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**EVALUATION OF DIABETES EDUCATION FOR LATINOS LIVING
IN A METROPOLITAN AREA**

by

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B.A., UNIVERSITY OF GEORGIA

B.S., UNIVERSITY OF GEORGIA

A Thesis Submitted to the Graduate Faculty
of Georgia State University in Partial Fulfillment
of the Requirements for the Degree

MASTER OF PUBLIC HEALTH

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2009

APPROVAL PAGE

EVALUATION OF DIABETES EDUCATION FOR LATINOS LIVING
IN A METROPOLITAN AREA

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ABSTRACT

Anna Rockett Potter

Evaluation of Diabetes Education for Latinos Living in a Metropolitan Area

(Under the direction of Dr. Frances McCarty, Faculty Member)

Diabetes is a worldwide epidemic, especially as the prevalence of Type 2 diabetes has increased in recent years. Minorities are disproportionately affected by the disease and, at the same time, often have less access to resources including medication and education. The Emory Latino Diabetes Education Program (ELDEP) is a culturally component diabetes education program aimed at promoting increased knowledge about diabetes disease management within the Latino population of metropolitan Atlanta. The program considers cultural competence and acculturation theory in its learning structure.

The purpose of this study was to evaluate ELDEP's effectiveness in increasing knowledge of diabetes, healthy behaviors, and disease management in the study population. The study evaluated changes in knowledge for those participants who attended only the initial intervention and those patients who attended both the initial session and at least one follow-up intervention. Data was collected through a self-report questionnaire completed by patients at the beginning of each intervention session.

The results of this study indicate that specific participant characteristics may be associated with attendance at follow-up sessions. Participant knowledge about certain factors related to diabetes also increased. Based on these results, recommendations will be made to the program staff at ELDEP.

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CHAPTER I: INTRODUCTION

Background and Context

Diabetes is a group of diseases that results in high levels of blood sugar. The primary types of diabetes are Type 1, otherwise known as juvenile diabetes, and Type 2, which accounts for approximately 90% of diabetes diagnoses. Estimates suggest that around 7.8% of the population of the United States has diabetes, which includes an estimate of 5.7 million undiagnosed cases (National Diabetes Fact Sheet, 2007). While diabetes is a serious problem in the United States' population as a whole, it disproportionately affects minorities, including Latinos.

In 2003, Latinos accounted for 13.7% of the United States' population with an estimated 39.9 million Latinos residing in the US at that time ("Presentation and Comparison of Race", 2008). Furthermore, by the year 2050, the US Census Bureau projects that one out of every four people (25%) in the United States will be of Hispanic/Latino origin (Population Report, 2008). In 2005, approximately 7.1% of Georgia's population was Hispanic after a reported growth rate of 299.6% for the period from 1990-2000 as compared to a national growth rate of Latinos of only 57.9% for the same time period (American Community Survey, 2005). Georgia's growth rate during that time was greater than any other state in the country. The majority of Latinos in Georgia are foreign-born, approximately 60%, making Georgia's population different than the Latino populations in other states due to the high percentage of new immigrants residing in Georgia (American Community Survey, 2005). New immigrants bring new challenges to Georgia in tackling Latino health as lack of knowledge of the

health care system, residence in a non-traditional area of migration, and fear of deportation often isolate this vulnerable population (Valdez et al., 1993).

As the Latino population in the United States continues to increase, the health of the Latino population must become of great interest to policymakers, researchers, and practitioners. Almost one out of every ten Latinos over the age of 20 suffers from diabetes, with the majority of Latinos (90-95%) experiencing Type 2 diabetes (DHHS, 2005). As rates of obesity in the United States have increased, so have the rates of Type 2 diabetes, which is usually associated with family history, being overweight or obese, lack of physical activity, poor diet, high blood pressure, high cholesterol, and being part of a minority group (Candib, 2007). Fortunately, patient education has proven to be an effective means of improving the lives of patients with diabetes (AADE, 2009).

Such education can occur in an individual or group setting and focus on behavioral strategies to change behaviors that negatively influence the progression of the disease. Culturally competent education programs are necessary when teaching patients whose primary culture differs from the dominant culture (Padilla & Perez, 2003). This study will focus on the evaluation of a specific culturally competent diabetes education program.

Structure of the Program

Emory University in Atlanta, Georgia, sponsors the Emory Latino Diabetes Education Program (ELDEP) through their School of Medicine and Department of Endocrinology at Grady Memorial Hospital. The program is funded primarily through a

grant by the Healthcare Georgia Foundation and receives additional funding through other unrestricted educational grants. ELDEP offers a two-hour introductory education class on diabetes to participants. The introductory class includes information about the symptoms and causes of diabetes and recommendations on disease management including a focus on the importance of routine medical exams, physical activity, and healthful eating behaviors.

Patients are usually connected to the class through a provider, friend, or local health fair. ELDEP staff also play a major role in the recruitment and retention of patients. Within 12 months of attending the initial intervention session, patients are invited to return to a diabetes club meeting where important messages about diabetes are reinforced and guest speakers make presentations to engage participants. Past presentations have included a “Cooking for Diabetes” class and a physical activity lesson.

Since diabetes remains a large problem for Latinos in the United States, with a prevalence rate 1.7 times greater than the rate in Caucasians (National Diabetes Fact Sheet, 2005), key community members are vital in spreading important educational messages about diabetes to the Latino population. Spanish speaking physicians, nurses, certified diabetes educators (CDEs), health promoters (*promotoras*), public health educators, and policymakers are key stakeholders in combating the disparity that exists for Latinos and their experience with diabetes. Stakeholders in the health field need to collaborate to create culturally competent curriculums for education programs through the sharing of best practices. The World Health Organization suggests that knowledge integration through the sharing of information leads to “actionable

knowledge” that better equips organizations to create, organize, and implement successful public health programs (Landry et al., 2006). Policymakers can further promote policy changes that better enable the Latino population as a whole to access health care services as needed through the availability of health insurance and the use of medical interpreters (National Council La Raza, 2004).

In order to engage stakeholders and begin the sharing of best practices, the American Association of Diabetes Educators (AADE) began accrediting diabetes education programs in the summer of 2008. ELDEP was the first program of its kind to receive accreditation from a national entity such as AADE. Furthermore, ELDEP continually seeks partnerships with new hospitals and communities across the state of Georgia and eventually plans to move in to Central and South America using *promotoras* as the primary vehicles for program replication. The use of *promotoras*, or health promoters, is a common practice, especially when CDE’s are not readily accessible in the community. Since the program’s inception in April 2006, ELDEP has expanded its program to offer diabetes education classes in seven local hospitals and clinics throughout metro Atlanta and northeast Georgia. In 2009, ELDEP plans to expand to Valdosta in south Georgia, Birmingham, AL, Wake Forrest, NC, and begin initial planning for expansion into the Americas. The success of program expansion for ELDEP not only depends on securing adequate funding sources but also ensuring that new staff are culturally competent so that patients are comfortable interacting with ELDEP staff whether in Georgia or abroad.

Purpose of the Study

Between April 2006 and December 2008, ELDEP taught diabetes education to over 600 participants at a cost of \$383.50 per patient. Since beginning in April 2006, ELDEP has never been formally evaluated. An evaluation of the program is necessary to determine if the classes offered impact the knowledge, behaviors, and diabetes disease progression of the participants. This evaluation will make recommendations based on data analysis and evaluation that could offer changes to the program structure for increased effectiveness in impacting participants' self-management behaviors for diabetes.

The present study attempted to ascertain whether participants attending ELDEP classes increased their knowledge about diabetes, practiced more healthy behaviors, and better managed their disease to ultimately result in slower disease progression. More specifically, the study sought to answer the following questions:

1. Are there differences in patients who are lost to follow-up versus those who attend multiple classes?
2. Do Emory's Latino Diabetes Education Program (ELDEP) participants experience increased access to care (insurance status, Spanish-speaking doctor)?
3. Do ELDEP participants increase their knowledge about diabetes (type of diabetes, causes, foods that raise blood sugar, etc.)?
4. Do ELDEP participants increase self-management of their diabetes (annual foot and eye exams, dental visits, flu vaccinations, etc.)?
5. Do ELDEP patients increase physical activity participation?

6. Do ELDEP participants experience a change eating behaviors?
7. How do ELDEP participants experience diabetes disease progression (weight, waist, BMI, blood pressure)?

CHAPTER II: LITERATURE REVIEW

Diabetes Self-Management Education

Diabetes self-management education (DSME) has become a crucial part of successful health outcomes related to diabetes (Mensing et al., 2002). ELDEP is a DSME program based on the national standards developed in 2002 by the American Diabetes Association (ADA). ADA created a task force made up of key stakeholders from various disciplines and agencies that devised ten standards for DSME. The national standards for DSME are as follows:

1. DSME programs should document goals, organizational structure, and mission statements and be devoted to quality.
2. DSME programs should identify a target population and determine the needs of the population and the resources necessary to engage that population.
3. Stakeholders should meet annually to review goals and outcomes of the DSME program.
4. DSME programs should appoint a coordinator in charge of planning, implementation and evaluation.
5. DSME programs should appoint a team of educators from various disciplines, who should be certified diabetes educators (CDE) or have relevant experience.
6. DSME staff should receive continuing education.
7. DSME programs should have a written curriculum.
8. To choose appropriate interventions, participants and instructors should make periodic assessments of the program.

9. Documentation should be provided for all participants and should include assessments, learning plans, goals, etc.
10. DSME programs should use a “continuous quality improvement process” to measure program effectiveness (Mensing et al, 2002)

Several studies have evaluated the use and effectiveness of DSME in the Latino population. Banister et al. (2004) conducted diabetes self-management training (DSMT) in a city in Texas. A total of 39 Hispanic patients completed the training program which included a 4-hour group class followed by individual consultation with a dietician and attendance during at least one monthly meeting over the course of a 12 month follow up period. The researchers used culturally competent interventions by conducting classes in English or Spanish, depending on the preference of the patient, and including the patient's family throughout the training program. After a twelve-month follow-up period their patients' A1c levels fell from 9.7% to 8.2%, which was found to be a significant decrease.

In 2005, Lorig et al. studied Mexican American adults with various chronic illnesses as part of the El Paso Diabetes Association Border Project along the Texas/New Mexico/Mexico border. Two-hundred ninety-nine patients completed the 12-month study, which comprised a 150-minute class taken once per week for a total of six weeks with an emphasis on self-management. Cultural competency was included in the curriculum by offering the training in Spanish, using bilingual and bicultural staff, and introducing a social and family emphasis into the classes. After the 12-month study period, improvements were seen in self-management behaviors including use of health care services and healthier eating and physical activity behaviors.

Two Feathers et al. (2005) studied “El Camino a la Salud” (Journey to Health) curriculum as part of CDC’s Racial and Ethnic Approaches to Community Health (REACH) initiative. The curriculum targeted diet, physical activity, and other self-care behaviors and used culturally competent interventions including bilingual materials and staff who ensured a cultural emphasis in classes to reach the target population which was 36% Hispanic American. The study took place in Detroit, Michigan, over a three-month period. During the study period, patients’ A1c levels dropped from 8.4% to 7.6%, and a significant difference was also measured between the experimental and control groups.

These studies show that DSME is an effective type of education program that can help patients better manage their diabetes. Additionally, these studies demonstrate that DSME can be effective in the Latino population when curricula are culturally competent. Other studies show the success of DSME in other minority populations as well including African-Americans (Two Feathers et al., 2005), Canadian aboriginals (Daniel et al., 1997), and Native Americans (Heath et al., 1987). If successful parts of these programs were combined, it would be possible to create a DSME program for Latinos that resulted in lower A1c levels, increased access to the health care system, and healthier eating and physical activity behaviors.

Patient Education & Acculturation

Since the study population in the ELDEP program consists primarily of non-US born Latino immigrants, one must come to understand the process and theory of acculturation. According to Padilla and Perez (2003), acculturation is a “social process

that occurs in a context in which newcomers and members of the host culture are in dynamic contact with each other.” ELDEP patients experience acculturation because they are primarily foreign born newcomers from other cultures that interact daily with the host culture of the United States. Theories of acculturation are varied because acculturation is such a vast and complex process. As Padilla and Perez (2003) describe, acculturation can consist of, but is not limited to, the following processes:

“the clothes they wear, the foods they eat, the people with whom they associate, the values to which they adhere, and the strategies used to accommodate to the new culture and its people, [which may be] indistinguishable from the majority group...[so] the extent that immigrants become aware and interpret their social stigma...will reflect their interpretation of the stigma and the cognitions that surround these perceptions.”

The theory of acculturation that Padilla and Perez (2003) describe is comprised of five basic components:

- a) social cognition theory
- b) cultural competence
- c) social identity theory
- d) social dominance
- e) social stigma

Social cognition theory is a traditional psychological theory that explains why people think the way they do. Fiske and Taylor (1991) define social cognition theory as “how ordinary people think about people and how they think they think about people” (p. 1). In later research, Fiske (1993) explains how one’s thoughts originate from his/her

pragmatic life goals. The theory posits that one's goals act as the precursors to one's thinking/cognition and that these goals and cognitions vary by context. In terms of acculturation, social cognition theory is important because one's ability to effectively acculturate depends on the way in which one develops personal goals and thinks about those goals as well as the current situation of that individual's life. Effective public health education programs, including ELDEP, should consider the merits of social cognition theory to ensure that their messages reach the intended population by considering the cognition processes and life stages of the target population. ELDEP understands that their target population is largely underserved in terms of education, employment, and access to the health care system. This knowledge combined with social cognition theory helps ELDEP tailor the content of its curriculum so that the messages will be understood by the program participants.

Cultural competence, or the "learned ability to function in a culture in a manner that is congruent with the values, beliefs, customs, mannerisms, and language of the majority of members of the culture" (Padilla and Perez, 2003), is wholly important in the process of acculturation. Furthermore, the development of cultural competence is necessary to achieve complete acculturation. While cultural competence can be thought of as a state that newcomers must reach to fully integrate into the dominant culture, it is also an important piece of developing effective public health education programs. Therefore, in order to be successful, ELDEP must seek to provide cultural competence in its curriculum. By offering classes only in Spanish and using culturally relevant food models and physical activity suggestions, to name a few, ELDEP does offer a culturally competent curriculum to its patients.

Therefore, education programs must be tailored to the audience they teach. Whether teaching fractions to a third grade class, astrology to university students, or diabetes education to Latino patients, each curriculum must be relevant to the population it serves. In working with people from other cultures, cultural competency is necessary. Cultural competency includes the assurance that classes will be taught in the participants' native language and that the curriculum will include messaging relevant to the participants' native culture (Valdez et al., 1993).

For the Latino population, culturally competent diabetes education programs include some or all of the following aspects:

1. Diabetes classes taught in Spanish (Whittemore, 2007) since the majority of Latinos speak Spanish as their native language;
2. The participation of family members in diabetes classes (Whittemore, 2007) as the family is a core component of Latino culture;
3. A curriculum with a cultural emphasis including nutritional messaging based on native foods (tortillas, rice, beans, etc) and music for exercise (salsa, bachata, rumba, etc) (Lorig et al., 2005);
4. A curriculum with a focus on shared cultural beliefs that Latinos have about the onset, progression, symptoms, and treatment of diabetes (Philis-Tsimikas et al., 2004). Common cultural beliefs about diabetes include:
 - a. *Susto* (fright/surprise) causes diabetes because of a shock to the body through a strong, sudden emotion;

- b. Herbal treatments of *nopal* (prickly pear cactus), *savila* (aloe vera), starbien, *espinosa de pochote* (silk cottonwood tree), and *chaya* (*Cnidoscoluschayamansa*) can be used to successfully treat diabetes;
 - c. God's major role in the etiology and cause of disease and prayer is used as a common treatment (Hatcher & Whittemore, 2007);
- 5. The use of bilingual and bicultural staff to teach the curriculum (Whittemore, 2007);
- 6. Classes that are culturally formatted for participants. For example, Rosal et al. (2005) used a soap opera (*telenovela*) format to communicate key diabetes messaging and relate coping strategies to participants in their program since soap operas are a large part of Latino culture.

Therefore, in public health education programs, cultural competence refers not only to a state newcomers should reach within the host culture but also to the way in which curriculums are tailored to meet the current state of the target population.

Building further on social cognition theory and cultural competence, social identity theory is another important piece of understanding the process of acculturation and building effective public health education programs. Social identity theory refers to the idea that individual behavior is reflective of an individual's group/collective behavior (Tajfel & Turner, 1986). The theory posits that an individual will act in a manner that is concordant with the behavior of his/her heritage group. Cultural competence is clearly related to social identity because the extent of an individual's ability to successfully acculturate into the dominant culture is a measure of one's cultural competence and how the individual perceives himself (his/her social identity) (Markus et al., 1996).

Therefore, public health education programs, including ELDEP, must consider the social identity of their target population in order to be effective. For ELDEP, understanding the social identity of their target population means that ELDEP employs Latino staff who can fully understand the collective behaviors of the Latino population and help patients be successful in the dominant culture.

Next, social dominance as related to acculturation considers the hierarchy of cultures (Sidanius, 1993). In this way, social dominance is directly related to social identity in developing effective public health education programs. Acculturation is affected by social dominance because the expectations of the dominant culture play a role in one's ability to acculturate as well as one's experience with social stigma (Taft, 1977). Public health educators and program developers must determine the role of the dominant culture in the target population by examining language skills, for example, in order to tailor the program to the population's needs. ELDEP staff recognizes that the dominant American culture differs greatly from that of their patients but they aim to provide an environment in which these differences are minimized so that their patients are best able to learn self-management strategies.

The final component of the acculturation theory is that of social stigma. Crocker, Major, and Steele (1998) define social stigma as an individual characteristic that portrays a negative social identity in a given context. However, the characteristic that can have a negative connotation in one situation can have a neutral or positive connotation in another context. Therefore, social stigma varies by context and those who experience stigma must learn to adapt depending on whether the stigmatized characteristic is external (skin color, accented speech, etc.) or internal (religion, choice

of partner, etc.) (Padilla and Perez, 2003). Populations who are especially vulnerable to social stigma will react best to education programs that target their needs based on the challenges they face in the community. ELDEP considers social stigma in the form of language, access to care, and discrimination in an effort to provide strategies to help their patients overcome the challenges they face as a minority population.

Understanding acculturation as a combination of social cognition and social identity theories along with the impact of social stigma is necessary to appreciate the current psychological status of Latino immigrants in the host culture. Research has shown that a lack of acculturation often keeps Latino patients from accessing the health care system and receiving needed care (Mainus et al., 2008). For those immigrants who have darker skin and accented speech, for example, the acculturation process will be more difficult because they will be more stigmatized (Padilla and Perez, 2003). However, public health education programs, including ELDEP, are one avenue by which the provision of culturally competent curriculums can provide needed social support and access to the health care system for Latinos while simultaneously making positive health impacts.

Framework for Program Evaluation

Program evaluation is an important tool for public health managers and administrators and the framework on which this study is designed. By evaluating and comparing the program outcomes to the original goals created by management and key stakeholders, program evaluation allows for adaptation within the program to better reach goals as well as the opportunity to share effective strategies with others. Program evaluation also helps to ensure that programs are being implemented as

planned, that the program is effective (it reaches the target population with the intended results), and ensures accountability in public health programs (CDC, 2005). In 2005, the Centers for Disease Control and Prevention (CDC) published a six step model to program evaluation that will be used as the framework for this study. Their six step framework includes the following:

1. Engaging stakeholders
2. Describing the program
3. Focusing the evaluation
4. Gathering credible evidence
5. Justifying conclusions
6. Ensuring the use of findings

As one works through the CDC framework, he/she should consider the utility, feasibility, propriety, and accuracy of each standard (Joint Committee on Standards for Educational Evaluation, 1994). The Joint Committee on Standards for Educational Evaluation defines the standards as the following:

- Utility – who will use the results of the evaluation?
- Feasibility – is the evaluation realistic based on the time and skill available?
- Propriety – is the evaluation ethical?
- Accuracy – will the findings of the evaluation be valid and reliable?

Figure 1 illustrates the six steps of the CDC theoretical framework and the four standards from the Joint Committee on Standards for Educational Evaluation to perform an effective evaluation of a public health program (CDC, 2005).

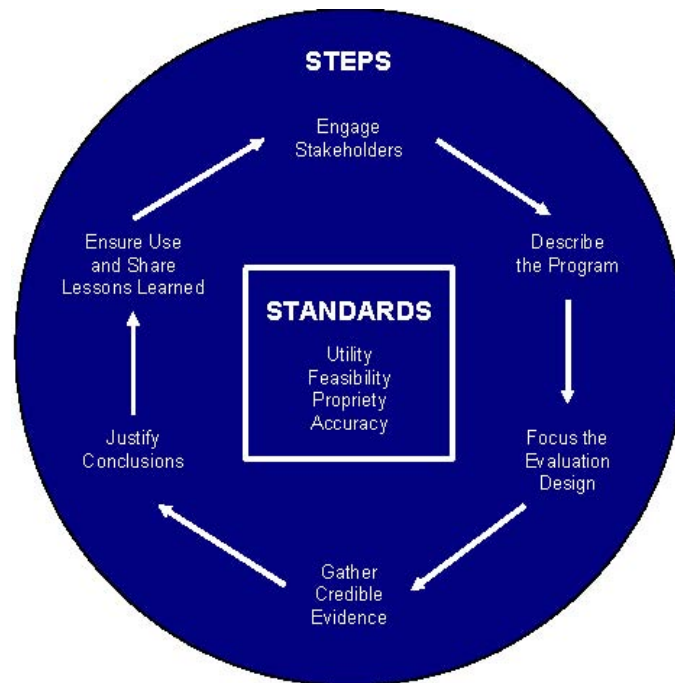


Figure 1.1
Evaluation Framework
CDC, 2005

Figure 1. Evaluation Framework Steps and Standards

Engaging stakeholders is a necessary part of a credible program evaluation. Stakeholders can include management, funding partners, patients, community members, and others with key interests in the program. Each stakeholder brings a certain amount of validity to the evaluation and can also serve as an advocate for the program in the community. Stakeholders can provide special insight on the goals and expected outcomes of the program as well as provide direction for the future of the program under evaluation.

A comprehensive program description aids in program evaluation by defining a clear background and history of the program. It then aims to identify the program's greatest needs, targets, outcomes, and key activities, and then define relationships between the outputs and inputs. A program description may also include information on

the context of the program within a larger environment (city, population, etc.) and may incorporate the use of logic models to further define the relationship between the inputs and outputs of the program.

Step three, focusing the evaluation, aims to help the evaluator determine the best type of evaluation to perform. Depending on the stage of development of the program and the intent of the evaluation, the evaluator should decide between a process evaluation (also known as an implementation evaluation) and an outcome evaluation. Outcome evaluations can include questions related to efficiency, cost-effectiveness, and attribution.

Gathering credible evidence is a crucial step in the evaluation process as data collection will serve as the primary source of results of the evaluation. In this step of the evaluation process, the evaluator must consider the quality and quantity of data as well as the source of data. Data collected should be representative of the activities and projected outcomes of the program and should be both valid and reliable to produce the most convincing results.

When justifying conclusions, which is the fifth step of CDC's evaluation framework, the evaluator first seeks to analyze the data collected in step four. After the data analysis is complete, the results should be compared to the program standards in order to interpret the results and determine if the program is meeting goals. The evaluator may choose to compare the results to national standards or results of similar programs. After considering the results, the evaluator should make judgments about the program's efforts including effectiveness, quality, and worth.

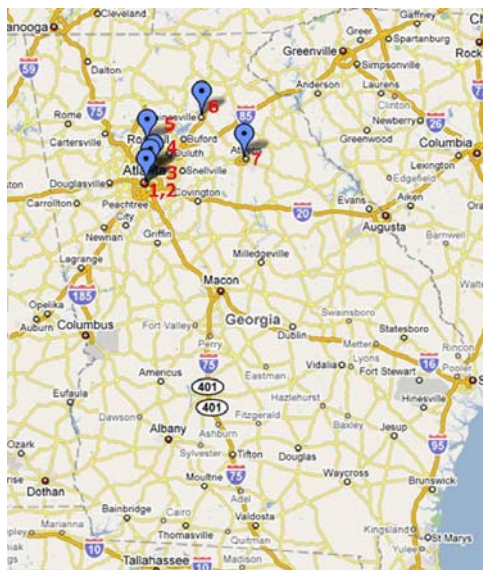
The final step of CDC's evaluation framework is ensuring the use of findings. In this last and final step the evaluator will make recommendations based on his/her judgments from step five. The results and recommendations should be shared with the stakeholders engaged at the beginning of the evaluation process to provide feedback and follow-up. Finally, the results of the evaluation should be disseminated to interested parties and may be published as a means of information sharing. This study will demonstrate how different components of ELDEP are consistent with each step of the framework and provide a basis for ELDEP to share results and recommendations with stakeholders.

Finally, a review of the literature shows that DSME has proven to be effective in other programs targeting the Latino population. Understanding acculturation theory is a necessary component of any diabetes education (or public health education program) for Latinos and other ethnic groups. And, a clear focus on program evaluation standards can help to ensure the usefulness of information obtained from program evaluations such as the one presented here.

CHAPTER III: METHODS

Participants

Latinos who had been diagnosed with Type I or Type II diabetes, or as pre-diabetic, were eligible to participate in ELDEP's intervention. Between April 2006 and December 2008, ELDEP saw 615 patients for the initial intervention session. During the same time period, 167 patients returned for at least one follow-up class. The program was offered in seven clinics and hospitals throughout the metro Atlanta area and northeast Georgia as shown in Figure 2 below.



1. International Medical Center, Grady Hospital System (Atlanta, GA)
2. Diabetes Clinic, Grady Hospital System (Atlanta, GA)
3. Latin American Association (Atlanta, GA)
4. North DeKalb Clinic, Grady Hospital System (Chamblee, GA)
5. North Fulton Regional Hospital (Roswell, GA)
6. North East Georgia Hospital (Gainesville, GA)
7. Mercy Heath Center (Athens, GA)

Figure 2. ELDEP Program Locations

Procedures

After arrival to the intervention, participants completed baseline assessments in Spanish using paper and pencil. Biometric measurements of height, weight, blood pressure, A1c, and waist circumference were taken by ELDEP staff and bilingual volunteers.

Initial Intervention

Patients were referred to ELDEP through physicians and other clinic staff as well as through word of mouth and ELDEP's presence in Latino community health fairs, newspapers, and radio. The intervention was conducted monthly or quarterly depending on the location and the volume of eligible patients. The initial intervention was a one-time session lasting approximately three hours with the first hour devoted to obtaining biometric measurements (height, weight, blood pressure, A1c, and waist circumference) and completion of questionnaires by patients. The remaining two hours of the class were devoted to the intervention.

The goal of the intervention was to provide culturally competent diabetes education to participants. By offering classes taught in Spanish, encouraging the participation of family members in classes, including native food models, encouraging physical activity based on native dance music, and employing only bilingual and bicultural staff, ELDEP's curriculum was culturally competent for the target population. The format of the class was casual to encourage discussion and group participation. The education intervention specifically covered AADE's seven criteria of diabetes self-care behaviors, which are healthy eating, being active, monitoring, medication use, problem-solving and healthy coping (AADE Fact Sheet).

Follow-up Assessment

Patients were contacted by phone within 12 months of their initial intervention session to attend a follow-up class. At the beginning of the follow-up assessment, participants were asked to complete a follow-up questionnaire while program staff

collected biometric measurements. Follow-up sessions consisted of a 30 minute discussion session to reinforce important topics from the initial intervention (nutrition, physical activity, medication, etc) followed by an activity that was intended to give patients the opportunity to learn firsthand about healthy behaviors related to diabetes. Activities included dance lessons, cooking demonstrations, and group fitness routines, which were tailored to be culturally relevant for the patients.

Some patients attended more than one follow-up session. For the purposes of this study, the first follow-up session, which generally occurred three to six months after the initial intervention, was the only data evaluated.

Measures

The questionnaire consisted of 42 questions related to demographics, knowledge of diabetes, access to care, and diabetes self-management behaviors. The Appendix includes a complete copy of the questionnaire with translations to English. The research team also took physical measures for height, weight, blood pressure, and BMI.

This study evaluated six different aspects of the program: access to care, knowledge of diabetes, diabetes self-management behaviors, physical activity, eating behavior, and disease progression. All questions taken from the questionnaire have been translated into English for the purposes of this evaluation.

To determine a patient's access to care, Table 1 indicates the items from the questionnaire that were measured.

Table 1. Measures Related to Access to Care

Does your doctor speak Spanish?	Yes or No
Do you have medical insurance?	Yes or No

Knowledge about diabetes and its treatment was assessed from the questions described in Table 2.

Table 2. Measures Related to Knowledge of Diabetes

Do you know what type of diabetes you have?	Yes or No
Do you know what causes your diabetes? (Mark all that apply)	I don't know, Poor diet, Lack of exercise, Obesity, Pregnancy, Death in the family, Job stress, Family stress, Genetics
Which foods raise blood sugar? (Mark all that apply)	Tortillas/rice/beans/bread, Meats, Fats, Fruits, Milk, I don't know

For the questions “Do you know what causes your diabetes?” and “Which foods raise blood sugar?”, participants received a cumulative score based on the number of correct answers. For causes of diabetes, poor diet, lack of exercise, obesity, pregnancy, and genetics were all considered to be correct answers, resulting in a cumulative score of five, if patients answered all causes correctly. No points were given or deducted for incorrect answers. For foods that raise blood sugar, tortillas, etc., fruits, and milks were deemed correct answers, resulting in a cumulative score of three, if patients answered all foods correctly. No points were given or deducted for incorrect answers.

Self-management of diabetes was measured by a patient's doctor visits and medication adherence according to the questions outlined in Table 3.

Table 3. Measures Related to Diabetes Self-Management

Have you visited the dentist in the past year?	Yes or No
Have you received the flu vaccine in the past year?	Yes or No
Have you had your eyes examined in the past year?	Yes or No
Have you or your doctor examined your feet in the past year?	Yes or No
How often do you forget to take your medication/insulin in a week?	Never, Sometimes, Almost Always, Always

For the question "How often do you forget to take your medication/insulin in a week?", the answers were collapsed into two categories. Never and sometimes were combined to mean that patients rarely forget to take their medication. Almost always and always were combined to indicate that patients frequently forget to take their medication.

Table 4 indicates the questions that were used to measure patients' activity levels.

Table 4. Measures Related to Physical Activity

Do you practice any kind of physical activity?	Yes or No
_____ # of times per week	
Minutes per day:	10-30 mins 30-60 mins More than 1 hr
Type of physical activity (mark all that apply)	Walking, Dancing, Sports, Gym, Others_____

Do you practice any kind of physical activity was evaluated as a dichotomous variable. For patients who did participate in physical activity, the lower bound of minutes per day indicated was multiplied by the number of times per week that patients indicated

performing physical activity. The lower bound was used because of the self-report nature of the questionnaire and the tendency for patients to over report.

Changes in eating behavior were measured by the following question detailed in Table 5 below.

Table 5. Measures Related to Eating Behavior

Do you follow a nutrition plan for diabetes?	Yes or No
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Disease progression was measured through the collection of biometric data by ELDEP staff at the beginning of each class as indicated in Table 6.

Table 6. Biometric Measurements Related to Disease Progression

BMI
Blood Pressure
A1c
Waist circumference

BMI was calculated in the web-based data management system after height and weight data were entered through the standard formula of (weight in lbs x 703)/height in inches². All other measures were taken by ELDEP using traditional equipment and procedures.

Statistical Analysis

Descriptive statistics and frequencies were run for all demographic variables, including gender, age, country of origin, insurance status, income, employment status, number of children, education level, English ability, and time of residence in the United States. McNemar's chi-square analysis for nonparametric data was then conducted for all dichotomous and categorical variables including insurance status, having a Spanish speaking doctor, medication adherence, knowledge of type of diabetes, dental visit, eye

exam, foot exam, participation in physical activity, and adherence to a nutrition plan. A paired samples t-test was then used for the remaining study variables, which were all quantitative and continuous in nature and included the knowledge of the causes of diabetes scale, knowledge of poor eating behavior scale, amount of physical activity participation, and all biometric measures (BMI, blood pressure, A1c, and waist circumference). Apart from the descriptive statistics and attrition analysis, all data analyses were based on the 167 patients who participated in the initial and at least one follow-up intervention.

CHAPTER IV: RESULTS

Study Population

Six hundred fifteen patients completed pre-intervention surveys and 167 of those returned for a follow-up class and completed a post-intervention survey. Characteristics of the baseline intervention group ($n=615$) indicated that they were primarily female (62.9%) with over 70% of the population being from Mexico (70.2%). The average age of the group was near 47 years ($M=46.94$, $SD=12.610$) and they had spent an average of about 9 years in the United States ($M=112.24$ months, $m=78.0$ months, $SD=119.294$). Just over half of the study population was employed (50.6%) and only 25.1% had an income of more than \$15,000 per year. Furthermore, only 25.7% of the initial group indicated that they had health insurance. The study population was generally not well educated as 73.1% completed eight years of school or less. Overall, the study population had poor health indicators (BMI and waist circumference in the obese category, for example) as shown in Table 7.

Table 7. Health Indicators of Study Population, Pre-Intervention

	Mean	Standard Deviation
BMI ($n=451$)	30.74	6.30
Systolic Blood Pressure ($n=576$)	128.74	21.50
Diastolic Blood Pressure ($n=576$)	82.23	14.88
A1c ($n=557$)	8.89	3.02
Waist Circumference ($n=557$)	40.50	13.71

Attrition Analysis

An attrition analysis was performed on the demographic variables of age, sex, employment status, English ability, education level, income, number of children, and time since diabetes diagnosis. This analysis was conducted to determine whether there

were significant demographic differences between those patients who only attended the initial intervention and those patients who attended both the initial intervention and at least one follow-up session. Chi-square and independent sample t-test analyses were run on these variables depending on the level of measurement, dichotomous or continuous, respectively. Attrition analyses revealed significant differences for three of the eight study variables. Nearly 14% of the initial group (13.6%) rated their English ability at good, but only 6.4% of the follow-up group indicated that their English ability was good, which was significant at the $p < .10$ level. In the initial group, 60.7% of participants were female compared to 68.1% female respondents in the follow-up group, which was significant also at the $p < .10$ level. At the $p < .05$ level, income was significant as 73.1% of the initial group reported annual income of less than \$15,000 compared to 81.7% in the follow-up group. No significant difference was found for any of the other study variables. Tables 8 and 9 indicate the differences in the initial and follow-up groups for dichotomous and continuous variables respectively.

Table 8. ELDEP Attrition, Chi-Square Analysis

	Initial Respondents		Follow-up Respondents		$\chi^2(df)$	<i>p</i>
	N	%	N	%		
Gender	440		144		2.52(1)	.07
Male	173	39.3%	46	31.9%		
Female	267	60.7%	98	68.1%		
Employment	425		143		6.15(1)	.11
Employed	220	51.8%	58	40.6%		
Unemployed	185	43.5%	74	51.7%		
Handicapped	10	2.4%	6	4.2%		
Retired	10	2.4%	5	3.5%		
English ability	405		141		8.62(1)	.07
None	169	41.7%	70	49.6%		
Very Bad	13	3.2%	8	5.7%		
Bad	102	25.2%	36	25.5%		
Adequate	66	16.3%	18	12.8%		
Good	55	13.6%	9	6.4%		
Education	415		135		6.13(1)	.19
< 5 years	100	24.0%	31	23.0%		
5-8 years	198	47.6%	76	56.3%		
High school	94	22.6%	26	19.3%		
College +	23	5.5%	2	1.5%		
Annual Income	390		120		3.62(1)	.04
>\$15,000	105	26.9%	22	18.3%		
<\$15,000	285	73.1%	98	81.7%		

Table 9. ELDEP Attrition, Independent Samples t-test Analysis

	Initial Respondents			Follow-up Respondents			<i>t</i>	<i>p</i>
	Mean	SD	N	Mean	SD	N		
Age	46.43	12.71	435	48.17	11.96	144	-1.45	.55
Number of Children	3.36	2.25	400	3.24	3.13	133	0.51	.64
Time since diagnosis, years	8.39	10.61	251	7.54	6.65	100	0.75	.24

Access to Care Changes

We first looked at whether or not ELDEP patients enrolled in both the initial and follow-up groups experienced an increased access to the health care system. By determining if they had a Spanish-speaking doctor and medical insurance, we used Chi-Square analysis to measure the difference between patients' insurance status when they attended the initial session as compared to when they attended the follow-up session. The percentage of patients with a Spanish speaking doctor increased from 63.8% in the initial group to 72.3% in the follow-up group, which was significant at the $p < .10$ level. No significant difference was found for medical insurance. Table 10 indicates the breakdown of results for the access to care variables.

Table 10. ELDEP Participants and Access to Care, McNemar Chi-Square Analysis

		Initial Respondents		Follow-up Respondents		$\chi^2(df)$	<i>p</i>
			%		%		
Spanish speaking doctor? (n=130)							
	Yes	83	63.8%	94	72.3%	3.45(1)	.06
	No	47	36.2%	36	27.7%		
Medical Insurance? (n=142)						.00(1)	1.00
	Yes	28	19.7%	29	20.4%		
	No	114	80.3%	113	79.6%		

Changes in Knowledge

After intervention, significant changes were seen in participants' knowledge of diabetes and related information. Significant differences between initial and follow-up groups were found for knowing which type of diabetes patients had, knowing causes of diabetes, and which foods raised blood sugar. Only 65.5% of participants knew which type of diabetes they had prior to the intervention, but after the intervention 83.1% of participants said they knew what type of diabetes they had, which was a significant difference at the $p < .10$ level. Patients could name a mean of 0.53 causes of diabetes out of a maximum of score of 5.0 prior to the intervention and 0.68 causes of diabetes post-intervention, which was found to be significant at the $p < .10$ level. Similarly, prior to the intervention participants were able to identify an average of 0.98 foods out of a maximum score of 3.0 that raise blood sugar compared to a mean of 1.73 foods that raise blood sugar in the follow up group, which resulted in a significant difference at the

$p < .001$ level. Tables 11 and 12 show the differences between the initial and follow-up groups in the chi-square and paired samples t-test respectively.

Table 11. ELDEP Participants and Changes in Knowledge, McNemar Chi-Square Analysis

		Initial Respondents		Follow-up Respondents		$\chi^2(df)$	p
			%		%		
Know type of diabetes? (n=148)						14.88(1)	.00
	Yes	97	65.5%	123	83.1%		
	No	51	34.5%	25	16.9%		

Table 12. ELDEP Participants and Changes in Knowledge, Paired Samples t-test Analysis

		Initial Respondents		Follow-up Respondents		t	p
		Mean	SD	Mean	SD		
Know causes of diabetes? (n=167)		0.53	0.87	0.68	0.96	-1.894	.06
Know foods that raise blood sugar? (n=112)		0.98	0.93	1.70	0.98	-7.604	.00

Diabetes Self-Management Changes

Significant changes were also found in participants' self-management and care of their diabetes and its complications. Eye examinations in the past year were completed by 44.7% of the initial participants and 59.3% of the follow-up group, which was found to

be a significant increase at the $p < .001$ level. Foot examinations (either performed by a doctor or self-examinations) were completed annually by 53.0% of initial participants and 67.8% of follow-up patients, which was a significant increase at the $p < .001$ level. For visiting a dentist annually, 32.5% of patients in the initial and follow-up groups said they had seen a dentist in the past year. No significant difference was found for annual dentist visit. Almost forty six percent of patients in the initial group (45.5%) indicated that they had received a flu vaccination in the past year compared to 51.3% in the follow-up group, which was not found to be a significant. Medication adherence, measured by the frequency in which participants forget to take their medicine, was the only other variable in this category that was not found to be significant. Table 13 shows the differences in the initial and follow-up participants in diabetes self-management for variables that were dichotomous. Table 14 reveals the differences between groups in diabetes self-management when using the paired samples t-test.

Table 13. ELDEP Participants and Diabetes Self-Management Changes, McNemar Chi-Square Analysis

		Initial Respondents		Follow-up Respondents		$\chi^2(df)$	<i>p</i>
			%		%		
Annual dental visit? (n=157)						0.00(1)	1.00
	Yes	51	32.5%	51	32.5%		
	No	106	67.5%	106	67.5%		
Annual flu vaccination? (n=156)						2.21(1)	.14
	Yes	71	45.5%	80	51.3%		
	No	85	54.5%	76	48.7%		
Annual eye examination? (n=150)						10.02(1)	.00
	Yes	67	44.7%	89	59.3%		
	No	83	55.3%	61	40.7%		
Annual feet examination? (n=149)						8.48(1)	.00
	Yes	79	53.0%	101	67.8%		
	No	70	47.0%	48	32.2%		

Table 14. ELDEP Participants and Diabetes Self-Management Changes, Paired Samples t-test Analysis

		Initial Respondents		Follow-up Respondents		<i>t</i>	<i>p</i>
		Mean	SD	Mean	SD		
Medication adherence? (n=112)		1.05	0.23	1.04	0.21	0.33	.74

Changes in Physical Activity

Physical activity behaviors improved after ELDEP intervention. Patients who said they participated in some form of physical activity were 61.8% of the initial group and 77.8% of the follow-up group, which resulted in a significant increase at the $p<.001$ level. There was not sufficient data available to run analysis on the number of minutes per week that patients participated in physical activity. Table 15 shows the differences between groups in physical activity participation.

Table 15. ELDEP Participants and Changes in Physical Activity, McNemar Chi-Square Analysis

		Initial Respondents		Follow-up Respondents		$\chi^2(df)$	p
			%		%		
Participation in physical activity? (n=152)						11.50(1)	.00
	Yes	94	61.8%	118	77.6%		
	No	58	38.2%	34	22.4%		

Changes in Eating Behavior

Significant changes in participants' eating behaviors also resulted. The percentage of patients indicating that they followed a specific nutrition plan for their diabetes increased from 50.8% in the initial group to 78.8% in the follow-up group, which resulted in a significant difference at the $p<.001$ level. Table 16 illustrates the differences between the initial and follow-up respondents demonstrating changes in eating behavior.

Table 16. ELDEP Participants and Changes in Eating Behavior, McNemar Chi-Square Analysis

	Initial Respondents		Follow-up Respondents		$\chi^2(df)$	<i>p</i>
		%		%		
Follow a nutrition plan? (n=132)					25.41(1)	.00
Yes	67	50.8%	104	78.8%		
No	65	49.2%	28	21.2%		

Factors associated with Disease Progression

Physical measurements related to disease progression were found to be significant. Mean BMI decreased slightly from 31.22 in the initial group to 30.18 in the follow-up group and was significant at the $p < .05$ level, $t = 2.012(108)$, $p = .047$. Systolic blood pressure decreased from a mean of 133.68 in the initial group to 127.02 in the follow-up group, which was significant at the $p < .001$ level, $t = 4.243(148)$, $p = .000$. Likewise, mean diastolic blood pressure decreased from 83.99 in the initial group to 79.01 in the follow-up group and was significant at the $p < .001$ level, $t = 3.771(148)$, $p = .000$. A1c, which decreased from a mean of 9.21 in the initial participants to 8.06 in the follow-up participants, was also found to be significant at the $p < .001$ level, $t = 4.407(134)$, $p = .000$. Waist circumference was the only biometric measurement that was not significant, $t = -0.827(139)$, $p = .409$. Table 17 clearly shows the differences between the initial and follow-up groups for all biometric measures taken.

Table 17. ELDEP Disease Progression, Paired Samples t-test Analysis

	Initial Respondents		Follow-up Respondents		<i>t</i>	<i>p</i>
	Mean	SD	Mean	SD		
BMI (n=108)	31.22	7.07	30.18	5.17	2.01	.05
Systolic BP (n=149)	133.68	23.54	127.02	21.81	4.24	.00
Diastolic BP (n=149)	83.99	15.08	79.01	11.62	3.77	.00
A1c (n=135)	9.21	3.16	8.06	2.17	4.41	.00
Waist circumference (n=140)	38.96	5.16	39.19	4.31	-0.83	.41

CHAPTER V: DISCUSSION & CONCLUSION

After a review of the literature, it was found that few DSME programs specifically target the Latino population. Most of the programs reviewed are offered in English and Spanish but do not exclusively target Latinos. ELDEP, on the other hand, does specifically target the Latino population in northeast Georgia for their intervention. Therefore, ELDEP staff formed their curriculum around the beliefs and values of the Latino culture. DSME aims to teach patients how to self-manage their diabetes, including proper eating, physical activity, and health-care related behaviors (Mensing et al., 2002). As a DSME program, ELDEP follows these same goals.

As previously outlined, program evaluation is an important tool for DSME programs, and other public health programs, to measure their effectiveness in reaching their target population while meeting program goals and standards. This program evaluation will give ELDEP staff and stakeholders the necessary data and recommendations to make modifications to the curriculum that may result in better outcomes for their patients.

Are there differences in patients who are lost to follow-up versus those who attend multiple classes?

Demographic variables were compared for the initial and follow-up groups to determine if significant differences existed and could account for attrition in the study. Of the variables studied, only three were significant: English ability, gender, and income. These results indicate that patients who speak less English, are female, and have lower incomes are more likely to return for follow-up care.

The acculturation theory can account for these significant results because patients who are less acculturated in terms of language, social support, and understanding of the health care system would be more likely to utilize the service. ELDEP provides a social support system that may make females, those with poorer English skills, and those making less than \$15,000 annually more likely to return for follow-up care due to the culturally competent curriculum and community that ELDEP creates (Padilla and Perez, 2003). It is likely harder for females, those with poor English skills, and those making less than \$15,000 annually to fully acculturate in the United States culture that has, in the past, traditionally produced a white, English speaking male as the model for success (Whittemore, 2007).

Since patients who were female, have poorer English skills and lower incomes were more likely to return to the follow-up session, ELDEP staff should attempt to specifically reach out to those patients who are less likely to return. In the future, ELDEP should target males, patients with better English skills, and/or higher incomes. The results indicate that these three groups are unique in that they are less likely to return for follow-up care. However, at the same time, the eagerness of those groups who do return for follow-up care may bias the results of the study in that their willingness to change behaviors may not be representative of the rest of the study population.

Do ELDEP participants experience increased access to care?

ELDEP's ability to increase patients' access to care was measured by patients' health insurance status and having a Spanish speaking doctor. While insurance status was not significant, the number of patients with a Spanish speaking physician increased

significantly. Since connecting patients to the health care system is not a primary focus of the program, this result was surprising. However, EDELP staff is always quick to offer patients a list of Spanish-speaking primary care physicians and specialists during the intervention session or upon request. Based on the significant finding for access to a Spanish-speaking provider, this service of ELDEP, while not a primary focus, should remain important to the ELDEP staff as it is significantly improving access to care for ELDEP patients.

While one finding was significant for access to care, the variables used to measure access to care were not specific to one's actual usage of the health care system, but instead variables that can be used as indicators of usage. To more accurately measure these variables in the future, ELDEP may consider adding a question such as "how many times have you visited a medical doctor in the past year" or "when was the date of your last doctor visit" to their questionnaire.

Do ELDEP participants increase their knowledge about diabetes?

Knowledge about diabetes was measured by patients' ability to name the type of diabetes they have, identify causes of diabetes, and know which foods raise blood sugar. Overall, patients enrolled in ELDEP experienced increased knowledge about diabetes as all variables in this section were significant.

ELDEP succeeded in meeting their goal that patients know the type of diabetes they have. Almost eighty three percent (82.5%) of patients in the follow-up group said they knew what type of diabetes they had. However, whether patients could accurately name the condition was not assessed as there was not a space for patients to indicate

which type of diabetes they believed they had. In the future, ELDEP staff should measure the accuracy of patients in naming the type of diabetes they have as compared to their medical history and records to help increase the validity of these results.

ELDEP also met the goal of patients' ability to accurately name the causes of diabetes as well as identify foods that are associated with high blood glucose levels. Even though significant increases were measured for both of these variables, overall knowledge was still low. Patients could only name an average of 0.68 causes of diabetes, where 0 was the lowest possible score and 5 was the highest possible score. This result indicates that although knowledge of causes of diabetes did increase, ELDEP patients as a whole could not name even 1 out of the 5 possible causes.

However, patients scored better in food knowledge being able to name 1.73 causes in the follow-up group out of a possible 3. This result could be due to the strong emphasis that ELDEP places on healthy eating in the initial intervention. Patients interact with the ELDEP staff using culturally relevant food models to actively discuss changes in eating behaviors. Since there are multiple risk factors for developing Type 2 diabetes and patients are already diagnosed when receiving the intervention, it may not be as important for them to understand the causes of diabetes. However, ELDEP staff should look to increase focus on understanding the causes of Type 2 diabetes and dispelling cultural myths about causes of the disease so that lack of knowledge and misinformation do not spread throughout the community.

Do ELDEP participants increase self-management of their diabetes?

Variables measuring diabetes self-management were patients' having an annual dentist visit, eye examination, foot examination, flu vaccination, and medication adherence. Overall, participants in ELDEP experienced increase diabetes self-management behaviors when attending both the initial and follow-up interventions. Annual dental visit, annual flu vaccination, and medication adherence were not found to be significant. Dental visit was likely not significant due to lack of access, as dental visits can be expensive and dental insurance is even less available than medical insurance, which the majority of ELDEP patients (79.8%) lacked. The non-significant results for flu vaccination are probably also due to lack of access to care. Medication adherence was already extremely high in the initial group, which likely accounts for the lack of change between the initial and follow-up groups.

Annual eye examination and foot examination were found to be significant, indicating that ELDEP participants understand the complications that can result in the body from diabetes as well as the importance of prevention. ELDEP should aim to further explain the importance of annual dental visits and connect patients to Spanish-speaking dentists when able. Medication adherence should also be explained in a culturally competent manner so that patients understand that their medication will be most effective only when taking it exactly as prescribed.

Do ELDEP patients increase participation in physical activity?

Levels of physical activity were measured by patients' participation in physical activity. This variable was found to be significant indicating that ELDEP participants do increase physical activity when attending both the initial and follow-up interventions.

Only five individuals reported data for number of minutes per week of physical activity, so analysis on number of minutes per week of physical activity was not possible.

Furthermore, this limitation means that although patients indicate they are participating in physical activity, the quantity of physical activity among the population as a whole is largely unknown.

Studies recommend that patients with diabetes participate in at least 30 minutes of physical activity on most days of the week (ADA, 2003). Although ELDEP participants successfully increased their physical activity participation, ELDEP staff should aim to focus more on minutes of participation and make sure that patients complete the questionnaire in its entirety.

Do ELDEP participants experience a change eating behaviors?

Change in patients' eating behaviors was measured by whether or not they followed a nutrition plan for diabetes. Patients enrolled in both the initial and follow-up ELDEP interventions did successfully change their eating behaviors as this variable was highly significant. Almost 80% of follow-up patients indicated that they followed a nutrition plan. Since ELDEP focuses largely on healthful eating behaviors in the initial intervention using culturally competent food models, it is likely that patients use that information to develop healthier nutrition plans at home. However, patients simply indicated that they were or were not following a nutrition plan, and no additional information such as the type or quantity of foods being eaten was gathered. In the future, the questionnaire should ask more detailed questions about the nutrition plan to determine whether or not the plan followed is beneficial in controlling diabetes.

How do ELDEP participants experience diabetes disease-progression?

Variables used to measure disease-progression were the biometric measurements of BMI, systolic blood pressure, diastolic blood pressure, A1c, and waist circumference. ELDEP participants saw a positive change in diabetes disease progression as all of these variables were found to be significant except for waist circumference. However, many of ELDEP patients take medication to control their diabetes and are often referred to the program after seeing a doctor who prescribes an oral antibiotic and/or insulin regimen. It is not clear and cannot be determined whether the significant results in this section were due to efforts of the ELDEP staff in educating patients about the control of their disease, due to medication, or both.

Overall Results of the Program

Based on the results of this study, ELDEP is DSME program for the Latino community in northeast Georgia that has proven to be successful in some of the goal areas of DSME. Participants who attended the initial intervention and at least one follow-up session developed an increased understanding of diabetes as a disease and its causes. While many positive knowledge and behavioral changes were observed for ELDEP patients, the analysis has limitations that potentially impact the results of the study.

Participants were able to identify foods that raised blood glucose levels as well as demonstrate an understanding of the importance of following a nutrition plan, but these variables were not well defined. Follow-up patients participated in significantly more physical activity routines indicating that they understood the importance of regular

physical activity in their lives, yet the amount of physical activity participation could not be quantified.

In terms of disease management, participants not only understood the importance of routine medical care to manage complications from diabetes, but they also put this knowledge into practice. Follow-up participants were more likely to have an annual vision examination and exam feet regularly than participants who only attended one session. Biometric measurements of BMI, blood pressure, and A1c also resulted in significant decreases between the initial and follow-up groups indicating that patients may have been beginning to understand the importance of disease management. The cultural competence of the ELDEP curriculum is a likely reason for the changes in behavior as the education was provided in a language and context that was relevant to participants.

Validity of the Program Evaluation

The accredited curriculum of the ELDEP curriculum provided substantial information that improved the validity of this program evaluation. In the first step of CDC's program evaluation, the program should engage stakeholders. ELDEP includes many stakeholders in program development and evolution, who include: Emory University medical staff, Grady Hospital medical staff, The Health Care Georgia Foundation, public health students, nutritionists, certified diabetes educators, local Latino leaders, and other community members.

Step two, describing the program, is something that ELDEP does well. They have well-defined goals and a target population and describe the program with ease when seeking grant money or talking to potential patients at health fairs. For the

purposes of this study, ELDEP is fully described in the Introduction section. Step three of CDC's program evaluation calls for focusing the evaluation. The focus and purpose of this study was an outcomes evaluation seeking to study program effectiveness.

Gathering credible evidence is the fourth step of the program evaluation framework. Evidence for this study was gathered through the self-report questionnaires completed by each participant at the beginning of each initial and follow-up class. The results of this study and the answers to each of the study questions make up the fifth step of the program evaluation, justifying conclusions. This study can only answer the first five steps of program evaluation validity and provide results and recommendations for ELDEP staff. ELDEP staff will be responsible for ensuring the use of findings, the final step of the program evaluation framework, as they see fit.

Implications for Public Health

The cost of diabetes in the United States was estimated at \$132 billion annually in 2002 (National Diabetes Fact Sheet, 2002). Approximately 2.5 million Latinos are estimated to suffer from either Type 1 or Type 2 diabetes, which accounts for approximately 13% of all diabetes cases (18.9 million) in the United States (National Diabetes Fact Sheet, 2002). This data indicates that approximately \$17.2 billion goes towards treating diabetes in the Latino population alone. Since these calculations include not only the costs directly associated with the treatment of the disease but also with the indirect costs associated to disability, unemployment, and premature death, DSME, which can effectively teach patients how to manage their disease and avoid these indirect costs, is an important tool for better managing diabetes and the costs

associated with it in the United States and across the globe. While little research has focused on the cost-effectiveness of DSME, with a cost of \$383.50 per patient, ELDEP's prevention efforts may be preventing further costs to the health care system especially since many of ELDEP's patients are uninsured.

Furthermore, since Georgia's Latino population has been growing exponentially (La Raza, 2004), public health educators in the state face a unique challenge in addressing the diabetes disease burden of Latinos in Georgia. Culturally competent programs that are community based, such as ELDEP, have proven to be an effective means of reaching this vulnerable population (Padilla and Perez, 2003). It is also true that few DSME programs for Latinos exist nationally despite their proven effectiveness (Whittemore, 2007). In that regard, ELDEP holds a unique advantage in providing a necessary service to the Latino community while also holding to high standards that make the program successful.

Study Limitations

Several limitations should be considered when interpreting the results of this study. First, the questionnaire and all study variables except for biometric measurements were based on self-reported data. Inaccuracies and bias in self-reported data can make the reliability and validity of the results questionable (Martin, 2000). Since the questionnaires were sometimes completed without assistance from ELDEP staff, many items were left unanswered resulting in much missing data in the data set. An incomplete data set can also influence the reliability and validity of the results of the study (Martin, 2000). Second, while over 600 patients attended the initial intervention, only 167 returned for a follow-up session. Attrition analysis did not provide

an overwhelming explanation for these results, and when interpreting the results of the study, it is important to consider that those patients who returned for follow-up may be inherently different than those who were lost to follow-up. It is possible that patients who returned were more motivated and/or committed to the management of their disease despite ELDEP's efforts.

Analyses were not run on several variables due to small sample size, but results for these variables could have been insightful and should be included in future studies. Finally, randomization was not possible in this study due to ELDEP's design. A study using a control group is recommended to compare the results of the ELDEP intervention as opposed to a non-culturally competent DSME program that could serve as the control. A study with a comparison group could also compare the results of the intervention in patients taking medication for their diabetes versus no medication or a placebo as it is not clear which results of this study are due to diabetes medications.

In addition to considering the use of a comparison group, future research should also determine the sensitivity and specificity of the ELDEP questionnaire. Other DSME programs have modified existing and well-tested questionnaires (NHANES, for example) for use in their programs (Whittemore, 2007), which may result in increased validity and reliability.

Recommendations for ELDEP curriculum

The results of this study indicate that while ELDEP appears successful in meeting some of its goals for improving diabetes self-management behaviors and diabetes health-related biometric measurements, the results should be taken with caution because of the limitations of this study. Despite the limitations, ELDEP

participants saw a significant increase in many positive health indicators. ELDEP has a strong affiliation with Grady Memorial Health Care System through Emory University. Because of this partnership, ELDEP should aim to connect Latino residents of Fulton and DeKalb counties to the Grady system, which uses a sliding fee-scale for uninsured patients who provide proof of residence and receive a Grady Card. The Grady Card acts as an immediate connection to the Grady Health System clinics and hospital and patients are enrolled in the sliding-fee program.

ELDEP's culturally competent curriculum makes the program meaningful and relevant to its participants and undoubtedly influenced the results of this program evaluation. Since a large percentage of ELDEP patients have completed less than eight years of school, ELDEP should also focus on employing low-literacy strategies into their already culturally relevant curriculum. Such low-literacy strategies could include a red-light, green-light traffic model for healthy and unhealthy foods as well as more visual aids with photos in addition to the flipchart used in classes (Rosal et al., 2005).

By building a culturally competent curriculum and employing bilingual and bicultural staff, ELDEP works to increase knowledge about diabetes self-management in the Latino community. ELDEP staff tangibly produces meaningful relationships with patients in order to advocate for their needs and offer health care advice or referrals when prompted. To maintain their offering of services to the community, ELDEP requires continued support from Emory University, the Healthcare Georgia Foundation, and other unrestricted educational grants and sources of funding. Local hospitals and

clinics must continue to help in recruitment of patients and in the provision of space for class meetings.

Conclusions

Overall the results of this study indicate that ELDEP patients have experienced some improved health indicators and behaviors related to diabetes self-management. Due to the limitations of this study, however, the results should be interpreted with caution. As a culturally competent DSME program, the areas of success are important for replication in other diabetes education programs for Latinos across the country. Helping to control the diabetes epidemic in the Latino population through ELDEP and other similar programs will help decrease disparities and spread knowledge about diabetes self-management. Healthy People 2010's first goal for diabetes is to increase the number of people who receive formal diabetes education, and ELDEP undoubtedly is helping to reach this goal.

While the results of this study indicate that some patients (those who are female, have poor English skills, and make less than \$15,000 per year) are more likely to follow-up and benefit from the ELDEP intervention, it is not possible to know how the outcomes of those patients who did not follow-up resulted. Certainly, patients with an increased motivation to succeed for personal, health, or family related reasons may be more naturally inclined to see positive changes as a result of the education they receive. Future research should focus on increasing patient motivation in addition to education.

While this study produced many important findings, perhaps the finding most important to add to the existing literature base is that culturally competent programs, no matter their size, can positively impact participants; however, staff must consider the

external reliability of their results depending on the population and the measures used to collect data. The increase in patients' doctor visits, healthy eating behaviors, and physical activity participation show that patients may be at the initial phase of understanding that a lack of participation in healthier behaviors can result in more devastating health consequences. Of course, these messages would have been less understood if they were not presented in a culturally competent setting.

One cannot underestimate the importance of cultural competency when dealing with ethnic and minority groups in public health education. ELDEP is a good example of a program that focuses on cultural competency in key messaging for patients. ELDEP's success in improving knowledge and behaviors related to some areas of diabetes self-management make it a valuable model not only for other DSME programs for Latinos but also for other public health education campaigns seeking to target the Latino community.

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Appendix

Emory Latino Diabetes Education Program (ELDEP)

Cuestionario

Estimado participante:

A continuación le presentamos una serie de preguntas sobre diferentes aspectos personales, su salud y su diabetes. Le pedimos el favor de responderlas en forma sincera. Sus respuestas nos ayudaran a mejorar nuestro programa para el control de diabetes en la comunidad latina/hispana. Por favor escriba claramente.

1. Nombre: _____
(First name)
2. Teléfono: (____) _____
(Phone number)(____) _____
3. Código postal: _____
(Zip code)
4. Edad: _____
(Age)
5. Sexo: ☐ M ☐ F
(Sex)
6. País de nacimiento: _____ (Place of birth)
Si nació en México, en que estado?
(If you were born in Mexico, in what state?)

7. Hace cuanto tiempo llego-vive en Estados Unidos?
(For how long have you lived in the U.S.?)
☐ _____ meses (months)
☐ _____ años (years)
8. Cuanto pesaba cuando llego a Estados Unidos?
(How much did you weigh when you arrived in the U.S.?)

9. ¿Ha asistido a clases de diabetes?
(Have you ever attended diabetes classes?)
☐ Sí (Yes) ☐ No (No)
Donde? (Where?) _____
10. ¿Cómo se entero del programa? (marque solamente uno) (How did you hear about the program? Check only one)
11. ☐ Médico / Clínica (Doctor/Clinic)
☐ Radio (Radio)
☐ Feria (Fair)
☐ Amistad/ familiares (Friends/family)
☐ Otro _____ (Other)
12. ¿Su médico habla español?
(Does your doctor speak Spanish?)
☐ Sí (Yes) ☐ No (No)
13. Sabe el nombre de su médico?
(Do you know your doctor's name?)
☐ Sí (Yes) ☐ No (No)
Cual es? (What is it?) _____
14. ¿Tiene seguro médico? (Do you have health insurance?)
☐ Sí (Yes) ☐ No (No)
15. Tipo de seguro médico: (Type of insurance)
☐ Medicaid
☐ Medicare
☐ Privado (Private)
☐ Otro _____ (Other)
☐ No tiene (None)
16. ¿Su ingreso anual es más de \$15,000 dólares?
(Annual income greater than \$15,000)
☐ Sí (Yes) ☐ No (No)
17. ¿Tiene empleo? (Are you employed)
☐ Sí (Yes)
☐ No (No)
☐ Incapacitado (Handicapped)
☐ Jubilado (Retired)
18. Numero de hijos: _____
(Number of children)
19. Usted sabe (marque todos los que aplican):
(You know..., check all that apply)
☐ No Se Leer ni Escribir en Espanol
(Can't read or write Spanish)
☐ Se Leer y Escribir en Espanol (Reads and writes Spanish)
☐ Se Leer y Escribir en Ingles (Reads and writes English)
☐ No se Leer ni Escribir en Ingles (Can't read or write English)

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20. Nivel de conocimiento de Inglés:
☐ Bueno
☐ Malo
☐ No sé inglés
21. Años de escuela completados:
☐ menos de 5 años de escuela
☐ entre 5 y 8 años de escuela
☐ Bachillerato completo
☐ Universidad completa o mas
22. Sabe que tipo de diabetes tiene?
☐ Sí ☐ No
23. Sabe que le causo su diabetes?
 (marque todos los que aplican):
☐ No se
☐ Mala alimentación
☐ Falta de ejercicio
☐ Obesidad
☐ Embarazo
☐ Muerte de un familiar
☐ Estrés del trabajo
☐ Estrés familiar
☐ Herencia
24. Tiempo desde el diagnóstico:
☐ _____ meses
☐ _____ años
25. ¿Tiene familiares con diabetes?
☐ No
☐ Sí
26. *Mujeres:* ¿Algún hijo suyo pesó mas de 9 libras (4 kilos) al nacer?
☐ Sí
☐ No
☐ No sé
☐ No aplica
27. ¿Le han dicho que tiene presión arterial alta?
☐ Sí
☐ No
28. ¿Se chequea la presión regularmente?
☐ Sí ☐ No
29. ¿Ha fumado o usado tabaco en los últimos 3 meses?
☐ Sí
☐ No (Dejé de fumar hace mas de tres meses)
30. Cuantas bebidas alcoholicas se toma a la semana?
 _____ (#) bebidas por semana
31. ¿Se mide sus niveles de azúcar?
☐ Sí
 Cuantas veces por semana? _____
☐ No
32. ¿Mantiene un registro de los niveles de Azúcar?
 Sí ☐ No
33. ¿Para qué usa los resultados de su azúcar? (marque todos los que aplican)
☐ para encontrar soluciones que me ayuden a regresar a un valor normal
☐ para mostrar a mi médico
☐ No sé
34. ¿Ha visto al dentista en el ultimo año?
 (Have you visited the dentist?)
☐ Sí
☐ No
35. ¿Ha recibido la vacuna contra la gripe en el ultimo año?
☐ Sí
☐ No
36. ¿Le han examinado los ojos en el ultimo año?
☐ Sí
☐ No
37. ¿Usted o su medico se ha examinado los pies en el ultimo año?
☐ Sí
☐ No
38. ¿Practica algun tipo de actividad fisica?
☐ No
☐ Sí
 _____ (#) veces por semana
 _____ Minutos por día:
☐ 10-30 minutos
☐ 30-60 minutos
☐ más de 1 hora
 _____ Tipo de actividad fisica: (marque todos los que aplican)
☐ Caminar
☐ Bailar
☐ Deportes
☐ Gimnasio
☐ Otros _____

39. ¿Sigue algún plan especial de alimentos para la diabetes? (Marque todos los que aplican)

- ☐ No
☐ Sí

40. ¿Cuáles comidas suben el azúcar? (marque todos los que aplican)

- ☐ tortillas, arroz, frijol, pan, arepa
☐ carnes
☐ grasas
☐ frutas
☐ leche
☐ no se

41. Cuenta con amigos/familiares que lo apoyen en su cuidado de salud?

- ☐ No
☐ Sí

42. Toma medicamentos?

- ☐ No
☐ Sí
☐ Orales
☐ Orales e Insulina
☐ Solo insulina

43. Con que frecuencia se le olvida usar sus medicamentos/insulina a la semana?

- ☐ Nunca
☐ A veces
☐ Casi siempre
☐ Siempre

_____ No Escriba Debajo esta Línea _____

Para uso oficial

75. Estatura (Height): _____ 76. Peso (Weight): _____ IMC (BMI): _____

78. Presión arterial (BP): ____/____ 79. A1c: _____ 80. Cintura (waist): _____

82. Nombre del "primary care physician" (Name of PCP): _____

83. Clínica (Location): _____ 84. Fecha (Date): _____

85. Initial _____ or Follow-up _____

BMI (kg/m ²)	19	20	21	22	23	24	25	26	27	28	29	30	35	40
Height (in.)	Weight (lb.)													
58	91	96	100	105	110	115	119	124	129	134	138	143	167	191
59	94	99	104	109	114	119	124	128	133	138	143	148	173	198
60	97	102	107	112	118	123	128	133	138	143	148	153	179	204
61	100	106	111	116	122	127	132	137	143	148	153	158	185	211
62	104	109	115	120	126	131	136	142	147	153	158	164	191	218
63	107	113	118	124	130	135	141	146	152	158	163	169	197	225
64	110	116	122	128	134	140	145	151	157	163	169	174	204	232
65	114	120	126	132	138	144	150	156	162	168	174	180	210	240
66	118	124	130	136	142	148	155	161	167	173	179	186	216	247
67	121	127	134	140	146	153	159	166	172	178	185	191	223	255
68	125	131	138	144	151	158	164	171	177	184	190	197	230	262
69	128	135	142	149	155	162	169	176	182	189	196	203	236	270
70	132	139	146	153	160	167	174	181	188	195	202	207	243	278
71	136	143	150	157	165	172	179	186	193	200	208	215	250	286
72	140	147	154	162	169	177	184	191	199	206	213	221	258	294
73	144	151	159	166	174	182	189	197	204	212	219	227	265	302
74	148	155	163	171	179	186	194	202	210	218	225	233	272	311
75	152	160	168	176	184	192	200	208	216	224	232	240	279	319
76	156	164	172	180	189	197	205	213	221	230	238	246	287	328

A1C Value	Average BG
14%	415
13%	380
12%	345
11%	310
10%	275
9%	240
8%	205
7%	170
6%	135
5%	100
4%	65

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