in a small city with a largely Hispanic population and where the majority of workers are employed in agriculture. Many clientele of this clinic commute form surrounding towns and villages. The other health center is centrally located in a mid-sized city with a racially and ethnically diverse clientele.

As these health centers are FQHCs they are required to accept all patients regardless of ability to pay. Those patients without any type of health insurance must be offered services with discounts based on their household sources of income (United States Department of Health and Human Services, Health Resources and Services Administration, n.d.). FQHCs must also be governed by a board of which a majority are persons who utilize the organization’s healthcare services. Additionally, as an FQHC, all Medicare and Medicaid patients who wish receive services must be accepted. Finally, FQHCs are strongly encouraged to provide additional services and follow the patient-centered medical home model. Though not a certified patient-centered medical home, this system does offer dental, behavioral health, nutrition, laboratory and radiology services at many of its health centers.

Subjects

The sample utilized in this project was one of convenience. Each health center in the network staffs two to four family, internal medicine, or adult medical providers who average 20-30 patient visits per eight to ten-hour day. Clientele of the previously mentioned two health centers who met the inclusion criteria of being adult, of Hispanic ethnicity, and having a diagnosis of type 2 diabetes mellitus were offered an opportunity to participate. There were no exclusion criteria. Surveys were distributed during a five-month time frame when was expected that several hundred diabetic patients will present to the health centers for their regular primary care appointments.

Recruitment Procedures

Patients presenting to the two community health centers were asked by registration staff if they meet the three inclusion criteria of being an adult, diabetic, and of Hispanic ethnicity; however medical assistants were also asked to offer surveys to any patients the front office staff may have missed. If these conditions are met, each individual received an envelope containing the two surveys and cover letter written in both English and Spanish explaining that participation was voluntary and anonymity would be maintained. The introductory letter also explained to participants that by turning in the survey they were giving their informed consent to participate in the study. Results of the survey and the resulting recommendations for the organization will be posted in the health centers from which participants were recruited.

Instruments

This needs assessment project relied on data from two surveys administered to the volunteer participants, see appendices A and B. One of these surveys, the Diabetes Education Preferences for Hispanics Living in the United States (DEPHLUS), was a new instrument created by this research team to uncover this population’s preferences for diabetes teaching delivery methods. The DEPHLUS was specifically created by the research team to answer basic questions about how to design a diabetes education intervention that would appeal to the target population. The Diabetes Knowledge

Questionnaire-24 (DKQ-24) was chosen for administration as it is a low-literacy, easy to administer tool that helps to establish the population's need for additional diabetes care instruction. Both instruments are further detailed below.

Diabetes education preferences for Hispanics living in the United States. This survey includes 21 questions written in a simple, sixth grade literacy level; literacy level was assessed using Microsoft Office readability statistics. The bilingual survey was translated by a certified translator. Participants were provided multiple choices to choose from with the final question being an open-ended request for additional information the participant might wish to provide about barriers to diabetes management. The first nine questions establish demographic characteristics of gender, age, income, country of birth, preferred language, time spent living in the United States, education level, health insurance status, and years living with diabetes. Remaining survey questions are loosely based on a telephone survey conducted by Sarkar et al. (2008) that queried patients' interest in diabetes education, preference for type of delivery, language used at home, self-reported health literacy, and belief that improved communication with health care providers would improve their health. This telephone instrument was not normalized, but did include a large sample of 796 diabetics from across the United States.

Diabetes knowledge questionnaire-24. The 24-item Diabetes Knowledge Questionnaire (DKQ) was also administered to willing participants. This bilingual written survey was created by Garcia, Villagomez, Brown, Kouzekanani & Hanis (2001) and tested in a sample of 502 Mexican-American diabetics and their support persons. The instrument was validated by the constructs of the intervention provided in that trial. After receiving the intervention of group diabetes education, the experimental group showed an increase in scores on the DKQ compared to their pre-intervention scores three months prior. The DKQ was tested using Cronbach's coefficient alpha and was found to be reliable with an alpha of 0.78. Permission to use this survey was provided through email communication with the lead author Dr. Garcia.

Management of Risk to Human Subjects

Overall risks to be faced by participation in this project were minimal. Participation in this study was entirely voluntary. Included in each survey packet was a cover letter that explained that should someone choose to proceed with completing the survey, his or her responses will remain confidential and anonymous. Also, all respondents were handed a sheet with correct responses for the DKQ-24, to minimize distress from any uncertainties in their own knowledge. Original surveys were collected on a weekly basis by the co-investigator and stored in a secure location in her home. Data was entered into statistical spreadsheets and saved on the co-investigator's home computer. Original surveys were disposed of in locked bins at community health centers, where any documents with patient identifiers are regularly collected for destruction. None of the participants' responses were transmitted or uploaded via the Internet or networked computers. This project DNP-1509 was approved as having minimal risk to human subjects by the California State University, Fresno Institutional Review Board in July 2105. An addendum changing the project's title, extending the data collection timeframe, and adding more data collectors was submitted January 20, 2016.

Data Collection

Data collection occurred within the confines of an affiliated network of community health centers in Central California. Permission to conduct research with this patient population was granted by organization administrators. Data was collected from September 1, 2015 to January 31, 2016. Upon check-in, front desk staff inquired whether patients met the basic inclusion criteria. A script was provided to front desk staff so that spoken delivery of the inclusion criteria and purpose of the research are explained unvaryingly. Once the inclusion criteria are met, paper versions of both bilingual surveys were provided to participants along with writing instruments. However, as the study progressed it became evident that front office staff were missing some eligible subjects, so medical assistants were also asked to distribute surveys. They had the advantage of viewing patients' paper medical record to see who had diabetes listed as a diagnosis. Participants' completed surveys were returned in sealed envelopes to clinic front desk staff or medical assistants who then gave completed surveys to the co-investigator for data analysis. As participants handed in their completed surveys, they were to be given a copy of correct responses to the DKQ-24 in both English and Spanish.

Using community health centers as a setting for research is not unique, in fact these federally-funded entities are encouraged to engage in clinical research (Jester, Proser, & Shin, 2014). However, by directly and individually inviting each eligible participant at check-in and using the clinic waiting and exam rooms for survey completion, the response rate was probably greater from those unlikely to volunteer for telephone or mail surveys.

Data Analysis

Once data collection was complete, all survey results were entered into the Statistical Package for Social Sciences software to obtain descriptive statistics. Mean and median figures from the DKQ-24 and DEPHLUS guided recommendations for diabetes education format based on the most frequently cited preferences.

Summary

Surveying members of this population helped to establish patients' baseline knowledge about diabetes and what they should be doing to lessen the disease's impact on their lives. This research project also provided a forum for participants to express their desires for how enhanced diabetes education should be delivered. The benefits of a survey included its ease of administration and confidentiality. It was hoped that by administering the survey anonymously to patients waiting to be seen, the response rate would be high and answers are valid and generalizable to the entire population of Hispanic-American diabetics served by the network of health centers. The survey findings will be instrumental to the redesign of diabetes education within the organization.

CHAPTER 4: RESULTS AND DISCUSSION

This project had a two-fold emphasis, to delineate the preferences for educational program design among a specific population of Hispanic diabetic clientele, and to identify gaps in diabetes knowledge. Survey packets were distributed over a five-month time period to individuals 18 years of age and older at two community health centers who self-identified as Hispanic and diabetic. Inside each packet was a brief bilingual introduction letter with instructions including informed consent directions and the two surveys instruments DEPHLUS and DKQ-24. A total of 94 partially complete or completed survey packets were returned. To be considered partially complete or completed, at least ten of the 20 questions on the DEPHLUS survey needed to be answered. Any packets with fewer than 10 questions answered were not used in data analysis. Data from each survey packet was analyzed using SPSS.

Results

Diabetes Education Preferences of Hispanics Living in the United States

This survey instrument collected demographic data on participants and also posed 12 multiple choice opinion questions and one open-ended question about barriers. Demographic data collected included participants'

- gender;
- age;
- monthly family income;
- country of birth;
- preferred language;
- years living in the US;
- highest level of education;

- health insurance status; and
- years as a diabetic.

The multiple choice preference questions covered a variety of topics including:

- preferred education topics;
- barriers posed by communication with health care provider;
- literacy difficulties;
- ideal class times;
- preference for individual, family, or group education;
- best format for education materials;
- interest in using internet health portals; type of educator preferred;
- importance of having a Hispanic health care provider;
- overall interest in improving diabetes outcomes; and
- barriers to blood glucose control.

The final open-ended question requested any additional important information that might aid in assisting patients' diabetes knowledge.

Demographics. A total of 94 DEPHLUS surveys, 63 from the smaller, more rural health center and 31 from the larger urban health center, were received and analyzed. The number of responses for each of the nine demographic questions ranged from 75-94. Roughly two-thirds (67.8%) of the sample was female and roughly one-third (32.2%) was male. The ages of participants ranged from 24 to 76, with over 60% falling between the age of 41-70 (see Figure 1).

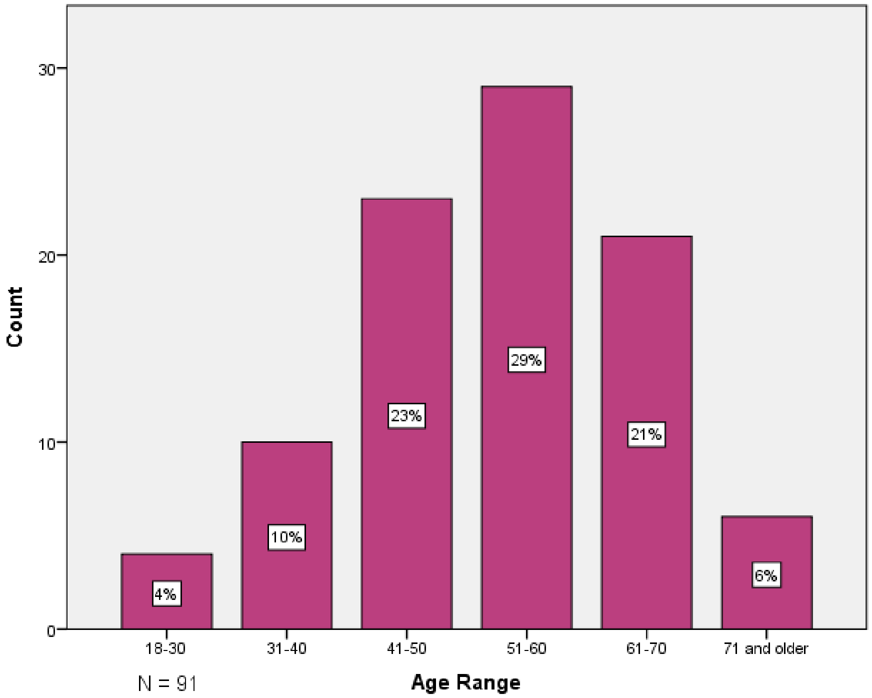

Figure 1. Age of respondents

Of the 75 respondents who indicated their country of birth, 61 (84.8%) were born outside of the United States and the remaining 14 (15.2%) indicated they were born in the United States. The vast majority (88.5%) of the 87 who answered how long they had lived in the United States, chose over 10 years (see Figure 2). Spanish is the sole preferred language of 78% of the sample, with another 8.8% using both Spanish and English at home. Only 11% prefer to use English at home; the remaining 2.2% chose the other language category.

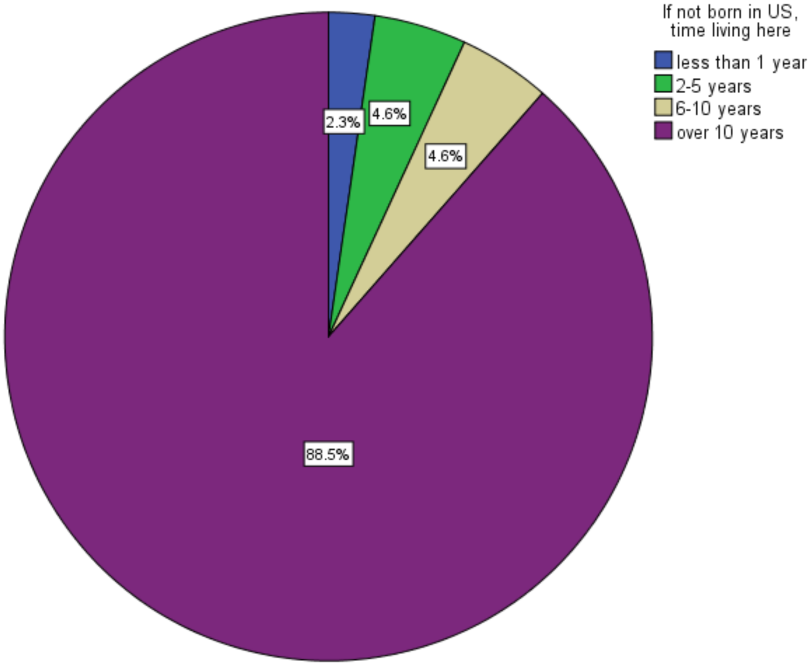

Figure 2. Years spent living in the United States

As expected, the sample does appear to represent a vulnerable population. Household income levels (see Figure 3) were generally low, though participants were not asked to indicate household size. A majority of the sample (59%) had not completed high school (see Figure 4). Additionally, few respondents (14.3%) had private insurance or insurance purchased through the Covered California market exchange. Nearly half of the sample (48.4%) met the low income status to qualify for Medi-Cal and it is likely that most of 37.4% without health insurance are undocumented immigrants who do not qualify for government-assisted insurance programs.

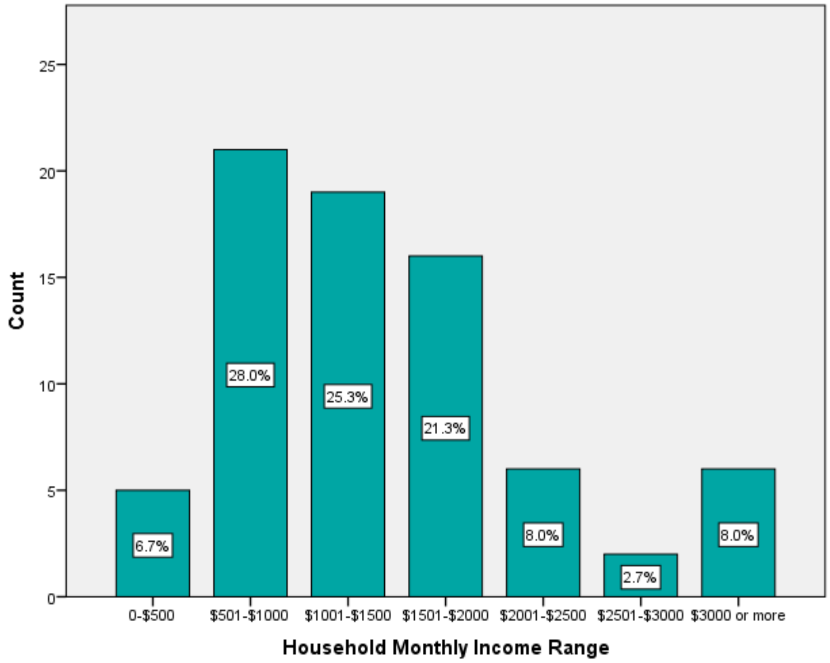

Figure 3. Household income

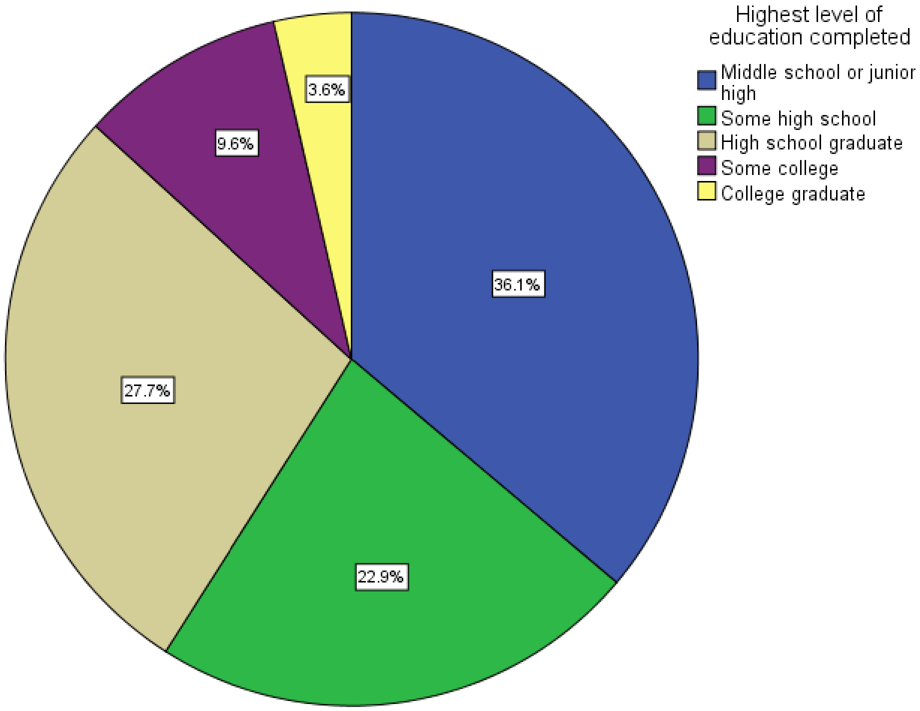

Figure 4. Education level

Diabetes was a relatively new problem (less than two years since diagnosis) for 14.6% of participants, but for the bulk of the sample diabetes has been a known health issue for several years. Figure 5 details how over 55% of the sample have known they are diabetic for six or more years.

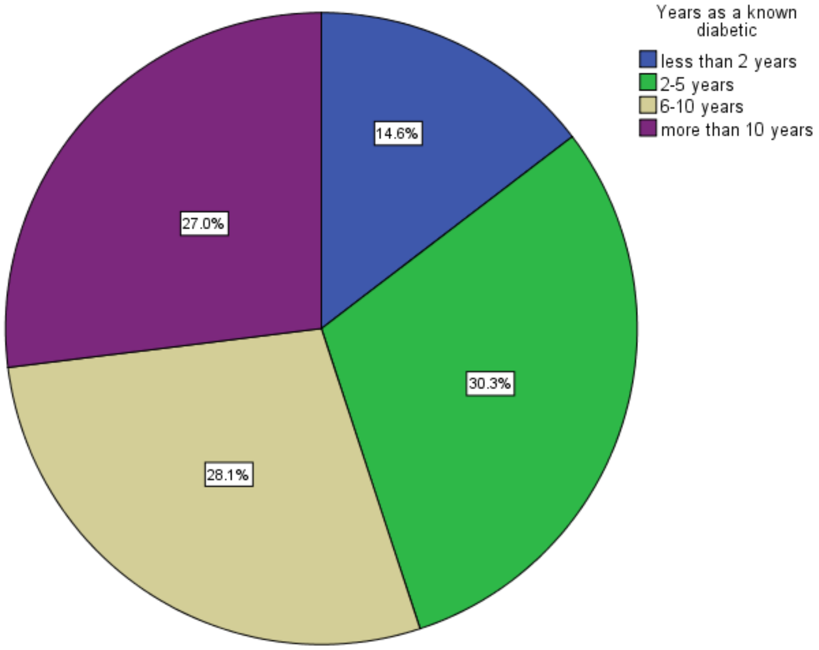

Figure 5. Years as a diabetic

Diabetes Education Preferences. After providing basic demographic information, participants were asked several multiple choice questions to elicit their opinions on diabetes education and also discover barriers that may hinder their diabetes self-management. Question number ten was a multiple choice question where respondents were asked to choose any diabetes education topics they in which they were interested (see Table 1). Eighty-nine responses were received.

Table 1

Diabetes Education Topics Selected

Topic	**Selected**		**Not Selected**	
	Frequency	Percent	Frequency	Percent
Reading labels on foods	24	27.0	65	73.0
Cooking low carbohydrate meals	33	37.1	56	62.9
Tips for eating out	28	31.5	61	68.5
Information about exercise and diabetes	39	43.8	50	56.2
How to prevent problems that come from poorly controlled diabetes like heart disease, blindness, and kidney problems	54	57.4	35	39.3
Taking care of your feet	31	34.8	58	65.2
Help paying for diabetes care	22	24.7	67	75.3
Using a glucometer	16	18.0	73	82.0
Giving and using the right amount of insulin	16	18.0	73	82.0

Question 11 explored whether or not Hispanic diabetics perceived a difficulty communicating with their health care providers as a barrier to diabetes control. Of the 82 responses received, only 16 did not believe that being able to communicate more easily with their health care provider would improve their diabetes control. The majority of those surveyed indicated their diabetes control would be better (39) or much better (27) with improved communication with their provider.

Literacy was another barrier to diabetes controlled that the DEPHLUS explored. Survey respondents were asked, “How often does trouble reading make it harder for you to understand diabetes care?” This was also chosen as a barrier by most of the sample with 51 choosing the response “sometimes” and 21 acknowledging literacy was “often” posed a difficulty in regards to diabetes care. The remaining 13 of the 85 respondents chose “never.”

Questions 13-18 investigated Hispanic diabetics' preferences on a variety of elements related to the design of a diabetes education program. Of the respondents who indicated a preferred time for diabetes education, the most popular suggestion with 40 selections was "with regular visits." The remaining respondents expressed some interest in separate weekday, evening, and weekend sessions (see Table 2). Results varied in respect setting, but it was clear that for 36.1% of participants the preference was for family members to participate in their education, whether it was individual family sessions or group family sessions (see Table 3).

Table 2

Preferred Time

Preference	**Frequency**	**Percent**
With regular visits	40	42.6
Separate weekday sessions	11	11.7
Evening sessions	10	10.6
Weekends	14	14.9
Total	75	100

Table 3

Preferred Individual, Family, or Group

Preference	**Frequency**	**Percent**
Individual	32	34.0
With family members	24	25.5
In groups	18	19.1
In a group with diabetics and family members	10	10.6
Total	84	100

Four formats—paper, internet and mobile applications, spoken information, and other—were listed as choices for the format of diabetes education materials. Paper handouts were chosen by an overwhelming majority (68.4%). Spoken information was selected by 16 respondents (21.4%) and the remaining two choices, internet links and other, were each chosen by four participants (see Table 4). Question 16 explored support for using internet interfaces to share personal medical information with health care workers. Preferences were mixed, with roughly even numbers of participants selecting their interest as not at all, somewhat interested, and very interested (see Table 5).

Table 4

Preferred Format of Materials

Preference	Frequency	Percent
Paper	52	68.4
Internet/Mobile Links	4	5.3
Spoken information	16	21.1
Other	4	5.3
Total	76	100

Table 5

Interest in Health Portals

Interest level	Frequency	Percent
Not at all	29	36.7
Somewhat interested	24	30.4
Very interested	26	32.9
Total	79	100

Questions 17 and 18 asked respondents who they wanted their diabetes educators to be. Four choices for type of diabetes educator were provided; certified diabetes educator, nutritionist, primary health care provider, and lay health worker. The frequency that each type of educator was chosen is provided in Table 6. Diabetes educators and primary care health providers were the two most popular choices. Question 18 asked respondents to choose whether the importance of having a Hispanic educator was not important, somewhat important, or very important. Forty-seven of the 87 responding to this question chose very important, while the remaining 40 were split evenly between not important and somewhat important.

Table 6

Type of Diabetes Educator

Preference	**Frequency**	**Percent**
Nurse with extra diabetes training (diabetes educator)	17	22.4
Nutrition Expert	27	35.5
Your regular medical provider	26	34.2
Someone from your neighborhood with extra diabetes training (lay health worker)	6	7.9
Total	76	100

Motivation for learning more about diabetes was the topic of question 19 which asked, "How interested are you in learning more about taking care of your diabetes?" Here, 49 of the 87 responding indicated that they were very interested. Only nine respondents answered they were not interested with the remaining 29 selecting somewhat interested.

The final multiple choice question from the DEPHLUS is a multiple choice question where participants could make multiple selections. This question allowed participants to select from a list of seven barriers, including other, that hinder their ability to control their blood glucose. Table 7 displays the frequency that each selection was identified as a barrier.

Table 7

Barriers to Blood Glucose Control

Barrier	**Selected**		**Not Selected**	
	Frequency	Percent	Frequency	Percent
Cannot afford medications	26	29.5	62	70.5
Not enough time to exercise and eat right	24	27.3	64	72.7
Don't understand what makes blood sugar change	28	31.8	60	68.2
Hard to buy healthy food	20	22.7	68	77.3
Lack of energy to exercise	23	26.1	65	73.9
Too much or too little appetite	16	18.2	72	81.8
Other	9	10.2	79	89.8

Additional Barriers to Diabetes Self-Management. The finale of the DEPHLUS is an open-ended appeal for any other information survey administrators (the health center network) should know about what would help survey respondents to manage their diabetes. Of the 94 surveys returned, 22 respondents had written in a response. These responses were broken down into five themes; many of these responses listed multiple themes. The most common theme was simply nothing more to add or a simple "no." Nine of the 22 responses merely suggested that there was no additional information they felt they needed to share.

The second most frequently referenced theme was that of help with diet. Five participants indicated that they could use help to eat right. One participant requested, "more classes on how to eat more nutritious meals," while another requested:

> …doctors give us more tips and opinions on the meal plans or brochure to give us some ideas of food that is harmful for one, not only sugar and pastas. There are

> other foods and vegetables that are usually harmful for diabetes that we do not know and sometimes cause us a high sugar…”

Three participants asked generally for more information about diabetes, with one participant in particular requesting more information to know how high blood sugar and not controlling diet is affecting her.

Four participants mentioned other health problems that make their diabetes difficult to control. One man offered that he needed eye surgery to see better, but cannot afford it. A respondent also listed vision problems and hot flashes as information that would be helpful for her providers to consider. Two more participants added depression as a factor that affected their motivation to control their diabetes.

The fifth and final theme is that of health system problems and was seen in two responses. One respondent offered that it would help if the doctors weren’t constantly changed, while another requested more time to speak with his doctor and also more communication with his pharmacy. There was one response which did not fit into the five themes, one participant simply commented, “too many questions.”

Diabetes Knowledge Questionnaire-24

The second instrument distributed in packets to participants was the Diabetes Knowledge Questionnaire 24 (DKQ-24). This is a shortened version of the original 60 question Diabetes Knowledge Questionnaire created by Garcia, et. al (2001). It was both validated and found to be reliable after being administered to a sample of 502 Mexican-American type 2 diabetics in Texas. Questions are presented as simple statements in both Spanish and English and participants are given the same three choices for each— “yes, no, or I don’t know.”

Three of the returned survey packets have only data for the DEPHLUS, meaning 91 DKQ-24 surveys were scored. Many participants returned only partially completed DKQ-24 surveys. Response rates on the 24 questions of the DKQ-24 varied from a low of 77 to a high of 86. The mean number of correct responses was 12.73 with a standard deviation of 5.02. The number of correct responses ranged from 1 to 22. Statistics for the number of correct and incorrect responses can be seen in Table 8.

Ten questions were missed by over half of respondents. The most frequently missed question was number 17, "a person with diabetes should cleanse a cut with iodine and alcohol." The second most frequently missed question was number 1 which stated, "eating too much sugar and other sweet foods is a cause of diabetes." The majority of respondents also mixed up symptoms of hyperglycemia and hypoglycemia which were the subjects of questions 21 and 22.

There were nine questions with correct response rates of over 75%. The most correct responses were recorded for number eight, "a fasting blood sugar level of 210 is too high." Question number 16, "diabetics should take extra care when cutting their toenails," had the highest percentage of correct responses with 90.0%.

Table 8

Results on Diabetes Knowledge Questionnaire-2

Statement	**Correct Responses**		**Incorrect or Didn't Know Responses**	
	Frequency	Percent	Frequency	Percent
1. Eating too much sugar and other sweet foods is a cause of diabetes.	11	12.8	75	87.2
2. The usual cause of diabetes is lack of effective insulin in the body.	64	72.7	24	27.3
3. Diabetes is caused by failure of the kidneys to keep sugar out of urine.	17	20.5	66	79.5

Statement	**Correct Responses**		**Incorrect or Didn't Know Responses**	
	Frequency	Percent	Frequency	Percent
4. Kidneys produce insulin.	33	39.8	50	60.2
5. In untreated diabetes, the amount of sugar in the blood usually increases.	71	82.6	15	17.4
6. If I am diabetic, my children have a higher chance of being diabetic.	70	83.3	14	16.7
7. Diabetes can be cured.	46	54.1	39	45.9
8. A fasting blood sugar level of 210 is too high.	73	86.9	11	13.1
9. The best way to check my diabetes is by testing my urine.	38	45.8	45	54.2
10. Regular exercise will increase the need for insulin or other diabetic medication.	43	51.2	41	48.8
11. There are two main types of diabetes: type 1 (insulin-dependent) and type 2 (non-insulin dependent).	56	72.7	21	27.3
12. An insulin reaction is caused by too much food.	20	26.0	57	74.0
13. Medication is more important than diet and exercise to control my diabetes.	39	50.6	38	49.4
14. Diabetes often causes poor circulation.	63	79.7	16	20.3
15. Cuts and abrasions on diabetics heal more slowly.	68	84.0	13	16.0
16. Diabetics should take extra care when cutting their toenails.	72	90.0	8	10.0
17. A person with diabetes should cleanse a cut with iodine and alcohol.	4	4.9	76	95.1
18. The way I prepare my food is as important as the foods I eat.	70	86.4	11	13.6
19. Diabetes can damage my kidneys.	72	88.9	9	11.1
20. Diabetes can cause loss of feeling in my hands, fingers, and feet.	66	85.7	11	14.3
21. Shaking and sweating are signs of high blood sugar.	23	29.5	55	70.5
22. Frequent urination and thirst are signs of low blood sugar.	31	36.9	53	63.1
23. Tight elastic hose or socks are not bad for diabetics.	38	44.8	47	55.2
24. A diabetic diet consists mostly of special foods.	18	22.0	64	88.0

Data Analysis and Discussion

The goals of data collection for this project were to learn more about the population served, including demographic data, but more specifically to gather their opinions about how best to structure a diabetes education program. A secondary aim of the needs assessment was to document diabetes knowledge gaps.

Demographic data from the DEPHLUS demonstrated a relatively homogeneous sample. Most respondents were born outside the US, but have resided here for over ten years. Spanish was the language of choice for 78%. Most were also middle-aged and had less than a high school education. A clear majority of the sample was female (67.8%); it is unknown whether this disproportion is reflected in the total population of Hispanic diabetics served. Monthly family income was also low, with 81.3% indicating their family earned less than $2000. Because household size was not provided, poverty levels cannot be extrapolated. Finally, over half (58.4%) of the sample have been diabetic for at least six years.

This demographic data helps to explain some of the barriers to diabetes control that respondents self-identified. Considering that a large portion of the sample (36.1%) did not attend school behind middle or junior school, it is less surprising that literacy was acknowledged as a significant barrier to managing diabetes for 72 of 85 respondents. This is an important factor for the organization to consider when developing the new curriculum. Another barrier recognized by a large majority (80.5%), was difficulty communicating with their healthcare providers. This may be due in part to a language barrier as 78% prefer to communicate in Spanish, or it may be a more complex issue.

Further exploration of this issue is needed to speculate why exactly communication with providers can be difficult.

The list of diabetes barriers presented in question number 20 elicited a wide range of responses (see Table 7). None of the seven barriers were listed by a majority of the diabetics surveyed. The barrier most commonly selected was a lack of understanding about what makes blood glucose change which would suggest an interest on the part of these participants in attending diabetes education sessions in the future. The second most commonly selected barrier was not being able to afford medications, this is undoubtedly related to lack of health insurance and low household income reported by many respondents. From the open-ended responses, new barriers emerged including lack of nutrition knowledge to prepare healthy meals, other health problems inhibiting diabetes control, and difficulties with the healthcare system. These barriers should also be considered in the planning of a diabetes education program.

One potential barrier to diabetes self-management is a lack of motivation to improve your diabetes control. This barrier was broached by question 19 which asked, “How interested are you in learning more about taking care of your diabetes?” Only nine of the 89 respondents selected that they were not interested, and the majority (56.3%) specified that they were very interested in more knowledge. This level of interest suggests that initiatives to improve diabetes education will be welcomed by the target population.

Preferences on diabetes education, though varied, yielded valuable information about the desires of those surveyed. In terms of topics to be discussed in education classes, only one of the nine listed, how to prevent diabetes complications, was selected by over 50% of the sample. Clearly this shows that participants are aware of the threats to their health that untreated diabetes can pose. Information about exercise and diabetes, cooking low carbohydrate meals, and taking care of feet all were selected by 30-40% of the sample. The least selected topics were using a glucometer and giving and using the right amount of insulin. This could mean that participants were confident in their correct use of their glucometers, or that they do not consider self-blood glucose monitoring to be important. The lack of interest in insulin information could stem from the fact that most participants do not currently need insulin and perhaps they hope that they never will require insulin for blood glucose control.

Evidence from the literature review showed that group classes, community lay health workers, and mobile apps can be very effective tools to help educate Hispanic diabetics. However, it was unclear from the literature whether these tools were chosen based on the preferences of the target audience. Those in this sample showed a marked preference (see Table 2) to receive diabetes education as the same time they come to the clinic for their regular check-ups. Following this preference could make group visits difficult to coordinate. When directly asked whether group or individual lessons were preferred, 59.5% of respondents indicated they would rather have individual or family sessions, though 29.7% could still be considered to be a large share interested in group sessions. This data suggests that if group education is the only offering, some Hispanic diabetics may choose not to attend.

Support for internet/mobile apps also seemed to be slight. When asked what type of educational materials they prefer to receive, only four of 76 chose internet/mobile links. Interest in using internet-based health portals, was greater, but still only 32.9%

suggested they would be strongly interested in something like this. One piece of demographic data not collected was the proportion of respondents with internet/smart phone access. Perhaps, the lack of interest in internet links and mobile applications merely reflected a lack of tools to utilize them.

When directly given a choice between having a nurse with extra diabetes training, a nutrition expert, their regular medical provider, or someone from their neighborhood with extra diabetes training, only six (7.9%) chose the last option (see Table 6). This does not suggest strong support for a community lay health worker. However, respondents were not given a thorough description of how this person from their neighborhood (lay health worker) would be trained to fulfill that role. On the very next question asking about the importance of their diabetes educator being Hispanic, 47 (54%) of those surveyed indicated this was very important and another 20 (23%) chose somewhat important. It is possible that more may have chosen community lay health worker as their preferred choice if it was made clear that this educator would definitely be Hispanic.

Data from the DKQ-24 provides the needs portion of this needs assessment project. Scores on this 24 basic question tool averaged only 12 correct answers. The sample's lack of diabetes knowledge, despite the fact that most surveyed have been diabetic for six or more years, suggests that current education is inadequate. Closer analysis of the most frequently missed questions reveals that topics such as the pathophysiology of diabetes mellitus, signs and symptoms of hypoglycemia and hyperglycemia, and how a person with diabetes should cleanse wounds should be addressed with patients.

The rich data yielded from these packets successfully completes the project’s goals of identifying a need for further diabetes education, discovering barriers to diabetes self-management, and engaging consumers in the design of a diabetes education program. The next chapter will discuss limitations to these surveys and specific recommendations based on this analysis.

CHAPTER 5: CONCLUSIONS

This needs assessment successfully achieved its goals of exploring a specific population's barriers to diabetes self-management, preferences in regards to diabetes education program design, and existing diabetes knowledge gaps. Also by engaging the sample in reflecting upon and communicating their own preferences and barriers, this project facilitated an application of Social Cognitive Theory among participants. The concepts of self-reflection and self-reactiveness were required by participants as they had to list the problems that keep them from optimally controlling their diabetes. Anticipating what type of diabetes education program would be most appealing facilitated the use of another SCT concept, forethought. Intent was set and gathered in the DEPHLUS question that asked respondents to share their motivation level for improving diabetes self-management. Helping clients achieve self-efficacy in regards to their diabetes, reaching a state where they can understand and anticipate the planning and actions required to control their blood glucose, will be the goal of a new diabetes education program.

The population served by the network of community health centers where this research was conducted is majority Hispanic, hence the study's focus on this particular ethnic group. Like the evidence suggests, many of these Hispanic patients served in the Central Valley of California face a disproportionate share of disparities such as poverty, lack of health insurance, illiteracy, and lack of English knowledge (California Postsecondary Education Commission, 2011; M. A. Kaplan & Inguanzo, 2011; Macartney, Bishaw & Fontenot, 2013; US Census Bureau, 2013). Data from the DKQ-24 reveals that there is a prevalent lack of diabetes knowledge within the sample group, and this most likely extends to the entire population of Hispanic diabetics living in the Central Valley. Objective diabetes outcomes were not measured, though it will be essential to any new diabetes education program to evaluate its effectiveness by tracking changes in pre and post intervention diabetes outcomes.

Like the interventions conducted by S. Kaplan et al. (2013), Ramal et al. (2012), and Rosal et al. (2011), this sample was recruited entirely from patients utilizing the services of safety-net community health centers. However, this was not an analysis of post-hoc data (S. Kaplan et al., 2013; Vaccaro et al., 2012) or analysis of motivated participants already attending group diabetes education classes (Ramal et al., 2012; Rosal et al., 2011). Because the data, attitudes, and opinions of all Hispanic individuals seeking diabetes care were sought the data from this sample is more generalizable than those used in many previous experiments.

Findings from these surveys will be instrumental in guiding the next phase of this organization’s efforts to provide more comprehensive, culturally-appropriate diabetes care to its thousands of Hispanic clientele impacted by this chronic health condition. This project did face several limitations; these will be discussed in the following section. Finally, recommendations for a revamping of diabetes education offerings based on the data collected with be given.

Limitations

The research conducted in this project was not without limitations and design flaws. Initially, it was suggested that the using the Spoken Knowledge in Low Literacy with Patients with Diabetes (SKILLD) assessment might be the best diabetes knowledge tool because of its ability to capture data from illiterate or very low literacy level individuals (Rothman et al., 2005). However, the problem of how to fund researchers to administer this survey and a lack of private space in which to conduct these assessments, ultimately led to using the DKQ-24. It is possible that data for illiterate Hispanic diabetics is underrepresented due to this design.

The DEPHLUS was a brand new instrument created by this team as a low literacy written tool to collect demographic data and also to assess the obstacles to diabetes management and individual partialities about the design of an education program. After analyzing results, it became obvious that some of the demographic data questions did not offer exhaustive selections. For example, in the question asking how long the respondent had lived in the United States, there was no selection choice for those born in the US. Additional problems included the lack of an education level choice for less than completing middle school and no option for respondents to indicate whether or not they had internet access. The low response rate (23.4%) to the final open-ended question about any additional information that might be useful for clinic staff to know to help patients manage their diabetes undoubtedly limited the generalizability of those responses. Also, it suggests that posing open-ended questions that require written responses is not an ideal format for this population.

Many of the survey packets received were only partially completed, many with entire blank pages. These omissions were sometimes pages in the middle of the survey, but were most often the final pages of the packet. This alludes that many in the sample simply ran out of time to complete the instrument and chose to turn it incomplete rather than return the completed survey at a later date. However, having incomplete packets affects the significance and generalizability of the results.

Another significant limitation of this data is the small sample size. It was expected that at least 250 and perhaps even more survey packets would be returned. A total of 600 packets were made in anticipation that many would not be returned. However, halfway through the data collection period, it became clear that less than 100 packets had been distributed. It was then that medical assistants began handing packets as well as receptionists and staff were more frequently reminded by the research team to attempt to offer the packets to all Hispanic diabetic clients they encountered. Though the pace of returned surveys did improve slightly, it is evident that the study would have benefitted from an improved method of survey distribution.

Finally, it is possible that the generalizability of the sample might be limited by its homogeneity. Data was collected from the clientele of two different health centers that are part of a network of 27. Demographic data revealed the sample to be very similar in age, education level, length of time living in the US, and length of time since diabetes diagnosis. Also, nearly two-thirds of the sample were female. Perhaps, the sample results might have differed slightly if the sample were larger, more diverse, or included clientele from more health centers.

Recommendations

Data from this needs assessment project has provided ample information to help steer the planning of a new diabetes education program. A significant gap in critical diabetes knowledge confirms the necessity of improved diabetes self-management education. One shortcoming of this study is the lack of diabetes outcome information that would further assess the need for investment in diabetes self-management education and also provide an important measurement for pre and post-intervention assessment. As the organization is now using electronic medical records in most clinical sites which makes data collection much less labor intensive, it is suggested that an anonymous statistical analysis of diabetics' clinical measures including HbA1C, blood pressure, and lipid levels be conducted to provide additional evidence of opportunities for improvement.

Participants also provided clear feedback in regards to the educational topics, time desired for education activities, format of materials, and type of educator preferred. These preferences will be instrumental as the organization decides how to structure a comprehensive new program. As the planning process evolves and more concrete plans take place, it is suggested that plans again be shared with clientele to ensure that ideas are still in line with the desires of the target audience. Focus groups with participant incentives may be a better design for any follow-up study. Focus groups with data collectors allow clientele with low literacy to easily express their thoughts. Also, the unstructured design would allow for evolution of themes as participants interact and may be seen as less taxing to those partaking than the lengthy written survey this study utilized.

From this initial data, it is very clear that the majority of Hispanic diabetics surveyed would like to be educated by a diabetes educator or nutritionist at the time of their diabetes check-ups with their medical providers. For most of those surveyed, it is preferred that these sessions be individually-focused, though many respondents indicated they would like family members presents at their sessions and this wish should be accommodated. It is also preferable that these educators be Hispanic themselves and share information with paper handouts or through spoken word. With these needs in mind, it is recommended that the new diabetes education program be spearheaded by a staff of full-time diabetes educators.

Bilingual diabetes education professionals could rotate between the health centers ensuring that each health center has at least one day each week where patients may choose to schedule both a thirty-minute counseling session with a diabetes educator and a medical visit with their primary care provider. Allowing people to make both visits the same day should help alleviate patients who may not have paid sick time or reliable transportation reap the greatest benefit from each visit to the health center. Also, these visits will be unstructured, allowing the individual's most pressing concerns to guide the dialogue. These educators could utilize a variety of interactive tools including mobile apps during their sessions and also provide people with colorful, low literacy handouts to take home.

Group education classes have been proven to be a successful strategy for diabetes education (Hu et al., 2014; Ramal et al., 2012; Rosal et al., 2011; Toobert et al., 2011) and there was a strong minority who indicated interest in this method of education. For those interested, the same CDEs available for individual sessions could also facilitate group education series within the health centers. Based on the desires expressed in the needs assessment, this population is eager to learn about avoiding diabetes complications and also how to incorporate diet and exercise modifications into their lifestyles. These concerns should be incorporated into a curriculum designed for a mostly Hispanic, low literacy population. Like the individual sessions, group classes could also be made open to not just diabetic clientele, but their support persons as well.

Though the evidence is promising for the success of community lay health worker programs (Cruz et al., 2013; Hurtado et al., 2014; Prezio et al., 2013), support for this type of educator was low in this population. This may be due to survey design; however, it is not recommended for the organization to explore this education route at this time without further support in follow-up studies. Also the lack of interest in mobile apps and electronic applications in this population may simply be due to much of the sample not having internet access. It is recommended that electronic applications be utilized within the health care setting and the popularity of such programs gauged before any efforts are made to utilize client-led technological education initiatives.

This organization has long been committed to providing high quality, affordable healthcare to the vulnerable population that it serves in the Central Valley of California. Diabetes mellitus has increasingly become a problem for this community and now poses a serious threat to the well-being and longevity of much of the organization's clientele. But diabetes complications are not inevitable; they can be prevented by successful self-management.   This organization will be instrumental in creating clientele's self-efficacy if they are able to provide an appealing educational program designed around their clients' needs and wants.

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APPENDICES

APPENDIX A: DIABETES EDUCATION PREFERENCES OF HISPANICS LIVING IN THE UNITED STATES

Encuesta de Preferencias Sobre Educación en Diabetes para Hispanos Viviendo en los Estados Unidos

Diabetes Education Preferences of Hispanics Living in the United States

Dibuja un círculo en una sola respuesta, a menos que la pregunta indique que puedes elegir más de una. Para las preguntas 2, 3 y 21 deberás escribir una respuesta. Please circle one choice unless the question states you may choose more than one. You need to write an answer for questions 2, 3, and 21.

1. ¿De qué sexo eres? What is your gender?

a. Hombre Male **b. Mujer** Female

2. ¿Cuántos años tienes? How old are you? ________

3. ¿Aproximadamente cuánto dinero ganan en un mes todas las personas con quienes vives en tu hogar? About how much money do all people in your house make in one month? _______________

4. ¿Naciste en los Estados Unidos? Were you born in the United States?

a. Sí Yes **b. No** No

5. ¿Qué idioma prefieres utilizar en tu hogar? What language do you prefer to use at home? **a. Inglés** English **b. Español** Spanish

c. Ambos Both **d. Otro** Other

6. Si no naciste en los Estados Unidos, ¿por cuánto tiempo has vivido allí? If you were not born in the United States, how long have you lived in the United States?

a. Menos de un año Less than one year

b. 2-5 años 2-5 years

c. 6-10 años 6-10 years

d. Más de 10 años Over 10 years

7. ¿Cuál es tu nivel máximo de estudios? What is the highest level of school you have completed?

a. Escuela intermedia Middle school or junior high

b. Secundaria incomplete Some high school

c. Secundaria complete High school graduate

d. Universitario incomplete Some college

e. Universitario complete College graduate

8. ¿Tienes seguro médico? Do you have health insurance?

a. **No** No

b. **Sí, Medi-Cal** Yes, Medi-Cal

c. **Sí, Covered California o seguro a través de mi trabajo** Yes, Covered California or insurance through my job

9. ¿Hace cuánto sabes que tienes diabetes? How long have you known that you have diabetes?

a. **Menos de dos años** Less than two years

b. **2-5 años** 2-5 years

c. **6-10 años** 6-10 years

d. **Más de 10 años** Over 10 years

10. ¿Qué temas relacionados con la diabetes te interesan? (Puedes elegir más de uno). What diabetes education topics are you interested in? (You may choose more than one).

a. **Cómo leer las etiquetas en los alimentos** Reading labels on foods
b. **Cómo cocinar platos con pocos carbohidratos** Cooking low carbohydrate meals
c. **Consejos para salir a comer afuera** Tips for eating out
d. **Información sobre ejercicio y diabetes** Information about exercise and diabetes
e. **Cómo evitar problemas que resultan de la diabetes mal controlada, como los problemas del corazón, la ceguera y los problemas del riñón** How to prevent problems that come from poorly controlled diabetes like heart disease, blindness and kidney problems
f. **Cómo cuidar de mis pies** Taking care of your feet
g. **Cómo ayudar a pagar el cuidado médico de la diabetes** Help paying for diabetes care
h. **Cómo utilizar un glucómetro (una máquina para medir el azúcar en sangre)** Using a glucometer (blood sugar machine)
i. **Cómo administrar y utilizar la cantidad adecuada de insulina** Giving and using the right amount of insulin

11. Si pudieras hablar en forma más fácil con tu proveedor de salud, ¿cuánto mejor crees que podrías controlar tu diabetes? If you were able to talk more easily with your healthcare provider, how much better would you be able to control your diabetes?

a. **No cambiaría** No change
b. **Sería major** Better
c. **Sería mucho mejor** Much better

12. ¿Qué tan seguido los problemas para leer hacen que comprender el cuidado de la diabetes sea una tarea difícil? How often does trouble reading make it harder for you to understand diabetes care?

a. **A menudo** Often
b. **A veces** Sometimes
c. **Nunca** Never

13. ¿En qué momento te gustaría recibir educación sobre la diabetes? When would you like to receive diabetes education?

a. **Al visitar regularmente al proveedor de salud** With your regular provider visits
b. **En distintas sesiones durante la semana** Separate weekday sessions
c. **Por la tarde** Evening sessions
d. **Los fines de semana** On weekends

14. ¿Te gustaría aprender sobre la diabetes tu solo, con tu familia o en clases donde participan otras personas con diabetes? Would you like to learn about diabetes on your own, with your family, or in classes with other people with diabetes?

a. **Yo solo** On your own
b. **Solo yo y mis familiars** Only you and your family members

- c. **En un grupo con otras personas con diabetes** In a group with other people with diabetes
- d. **En un grupo con otras personas con diabetes y sus familiares** In a group with other people with diabetes and their families

15. ¿Qué formato de materiales educativos prefieres? What format of education materials do you prefer?

- a. **Papel** Paper
- b. **Links a recursos en internet y aplicaciones para celulares** Links to internet resources and mobile apps
- c. **Información oral** Spoken information
- d. **Otros** Other

16. Si tuvieras acceso a internet, ¿qué tan interesado estarías en compartir información sobre tu diabetes con un enfermero o proveedor de la salud a través de un correo electrónico o un sitio web? If you had access to the internet, how interested would you be in sharing information about your diabetes with a nurse or health care provider through email or a website?

- a. **No estaría interesado** Not at all
- b. **Estaría algo interesado** Somewhat interested
- c. **Estaría muy interesado** Very interested

17. ¿Quién te gustaría que te enseñe sobre la diabetes? Who would you most like to receive diabetes education from?

a. **Un enfermero que conozca mucho sobre la diabetes** A nurse with extra diabetes training
b. **Un experto en alimentación** A nutrition expert
c. **Tu proveedor de salud** Your regular medical provider
d. **Alguien de tu vecindario que sepa mucho sobre la diabetes** Someone from your neighborhood with extra diabetes training

18. ¿Qué tan importante es para ti recibir educación sobre la diabetes de un trabajador de la salud hispánico? How important is it to you that you receive diabetes education from a Hispanic health care worker?

a. **No es importante** Not at all
b. **Es algo importante** Somewhat important
c. **Es muy importante** Very important

19. ¿Qué tan interesado estarías en aprender más acerca de cómo cuidar de tu diabetes? How interested are you in learning more about taking care of your diabetes?

a. **No estaría interesado** Not at all
b. **Estaría algo interesado** Somewhat interested
c. **Estaría muy interesado** Very interested

20. ¿Qué hace que controlar tu azúcar en sangre sea una tarea difícil? (Puedes elegir más de uno). What makes controlling your blood sugar more difficult? (You may choose more than one.)

a. **No poder pagar la medicación** Cannot afford medications

- b. **No tener tiempo suficiente para ejercitarme y comer bien** Not enough time to exercise and eat right
- c. **No poder comprender qué hace que el azúcar en sangre cambie** Don't understand what makes blood sugar change
- d. **La dificultad de comprar alimentos sanos** Hard to buy healthy food
- e. **La falta de energía para realizar ejercicio** Lack of energy to exercise
- f. **El exceso o la falta de apetito** Too much or too little appetite
- g. **Otros** Other

21. ¿Hay alguna otra cosa importante que debamos saber acerca de qué ayudaría a manejar tu diabetes? (Por favor escribe tu respuesta a continuación). Is there anything else important for us to know about what would help you manage your diabetes? (Please write in your response below.)

APPENDIX B: DIABETES KNOWLEDGE QUESTIONNAIRE-24

CUESTIONARIO DE CONOCIMIENTO DE LA DIABETES

DIABETES KNOWLEDGE QUESTIONNAIRE

<u>INSTRUCCIONES</u>: Por favor lea estas frases cuidadosamente mientras yo las leo en voz alta y marque su respuesta con círculo de acuerdo a la siguiente escala: Sí = 2, No = 1, No sé = 0

<u>DIRECTIONS</u>: Read the following statements below carefully, as I read them aloud, and circle your response according to the following scale: Yes = 2, No = 1, I don't know = 0

Item #	**Preguntas** Questions	**Sí** Yes	**No** No	**No sé** I don't know
1.	**El comer mucha azúcar y otras comidas dulces es una causa de la diabetes.**	**2**	**1**	**0**
1.	Eating too much sugar and other sweet foods is a cause of diabetes.	2	1	0
2.	**La causa común de la diabetes es la falta de insulina efectiva en el cuerpo.**	**2**	**1**	**0**
2.	The usual cause of diabetes is lack of effective insulin in the body.	2	1	0
3.	**La diabetes es causada por la incapacidad del riñón para mantener la orina libre de azúcar.**	**2**	**1**	**0**
3.	Diabetes is caused by failure of the kidneys to keep sugar out of the urine.	2	1	0
4.	**Los riñones producen la insulina.**	**2**	**1**	**0**
4.	Kidneys produce insulin.	2	1	0
5.	**En la diabetes sin tratamiento, la cantidad de azúcar en la usualmente sube.**	**2**	**1**	**0**
5.	In untreated diabetes, the amount of sugar in the blood usually increases.	2	1	0
6.	**Si yo soy diabético, mis hijos tendrán más riesgo de ser diabéticos.**	**2**	**1**	**0**
6.	If I am diabetic, my children have a higher chance of being diabetic.	2	1	0
7.	**Se puede curar la diabetes.**	**2**	**1**	**0**
7.	Diabetes can be cured.	2	1	0
8.	**Un nivel de azúcar de 210 en prueba de sangre hecha en ayunas es muy alto.**	**2**	**1**	**0**
8.	A fasting blood sugar level of 210 is too high.	2	1	0
9.	**La mejor manera de chequear mi diabetes es**	**2**	**1**	**0**

Item #	**Preguntas** Questions	**Sí** Yes	**No** No	**No sé** I don't know
	haciendo pruebas de orina.			
9.	The best way to check my diabetes is by testing my urine.	2	1	0
10.	**El ejercicio regular aumentará la necesidad de insulina u otro medicamento para la diabetes.**	**2**	**1**	**0**
10.	Regular exercise will increase the need for insulin or other diabetic medication.	2	1	0
11.	**Hay dos tipos principales de diabetes: tipo 1 (dependiente de insulina) y tipo 2 (no-dependiente de insulina).**	**2**	**1**	**0**
11.	There are two main types of diabetes: type 1 (insulin-dependent) and type 2 (non-insulin dependent).	2	1	0
12.	**Una reacción de insulina es causada por mucha comida.**	**2**	**1**	**0**
12.	An insulin reaction is caused by too much food.	2	1	0
13.	**La medicina es más importante que la dieta y el ejercicio para controlar mi diabetes.**	**2**	**1**	**0**
13.	Medication is more important than diet and exercise to control my diabetes.	2	1	0
14.	**La diabetes frecuentemente causa mala circulación.**	**2**	**1**	**0**
14.	Diabetes often causes poor circulation.	2	1	0
15.	**Cortaduras y rasguños cicatrizan mas despacio en diabéticos.**	**2**	**1**	**0**
15.	Cuts and abrasions on diabetics heal more slowly.	2	1	0
16.	**Los diabéticos deberían poner cuidado extra al cortarse las uñas de los dedos de los pies.**	**2**	**1**	**0**
16.	Diabetics should take extra care when cutting their toenails.	2	1	0
17.	**Una persona con diabetes debería limpiar una cortadura primero con yodo y alcohol.**	**2**	**1**	**0**
17.	A person with diabetes should cleanse a cut with iodine and alcohol.	2	1	0
18.	**La manera en que preparo mi comida es igual de importante que las comidas que como.**	**2**	**1**	**0**
18.	The way I prepare my food is as important as the foods I eat.	2	1	0

Item #	**Preguntas** Questions	**Sí** Yes	**No** No	**No sé** I don't know
19.	**La diabetes puede dañar mis riñones.**	**2**	**1**	**0**
19.	Diabetes can damage my kidneys.	2	1	0
20.	**La diabetes puede causar pérdida de sensibilidad en mis manos, dedos y pies.**	**2**	**1**	**0**
20.	Diabetes can cause loss of feeling in my hands, fingers, and feet.	2	1	0
21.	**El temblar y sudar son señales de azúcar alta en la sangre.**	**2**	**1**	**0**
21.	Shaking and sweating are signs of high blood sugar.	2	1	0
22.	**El orinar seguido y la sed son señales de azúcar baja en la sangre.**	**2**	**1**	**0**
22.	Frequent urination and thirst are signs of low blood sugar.	2	1	0
23.	**Los calcetines y las medias elásticas apretados son adecuados para los diabéticos.**	**2**	**1**	**0**
23.	Tight elastic hose or socks are not bad for diabetics.	2	1	0
24.	**Una dieta diabética consiste principalmente de comidas especiales.**	**2**	**1**	**0**
24.	A diabetic diet consists mostly of special foods.	2	1	0