

**DIETARY GOAL SETTING AMONG LATINOS AND
CAUCASIANS WITH TYPE 2 DIABETES**

By

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**A dissertation submitted in partial fulfillment of
the requirements for the degree of**

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To the Faculty of Washington State University:

The members of the Committee appointed to examine the dissertation of
KATHALEEN R. BRIGGS EARLY find it satisfactory and recommend that it be accepted.

Approved by _____
Chair

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WASHINGTON STATE UNIVERSITY

ABSTRACT

**DIETARY GOAL SETTING AMONG LATINOS AND CAUCASIANS WITH
TYPE 2 DIABETES**

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This research investigated patient experiences with goal setting as an approach to diabetes dietary self-management among Latinos and Caucasians with type 2 diabetes. In a preliminary qualitative stage of the project, individual in-depth interviews were conducted with male and female Latinos (n=10) and a comparison Caucasian group (n=8) from a community clinic to identify goal setting experiences and related influences derived from Social Cognitive Theory. Preliminary findings were used to develop a survey for a follow-up quantitative stage. Survey respondents were male and female Latino (n=50) and Caucasian (n=50) patients with type 2 diabetes who had received diabetes education (DE) within the last 18 months at a similar clinic. Data collection included a 40-item questionnaire, a one-time A1C value, and selected cardiovascular (CVD) risk factors from medical records. No significant ethnic differences occurred with CVD risk factors; however, mean A1C value was higher for Latino (8.7%) than Caucasian patients (7.8%) ($p < 0.05$). Latino patients (96%) were more likely than Caucasians (68%) to receive a food plan (FP) from a health care provider ($p < 0.001$), and reported different experiences with DE compared to Caucasians. Ordinal logistic regression models tested three dependent variables representing dietary outcomes of DE. In the first model, more frequent FP

adherence was predicted by greater FP satisfaction, greater adoption of a dietary pattern emphasizing vegetables and smaller meals, less frequent barriers to eating socially, and greater physical activity adherence (model $p < 0.0001$, $R^2 = 0.49$). In another model, stage of change for a FP as an indicator of FP adoption was positively predicted by greater patient influence on choosing final FP goals during DE, adoption of a dietary pattern of modifying fat, sugar, and fiber, and a pattern of personal motivators reflecting clinical and physical signs of improved diabetes control (model $p < 0.0001$, $R^2 = 0.26$). Lastly, FP goal attainment, the extent that patients were following a FP relative to what they said they would do initially, related positively to greater FP satisfaction and greater goal attainment for overall diabetes self-management (model $p < 0.0001$, $R^2 = 0.39$). Findings suggest several applications for DE with Latinos and outcome measures useful to DE programs.

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Dedication

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LITERATURE REVIEW

INTRODUCTION

Diabetes, a chronic disease affecting approximately 20.8 million individuals (7% of the population), is the 6th leading cause of death in the US.¹ It is estimated that approximately 6.2 million Americans do not know they have diabetes.² The World Health Organization (WHO) reports that at least 171 million people worldwide have diabetes and this is expected reach 366 million by 2030.³ Type 2 diabetes, which accounts for 90-95% of all diabetes cases, is characterized by the body not producing enough insulin or the body's cells not responding to insulin. While it can be diagnosed at any age and it is on the rise among children and adolescents, type 2 diabetes is more common among adults and is usually associated with obesity, inactive lifestyle, and a family history of diabetes. Moreover, type 2 diabetes and obesity have become a prominent public health concern in the Latino community.

Pathophysiology of Type 2 Diabetes

Type 2 diabetes is a heterogeneous disorder associated with both defective insulin secretion and peripheral insulin resistance.^{4, 5} Metabolic characteristics of type 2 diabetes include hyperglycemia without absolute insulin deficiency and may also include insulin resistance and/or hyperinsulinemia, hypertriglyceridemia, atherosclerosis, and hypertension.⁶ Metabolic Syndrome, which often precedes type 2 diabetes, is diagnosed in the presence of 3 of the 5 symptoms: abdominal obesity, atherogenic dyslipidemia, raised blood pressure, insulin resistance with or without glucose intolerance, proinflammatory state, and prothrombotic state.⁷ Ford et al⁸ analyzed data from the Third National Health

and Nutrition Examination Survey (NHANES III) and found that Metabolic Syndrome is highly prevalent in the general U.S. population; nearly one-quarter of all individuals studied qualified as having Metabolic Syndrome. However, Mexican Americans had the highest rate of metabolic syndrome (31.9%) of all groups studied.⁸

Prediabetes, formerly termed “borderline diabetes,” is a significant burden on America’s health care infrastructure⁹, affecting approximately 54 million Americans.² Prediabetes is typically defined as fasting blood glucose levels greater than 99 mg/dl but less than 126 mg/dl¹⁰ and in 90% of cases, prediabetes precedes the development of type 2 diabetes.¹¹ Insulin resistance and prediabetes are usually preceded by obesity, physical inactivity, and poor nutrition, and are rising in prevalence among children.¹²

Obesity, a recognized independent risk factor for type 2 diabetes, is clinically defined as a body mass index (BMI) ≥ 30 kg/m².¹³ Among persons with type 2 diabetes and prediabetes, central adiposity is frequently cited as a prominent risk factor compared with persons with normal glucose tolerance.¹⁴ Obesity is suspected to be a primary cause of insulin resistance through a proposed aggregate involving genetics, and inflammatory processes^{11,15} that include glucotoxicity, lipotoxicity and adipokine production.^{4, 16, 17} Inflammation has been implicated as a key process in the development of type 2 diabetes.^{11, 15, 16} The increased production of non-esterified fatty acids, retinol-binding protein, glycerol, hormones (namely leptin and adiponectine) and pro-inflammatory cytokines (specifically tumor-necrosis factor- α and interleukin-6) that accompany obesity have been shown to reduce insulin sensitivity.¹⁶ Additionally, β -cells in the pancreas that are responsible for insulin production have also been reported to be directly inhibited by obesity.^{16, 18} In a review of pathogenesis of type 2 diabetes, Poitout and Robertson⁴ describe glucotoxicity as a result of chronic hyperglycemia and the deleterious and progressively irreversible effects

on pancreatic- β -cell function. Additionally, chronically elevated fatty acids, normally an essential fuel for β -cells, become toxic in excessive concentrations, thereby resulting in lipotoxicity.⁴ When excessive fatty acids and glucose concentrations exist, as in some obese people, accumulation of metabolites inhibits glucose induced insulin secretion and insulin gene expression.⁴

COMPLICATIONS OF CHRONIC HYPERGLYCEMIA

Long-term complications of diabetes lead to vascular disease and are primarily due to chronically elevated glucose levels.¹⁹ Vascular disease, resulting from direct endothelial toxicity that excess blood glucose imparts on vasculature, contributes to the pathogenesis of heart disease, kidney disease, limb amputations and blindness.^{20, 21} Diabetes-related vascular disease complications can involve the macrovascular system, resulting in cardiovascular disease, or microvascular diseases – retinopathy, neuropathy, and nephropathy. Capillary basement membrane thickening in the kidneys and eyes causes poor tissue perfusion and compensatory neovascularization.⁶ Hyperglycemia also increases activity of the polyol pathway and results in a build-up of sorbitol within cells²² and increased production of advanced glycosylated end products (AGE's), which interfere with protein physiology.²³ Additionally, excessively high blood glucose interferes with the body's ability to fight infection.²⁴

Cardiovascular disease, including coronary artery disease, peripheral arterial disease, and cerebrovascular disease, is the leading cause of death among people with diabetes.¹ These cardiovascular disorders occur in greater number and severity among individuals with poorly controlled diabetes.²⁵ Platelets become excessively adhesive, causing increased likelihood of blood coagulatory defects.²⁵ Endothelial cell dysfunction

causes activation of protein kinase C, decreases nitric oxide production, and increases angiotensin II leading to inflammation, thrombosis, and vasoconstriction.^{23, 25} People with diabetes have also been found to have higher than normal levels of homocysteine, an amino acid shown to be an independent risk factor for cardiovascular disease.²⁶

Diabetic retinopathy, the number one cause of non-traumatic blindness in the US, is caused by activation of protein kinase C- β pathway (PKC- β) as a result of chronic hyperglycemia, and this has a deleterious cascade-effect on visual abilities.²⁷ Past research has indicated that retinopathy was more prevalent among Mexican Americans than non-Hispanic whites^{28, 29}; however, a more recent study showed similar prevalence of retinopathy among all ethnic groups.³⁰

Hypertension increases risk of micro- and macrovascular complications among persons with diabetes³¹, and is a common co-morbidity of diabetes. Target blood pressure for people with diabetes is defined as blood pressure of 130/80 mmHg or less.³² Uncontrolled high blood pressure causes increased stress in the kidneys and brain, resulting in increased risk of renal insufficiency, end-stage renal disease (ESRD), and stroke. Diabetes-related kidney disease often results in ESRD, which requires dialysis or kidney transplant. ESRD can significantly decrease quality of life³³ and exponentially increase financial burden³⁴ in patients living with the condition.

THE OBESITY AND TYPE 2 DIABETES EPIDEMIC

Many organizations and public health researchers are describing the prevalence of obesity and type 2 diabetes as “epidemics,” particularly among minority populations and those living at low socioeconomic status.³⁵⁻³⁸ Approximately one-third of US adults (68.5 million) over the age of 20 are overweight (BMI \geq 25 kg/m²) and another one-third (64.7

million) are obese (BMI \geq 30 kg/m²).³⁹ The prevalence of overweight and obesity has steadily increased among all groups, regardless of gender, ethnicity, or educational level.³⁹ Approximately 75.5% of Mexican-American women and 76.1% of Mexican-American men are overweight, compared to only 58% of non-Hispanic white women and 70.6% of non-Hispanic white men.³⁹ In a recent comprehensive analysis of the NHANES data sets, Mainous et al⁴⁰ projected that cases of diabetes among Americans are estimated to increase substantially, reaching 11.5% (25.4 million) by 2011, 13.5% (32.6 million) by 2021, and 14.5% (37.7 million) by 2031. Rates of overweight, obesity and type 2 diabetes has increased dramatically, especially among Latinos³⁷, and the impact on Latino health disparities is clear.

The Public Health Impact of Diabetes

Healthy People 2010, a national public health policy directive, identifies diabetes education as the number one objective of Healthy People 2010: Diabetes.⁴¹ In addition, the U.S. Department of Health and Human Services created the Health People Initiative, a set of guidelines for specific chronic diseases that have a large health and economic impact on the nation, including diabetes.⁴¹ This is a direct result of the increasing prevalence and high cost of diabetes, as well as complications related to poor blood glucose control, coupled with a better understanding of the long-term effects of inadequate diabetes management. There is a clear need for a public health focus on diabetes prevention and treatment. The Centers for Disease Control recommends that “health systems address diabetes in Hispanic/Latino populations in a comprehensive and effective manner with an emphasis on prevention.”⁴² In a position statement by the American Association of Diabetes Educators (AADE)⁴³, the organization recommends that diabetes educators should work collaboratively

with public health agencies. The AADE emphasized that diabetes educators should build their programs on scientifically based theories and models while increasing public awareness of diabetes as a public health disorder.

Economic Cost of Diabetes

The total economic impact of diabetes in the US for 2002 was \$132 billion dollars.⁴⁴ The costs associated with diabetes come from several areas related to the pathology of the disease. Blood glucose monitoring equipment (glucose monitor, test strips, lancets, etc.) and hypoglycemic medications that many patients take on a daily basis contribute a significant cost of daily diabetes management. Additionally, the multitude of long term complications associated with obesity and poorly controlled diabetes are very costly to the health care infrastructure.^{38, 45} All of these complications are costly both in terms of financial burden on the health care system and the cost to the individual's quality of life.

Those individuals with diabetes who lack health care insurance are especially at risk. *Project Dulce*, culturally oriented, peer-led, self-empowerment diabetes training program for underinsured Latinos in San Diego County, CA, resulted in significant improvements in diabetes clinical outcomes and financial costs among 3,893 participants.⁴⁶

⁴⁷ Research has shown that people who have been without health care coverage for long periods of time are at much greater risk for poor health care outcomes.⁴⁸ In their examination of 605,825 hospital medical records, Booth et al⁴⁹ found a strong, inverse relationship between income and acute diabetes-related emergencies requiring hospitalization. In 2003, the charges for over 70,009 diabetes-related hospitalizations in Washington totaled more than \$1.27 billion dollars.¹⁰ It has been estimated that a person

with uncomplicated diabetes incurs \$1,600 in medical costs per year, but this cost dramatically increases once complications set in.¹⁰

Diabetes Prevention

There is now a great push by the public health community to focus more attention to preventing diabetes before it develops.⁵⁰ For the first time, the American Diabetes Association (ADA) included measures specifically addressing diabetes *prevention* through diet in its 2003 Nutrition Recommendations.⁵¹ The ADA and the National Institute of Diabetes, Digestive and Kidney Diseases (NIDDK) published a position statement calling for health care professionals to focus more efforts toward preventing diabetes through public health campaigns targeting lifestyle modification, modest weight loss, and increased physical activity.⁹ Lifestyle behaviors are integral to diabetes prevention and control.

There is strong evidence to support that diabetes can be prevented through diet and exercise.^{52, 53} In their landmark Finnish Diabetes Prevention Study, Tuomilehto et al⁵⁴ showed that lifestyle modification is an effective approach to preventing type 2 diabetes in individuals with insulin resistance. Tuomilehto et al⁵⁴ studied 522 men and women for 3.2 years and found that those receiving intensive medical nutrition therapy developed significantly fewer cases of type 2 diabetes. The Da Qing Impaired Glucose Tolerance and Diabetes Study⁵⁵ (n=577) found that diet and exercise reduced the risk of developing diabetes in participants who had impaired glucose tolerance over a 6 year period. The Diabetes Prevention Program (DPP), a multi-center (n=27) randomized clinical trial, followed participants (n=3,234) who did not have diabetes but did have elevated fasting glucose (impaired glucose tolerance) for a mean of 2.8 years. Results of the DPP showed that lifestyle behavior modification prevented diabetes to a greater degree than did the

hypoglycemic agent³⁶ tested. Knowler et al³⁶ used goal setting as a primary method of education for those participants in the DPP receiving lifestyle modification counseling, which focused on weight loss and increased physical activity. Moreover, the diabetes prevention studies demonstrate the need for early emphasis on lifestyle behavior change emphasizing diet and exercise.

DIABETES RELATED HEALTH DISPARITIES

Obesity and diabetes are especially widespread among ethnic minorities, and are a growing concern for health care providers and researchers who serve clients of Latin ancestry.⁵⁶ The CDC's National Diabetes Fact Sheet 2005 reported that the Hispanic/Latino diabetes rate is now at 2.5 million persons (9.5%).⁵⁷ Mainous et al⁴⁰ described the projected diabetes epidemic among Hispanics as "overwhelming." Prevalence of type 2 diabetes is 1.7 times higher among Latinos as it is among non-Hispanic whites⁵⁷, and Latinos with diabetes are at higher risk than non-Hispanic whites for functional impairment secondary to poorly controlled diabetes.⁵⁸ Additionally, Hispanics are also more likely to have undesirable outcomes related to inadequate diabetes self-care⁵⁹, regardless of socioeconomic status.⁶⁰ Type 2 diabetes-related health burden has been shown to be more severe in Mexican Americans as opposed to African Americans or Caucasians⁵⁸, and Mexican Americans are 4.5 to 6.6 times more likely to develop end-stage renal disease as a long-term complication related to poorly controlled diabetes.⁹ Thirty-two percent to 40% of Mexican Americans have diabetes-related retinopathy,⁹ often resulting in functional impairment in activities of daily living (ADL's). These statistics illustrate the severity of diabetes disparities in the US and several federal agencies are calling for further research into reducing the burden of diabetes among Latinos.^{9, 61, 62}

The Washington State Latino Population

Although there have been numerous studies examining Latinos in other parts of the country, primarily Texas⁶³⁻⁶⁶ and California⁶⁷⁻⁷⁰, there is only limited research examining the health practices of this group in Washington or the Pacific Northwest region.⁷¹⁻⁷⁵ The 2005 US Census Bureau reported that approximately 9% of Washington's population 18 years of age and older (541,722 people) are of Latin ancestry.⁷⁶ Several counties in Washington have large Mexican American populations, ranging from 12.5% to nearly 50%. Lastly, much of the central and eastern part of Washington state, where there are larger Latino communities, is rural and there are different health disparities between rural and urban populations with diabetes.⁷⁷

DIABETES SELF-MANAGEMENT EDUCATION

Self-management, also called self-care, is complex and required for any chronic disease.⁷⁸ Self-management requires many daily tasks by the individual living with the chronic illness; for diabetes self-management, lifestyle modifications, primarily meal planning and physical activity, are two fundamental pieces of the self-management picture. Diabetes self-management also includes medication taking, self-monitoring of blood glucose, foot and eye care, coping skills and problem solving, and regular follow-up with the medical team. All of these self-management activities are important and necessary for good glycemic control and reducing risks of diabetes-related complications. Patients are expected to obtain diabetes self-management training, usually by referral from a primary care physician to a diabetes education program. Medicare, the federal health insurance program that provides health benefits to persons over age 65 and those under age 65 who are disabled, encourages subscribers to get diabetes self-management education if any of

the following apply: 1) their doctor prescribes it; 2) they are at risk for complications from diabetes; 3) they have been recently diagnosed with diabetes; 4) they have diabetes and are newly eligible for Medicare.⁷⁹ Currently, Medicare covers 10 hours of initial diabetes self-management training within 12 months, and an additional 2 hours of follow-up training each year after initial training is completed.⁷⁹

Diabetes self-management education became a standard of practice in the late 1980's, and the Medicare Outpatient Diabetes Self-Management Training Coverage Act (HR 1194 and S 602) was introduced in 1993.⁸⁰ The American Diabetes Association (ADA) endorsed a resolution recommending third-party payment for outpatient education and nutritional counseling in 1986.⁸¹ This process led to ADA Recognition to ensure continuity of care among diabetes education programs across the country, and to ensure that payers (Medicare, insurance companies) were getting services that were in line with the National Standards of Diabetes Education. There are currently 1,980 recognized programs at 2,800 sites across the country.⁸² As part of ADA's effort to, "...promote quality education for people with diabetes, the Association (ADA) endorses the National Standards for Diabetes Self-Management Education Programs."⁸³ To support this effort, the Education Recognition Program of the ADA assesses whether applicants meet the National Standards, which are designed to be flexible enough to be used in any health care setting.⁸³

Meal planning is a cornerstone of diabetes self-management and has been designated as a "step-1" approach by physicians for improving blood glucose control as well as beginning moderate, safe weight loss.⁶ Effective dietary self-management can delay the need for medications as well as the onset of complications, resulting in a more economically feasible disease management system.⁸⁴ However, research indicates that meal plan adherence is considered the most challenging part of diabetes self-care.⁸⁵⁻⁸⁹ Difficulties in

meal plan adherence are associated with barriers to change and psychosocial factors, including self-efficacy and support of family.⁹⁰ Bainister and colleagues⁹¹ assessed the effectiveness of a 4-hour diabetes self-management training class with 39 Hispanics at a community health clinic and found a 15% improvement in A1C within the first 2-12 months after education. Brown et al⁹² also reported improvements in A1C following educational intervention with type 2 Latinos. Clearly self-management education with Latinos has been successful. However, educational approaches and self-management outcomes have not been adequately understood to delineate best practices in diabetes self-management education with this population.

Goal Setting

Goal setting, which involves establishing new behaviors or modifying current behaviors to promote glycemic control in people with diabetes, is a common tool used in diabetes self-management education^{93, 94 95}; yet, it is not well-defined or researched in the literature. ADA recognized diabetes education programs must include goal setting in their curriculum; however, goal setting techniques have not been developed and validated for multiethnic populations, and it is not known if this approach to behavior change is effective in a Latino population. Key components of ADA recognized diabetes education programs include being physically active, eating, medication taking, monitoring of blood glucose, problem solving for blood glucose (especially for hypo- and hyperglycemia and sick days), reducing risks of diabetes complications, and living with diabetes (psychosocial adaptation).⁹⁶

Goal setting typically requires that the patient have a general idea of what they hope to accomplish by coming to diabetes education. For example, educators may suggest

patients consider a question such as, “Do you want to increase exercise, or eat fewer high-fat foods?” Goals are often set by the patient in cooperation with their health care provider, but this varies by educator and there is no established “rule” for goal setting technique. Better understanding of the goal setting process related to managing a meal plan has the potential to enhance Latino patients’ educational experiences with goal setting, improve self-care and glycemic control, enrich quality of life, reduce long-term complications, and minimize health care costs. Further, the processes used by the patient during goal setting, subsequent self-care behaviors, and the impact on diabetes control have not been examined. Instead, adherence (e.g., to a pre-determined food plan) has been more a frequently reported outcome measure of diabetes education.^{86, 97-99}

The Empowerment Approach

There has been a drive by some clinicians to shift focus away from adherence and instead move to a more patient-centered, relationship-oriented, collaborative method of diabetes educational strategy and outcome measure^{5, 100-103}, which is likely more conducive to achieving desired diabetes self-management outcomes. Anderson and Funnell¹⁰⁰ posit that the paradigms educators learn during their training exert a strong influence on how they interact with patients. Paradigms, philosophies or overall approaches to diabetes education¹⁰⁰, are so engrained in the educator’s subconscious that they are usually unaware of their existence and influence on their diabetes education practice.¹⁰⁰ A paradigm is part of the educators’ professional (and often personal) identity, so it is very difficult to change.¹⁰⁰

The acute-care paradigm, also called the compliance approach⁵, is still widely used in diabetes education. However, the acute-care paradigm does not work for the majority of patients because attempts by the educator to control the patient’s *diabetes* is often

perceived by the patient as an attempt to control their *lives*.¹⁰⁰ Patient and provider communication may be lacking in the acute-care paradigm. Moreover, there have been a number of studies showing that patients and health care providers often have differing ideas of communication interactions.^{94, 104} For example, instead of focusing educational sessions on glucose control or weight loss, the empowerment approach helps participants develop skills and self-awareness in goal setting, problem solving, stress management, coping, social support, and motivation.¹⁰⁵

The empowerment approach has been used successfully in weight loss programs¹⁰⁶ and diabetes education programs^{105, 107}, but authors caution that the approach should only be used by experienced educators comfortable with a patient-driven educational session.¹⁰⁷ Goal setting within the empowerment approach is a 5-step process, summarized as step 1) explore the problem or issue; 2) clarify feelings and meaning; 3) develop a plan; 4) commit to action; and 5) experience and evaluate the plan.¹⁰¹ This process involves much patient self-reflection and is contributory to the diabetes educator acting as a goal-facilitator and allowing the patient to direct the session. Although the empowerment approach is explained in detail in the reference materials used by certified diabetes educators⁵, it is unknown how many educators use this approach in practice. The empowerment approach, which requires a well-informed, active patient, also necessitates an educator who is willing to listen rather than advise¹⁰⁵ and facilitate rather than direct.^{107, 108}

The Stanford Model

There are several different patient-centered models currently being evaluated for use with Latino populations with diabetes. One model, originated by Lorig et al from Stanford University for use with arthritis sufferers¹⁰⁹ has been used in large populations of

Spanish-speaking patients with type 2 diabetes and other chronic diseases.¹¹⁰⁻¹¹² *Tomando Control de su Salud*¹¹³ is a 14-hour community-based behavioral intervention given in 2 ½ hour sessions over 6 weeks. All aspects of the intervention are in Spanish, and *Tomando Control de su Salud* appears to be the only intervention of its kind to provide a culturally appropriate self-management program in Spanish for a variety of chronic diseases utilizing peer leaders (also called lay leaders) as the primary educational contacts. Regular social support, follow-up, and action planning (goal setting) are all components of the intervention; however, there is no disease-specific educational content provided. The intervention sessions address healthy eating behaviors, grocery shopping and portion control, positive self-talk, problem solving, and maintaining motivation to self-management principles.¹¹⁴ There are also exercises performed in class with a culturally appropriate audiotape. It is a cost-effective, and perhaps more patient-acceptable alternative to traditional diabetes self-management strategy educational approaches. Moreover, *Tomando Control*, despite not providing any disease-specific instruction, has been shown to improve beneficial diabetes self-management behaviors, such as healthy eating and exercise habits, among Latino patients.¹¹³

Goal Attainment Scaling

There has been little research done to improve our understanding of processes involved in goal setting. Goal setting during diabetes education can be formal, such as writing goals down on a pre-made form and sending copies home with the patient and to the primary care physician who referred the patient initially for education. Goal setting might also be more informal, such as when patients simply tell the educator what they intend to do after the educational session and the educator makes note of this in the patients' medical

records. Goal setting may be done with the educator leading the discussion, or the patient may lead the discussion. There are a variety of techniques used in practice, often dependent on educator experience and personal beliefs¹¹⁵, but there is very little evidence-based research available to support different methods of goal setting.

Goal Attainment Scaling (GAS) is one method of estimating outcomes with goal setting that has been researched and is the only apparent method for quantifying the degree of goal attainment. GAS is a scaling technique used to measure movement to or away from targeted goals¹¹⁶ and has been tested in a variety of health care settings¹¹⁷⁻¹¹⁹, but has not been applied to diabetes management or to a Latino population. With GAS, the patient identifies the steps he or she might take that a) meet the goal, b) do not meet the goal, or c) exceed the goal. A validated GAS protocol may improve our understanding of how goals are attained and what factors mediate goal attainment, such as barriers and social support. An improved understanding of the way Latinos may benefit from various goal setting techniques can result in more culturally appropriate diabetes education programs. In turn, improved diabetes education will have a more significant impact reducing long-term complications related to poorly controlled diabetes. GAS has been used successfully to document and improve dietary changes in a work-site health promotion program¹²⁰ and this strategy could also work in a community setting, if evaluated as culturally appropriate for the Latino population.

DISEASE MANAGEMENT SYSTEMS

The Chronic Care Model

The Behavioral Science Research in Diabetes (BSRD) group sponsored by the National Institute on Diabetes and Digestive and Kidney Diseases issued a report which

outlined the best approach for health care professionals to take for improving diabetes outcomes in 1999.¹²¹ The report illustrated that the acute care model (also known as the biomedical model) for disease management is an inadequate model to use for diabetes management, which is a lifelong, chronic condition, primarily managed by the patient living with diabetes. The BSRD group concluded that behavioral researchers should move beyond the focus on patients with diabetes and their families, and work towards examining larger societal and health care system issues that affect diabetes care.¹²¹ The BSRD working group proposed the Chronic Care Model (CCM) to instigate change in the health care systems' approach to diabetes management.¹²¹

Collaborative goal setting is a key component of the CCM.^{121, 122} The CCM focuses on organizational change to support a health care team-patient relationship and emphasizes evidence-based, collaborative and integrated care to meet the needs of patients. The CCM recommends utilizing long term support groups run by trained chronic disease patients themselves, rather than health care professionals. This approach can be adapted to any chronic condition. Recently, the CCM was used in a randomized controlled clinical trial in Pennsylvania with 119 mostly Caucasian older people (mean 69.7 years) with diabetes.¹²³ Piatt et al found participants had improvements in A1C, non-HDL cholesterol, and self-monitoring of blood glucose.¹²³ The CCM has been embraced by the diabetes research community and is now being used in many state-wide diabetes control programs across the country to improve diabetes outcomes, and patient satisfaction, and to reduce health care costs.^{121, 124, 125}

DIABETES EDUCATION IN WASHINGTON

The Washington State Diabetes Control Program oversees a number of activities related to diabetes prevention and control strategies throughout the state. Established activities include surveillance, the Washington State Diabetes Collaborative, the Chronic Disease Electronic Management System (CDEMS), National Diabetes Education Program (NDEP), Medicaid Reimbursement for Diabetes Education, and Chronic Disease Self-Management Support Network.¹²⁶ There are also numerous hospital and clinic-based diabetes education programs recognized by the American Diabetes Association located throughout the state. In 2004, 298,000 people in Washington had diagnosed diabetes; an estimated 126,000 people had undiagnosed diabetes, and another 963,000 had pre-diabetes.¹⁰ In a recent report, *The State of Diabetes in America*, the ADA and the American Association of Clinical Endocrinologists (AACE) found that 67% of respondents were not meeting the AACE guidelines of good diabetes control (hemoglobin A1C $\leq 6.5\%$).¹²⁷ Washington state ranked 12th at 68.4% of diagnosed patients not meeting the A1C guidelines, but ethnicity was not reported.¹²⁷

The Washington State Diabetes Control Program adopted the CCM for their state-wide diabetes collaborative in 1999. The Washington State Diabetes Collaborative began implementation in 2000 and is now in its fifth cycle. Qualis Health¹²⁸, describes the Washington State Diabetes Collaborative as, “a systematic, rapid-cycle approach to healthcare quality improvement. Clinic teams from across the state work together to improve the care of patients with diabetes or at risk for cardiovascular disease.”

CULTURALLY COMPETENT DIABETES EDUCATION

Due to the disproportionate number of ethnic minorities that are affected with diabetes, the American Association of Diabetes Educators (AADE) recently published a position statement in their journal, *The Diabetes Educator*.¹²⁹ The position statement, *Cultural Sensitivity and Diabetes Education: Recommendations for Diabetes Educators*, concludes that diabetes educators and their organizations need to evaluate and expand efforts to deliver culturally appropriate interventions in collaboration with communities. This statement illustrates the significant role that diabetes has in society today, and should be further fuel for researchers wanting to make contributions to the field.

There have been a number of studies designed to provide a culturally competent, patient-centered diabetes education experience for Latino patients.¹³⁰⁻¹³² The Starr County Health Initiative research study was a 4-year prospective diabetes educational intervention involving 256 Latinos with type 2 diabetes along a rural area of the Texas-Mexico border.⁹² After 52 contact hours over a 12 month period, Brown et al.⁹² found significant improvements in A1C, fasting blood glucose, and also higher diabetes-related health knowledge scores. Another large scale study with Latinos, the REACH project (Racial and Ethnic Approaches to Community Health), provided interventions to reduce the diabetes-related disparities among 165 Latinos and 393 other minority groups in the Seattle-King County area of Washington state.¹³⁰ REACH was evaluated with survey and focus group data, which showed that participants had improvements in diabetes-related health knowledge, improved self-efficacy, more frequent exercise, and better eating habits. *Project Dulce*, an educational intervention with 153 high-risk Latino diabetes patients in San Diego County, California, also reported improvements in clinical measures (A1C, cholesterol, and blood pressure), knowledge of diabetes, treatment satisfaction, and culture-based beliefs (e.g.,

“Eating *nopales* can cure diabetes”).¹³¹ These studies demonstrate that comprehensive, culturally competent diabetes education programs can produce beneficial outcomes among Latino patients.

Family and Gender Roles

Food plays a significant role in family, religious, and ethnic background. Many societies embrace food as part of celebration and ceremony, and use it as a way for people to convey feelings to one another. Fisher et al¹¹⁵ proposed less focus on the “self” part of self-management and more focus on the social environment of the family, friends and culture within which the patient with diabetes operates. In a review of 72 publications, Norris et al⁶² found short-term benefits of diabetes self-management education (DSME), but was unable to conclude the effectiveness of DSME in the long-term; Fisher et al¹¹⁵ attributes to lack of emphasis on the social environment of people living with diabetes. Focus group data from the Starr County studies indicates that there is a strong belief in that Latino population that diabetes cannot be controlled.¹³³ In their focus group and survey research with Mexican Americans in Arizona, Larkey et al¹³⁴ found that faith in God and seriousness of disease symptoms were both strongly related to health-seeking behaviors. In another focus group study with 40 Latino participants, Vincent et al¹³⁵ reported that family members’ support and understanding was critical for patients to maintain necessary lifestyle changes. A Spanish language family diabetes education intervention collaborative in association with the University of Arizona¹³⁶, *La Diabetes y La Unión Familiar*, targets family support, communication, and family health behaviors. The interventions were implemented by *promotoras* (lay health-outreach education workers) in two Arizona border communities with 72 Latino families (249 individual participants). Through pre- and post-intervention surveys

and focus group assessments of this program, Teufel-Shone et al¹³⁶ found positive changes in family members' knowledge, attitudes, behaviors, and beliefs relative to diabetes prevention and control.

There are also differences between genders in how Latinos manage their diabetes. Using diet as a primary treatment modality in the Starr County studies, male Latinos reported higher perceived control and social support compared to women.¹³³ Latino culture emphasizes cooperation rather than competition and family instead of self, which can make assessment of the effectiveness of diabetes education strategy challenging in this population.¹³⁷ These reports suggest a great need for culturally sensitive diabetes education programs that take into account family and gender roles.

Herbal Remedies and Folk Medicine

Informal observation by health care professionals in central Washington have supported the hypothesis that many Latino patients utilize herbal, folk, or home remedies to assist in their diabetes control.^{138, 139} In their review of the literature, Oomen et al¹³⁷ also reported that use of folk medicine is often overlooked by diabetes health care professionals when working with Latinos. In a more recent assessment of alternative medicine use among Southwestern Hispanics, Johnson et al¹⁴⁰ found that use of herbs was very common (91% of interviewed patients; 16% among randomly selected medical charts). Another group of in-depth interviews done in El Paso County Texas also found that most of the 22 Mexican-Americans interviewed used herbal remedies.¹⁴¹ Coronado et al⁷² conducted six focus groups with 42 Mexican Americans in the Yakima and Skagit Valleys of Washington state and found herbal remedy use common, often in conjunction with oral diabetes medications or insulin (numbers not reported). Some of the more common herbal remedies

often cited by Latino patients with diabetes include prickly pear cactus (nopal) and aloe vera.^{72, 142} Herbal remedies play an important role in Latino culture and these studies illustrate the importance of evaluating their use in any diabetes research with Latinos.

ISSUES AFFECTING SUCCESS WITH DIABETES EDUCATION

Quality of Life

Glasgow and Osteen¹⁴³ called for more focus on addressing quality of life in people with diabetes in the early 1990's. Rubin et al¹⁴⁴ describe quality of life as "physical and social functioning, and perceived physical and mental well-being." Numerous studies have addressed quality of life in many chronic diseases, including diabetes,¹⁴⁵⁻¹⁴⁸ but few have focused on Latino people.^{149, 150} In their examination of 223 Hispanics with non-insulin dependent diabetes and 753 Hispanics without diabetes, Caldwell et al¹⁴⁹ found that those with diabetes had a significantly lower quality of life than those without diabetes. Cultural factors confound measurement of quality of life and further research is clearly warranted in this area of diabetes research.

Barriers to Diabetes Care

Barriers to diabetes care hinder successful diabetes self-management and may include factors of language, finance, health care provider and patient interactions, and patients' personal beliefs, environmental situations, or psychosocial barriers. The theoretical framework for barriers comes from the Health Belief Model.¹⁵¹ Assessment of barriers to participation in education is a standard component of diabetes education¹⁵², and is typically performed by diabetes educators at the initial visit. Significant work has been done in diabetes research to better understand the impact of perceived barriers on glycemic

control,^{74, 121, 153-156} but there is much less research that has focused on Latinos.^{157, 158} Lasater et al¹⁵⁷ conducted telephone surveys and medical record data collection with 183 Hispanic type 2 patients from a public health care system serving low-income patients in Denver, Colorado. Included in their analysis was 58 providers' self-report of Spanish speaking abilities at the health care system. Although there was no difference between English and Spanish speaking Hispanics in glycemic control or other clinical measures based on medical record data, the Spanish speakers were much less likely to receive written materials during diabetes education. Lasater et al¹⁵⁷ also found that Spanish speaking patients who had been paired with Spanish speaking providers was beneficial to those patients. Lipton et al¹⁵⁸ conducted three focus groups sessions with 24 healthcare providers in the Chicago-area. Providers that participated in the focus groups reported that communication, financial/legal problems, and cultural barriers, including conflict of folk remedies with prescribed diet, were the primary Latino barriers to diabetes care.¹⁵⁸

Depression has been recognized as a barrier and comorbidity for many patients living with diabetes.¹⁵⁹ In a survey of 367 patients with types 1 and 2 diabetes, Ciechanowski et al¹⁶⁰ found that patients who were more depressed had poorer diet and medication adherence and higher costs associated with their care. Cherrington et al¹⁶¹ conducted eight 90-minute focus groups with 45 Latino adults with type 2 diabetes in North Carolina to investigate attitudes and beliefs about depression.¹⁶¹ Those patients who felt understood by their family members did better with their diabetes self-management.¹⁶¹ Fisher et al¹⁶² reported that depression among the 75 Latinos and 113 European Americans they surveyed was a result of multiple life issues and not just diabetes alone. Depression can be a powerful barrier to diabetes self-management for patients and should be evaluated at each visit.

Ineffective use of goal setting can be another significant barrier to achieving glycemic control, yet data examining the effectiveness of behavior change via goal setting is scant. Difficulties in meal plan adherence for preventing or treating diabetes are associated with barriers to change and other psychosocial factors, such as belief in one's ability to manage a chronic illness (self-efficacy) or perceived support from the family.^{90, 163, 164} Latinos and low-income people are even more at-risk for having significant financial and access barriers that hinder behavior change to manage diabetes.^{90, 158}

Physician and health care provider barriers can also interfere with diabetes care. Freeman and Loewe¹⁶⁵ did qualitative, semi-structured interviews with 17 physicians and 22 patients in an urban family practice clinic. They found¹⁶⁵ that physicians and their patients often had very disparate notions of "diabetes control" and this greatly affected patient-physician communication. Sprague et al¹⁵³ collected 163 surveys from Washington state area diabetes educators. Most educators (71%) believed that a major patient barrier to obtaining follow-up education was that patients felt they had adequate knowledge about managing their diabetes. Patients might receive comprehensive diabetes education upon diagnosis and not realize that DSME should be an ongoing event throughout their life – not just a one-time encounter.¹⁵³ Diabetes educators, physicians, and healthcare organizations may need to work to improve the understanding that diabetes education should be a regular event, just like other medical check-ups.

Regardless of the overwhelming evidence indicating that behavior change for the management of diabetes is effective, understanding how to best assist patients in making lasting behavior change continues to elude health care providers.^{166, 167} People with type 2 diabetes struggle in making long-lasting lifestyle changes and health care providers continue to struggle with helping their clients achieve them.

SUMMARY

Type 2 diabetes and its related long-term complications make a significant impact on the Latino community and the health care infrastructure. Recent research suggests a great need for culturally competent diabetes education programs for Latinos that take into account family and gender roles which are very important in Latino culture. The goal of this research was to examine the cultural relevance of goal setting for Latino patients with type 2 diabetes from a migrant/community health clinic, and to propose novel approaches to diabetes self-management that may lead to improved diabetes patient and program outcomes. Specific objectives of the project were:

1. to conduct a preliminary and qualitative study to identify experiences with goal setting and influences on goal setting among Latino and Caucasian patients with type 2 diabetes;
2. to utilize findings from the preliminary study to design a survey questionnaire for quantifying goal setting experiences related psychosocial influences and their relationships;
3. to suggest innovative approaches to education for diabetes educators serving Latino clients, appropriate measures for diabetes education program impacts, and future research to strengthen evidence-based diabetes education practice and associated goal setting education.

This dissertation presents two manuscripts; one presenting findings for objective 1, the second presenting results relative to objectives 2 and 3.

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MANUSCRIPT 1

QUALITATIVE EXPLORATION OF DIETARY GOAL SETTING STRATEGIES USED BY
LATINOS AND CAUCASIANS WITH TYPE 2 DIABETES

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ABSTRACT

This qualitative study investigated the goal setting process of dietary self-management in low income Latino and Caucasian clients with type 2 diabetes at a community health clinic. Individual in-depth interviews were conducted with 10 Latino and 8 Caucasian clients with type 2 diabetes. The interview schedule contained 36 open-ended questions, based on a conceptual framework of the goal setting process. Latino clients were interviewed in Spanish by a bilingual research assistant. All participants had attended diabetes self-management classes at the clinic within the last 18 months. Interviews gathered information on current and future goals, goal attainment, and factors influencing goals, including motivators and barriers. Content analysis was conducted and themes were identified. Current goal achievement strategies were often the same as future goal strategies for both groups, suggesting that diet-related goals are established early in the self-management process. Eating more non-starchy vegetables and reducing portion sizes were two examples of similar current and future goal strategies. Motivators to meal plan adherence included self-efficacy, religious beliefs, and social support for Latinos. Barriers to meal plan adherence for both groups included lack of will power and difficulty controlling portion sizes. Most Latino respondents wanted to continue or improve upon previously established goals, suggesting that follow up visits should review current goal achievement strategies and how to minimize barriers. Addressing problem solving ability to enhance dietary control in social eating situations is also important. Setting new goals at follow up education visits may not always be warranted.

INTRODUCTION

Type 2 diabetes has increased over the last 15 years among Latinos¹, who are at high-risk for having poorly controlled diabetes regardless of socioeconomic status.² For example, among persons with type 2 diabetes, health burden and poor outcomes have been shown to be more severe in Mexican Americans as opposed to African Americans or Caucasians.^{3, 4} The American Diabetes Association specifically recommends that health care providers work with Latino patients to enhance diabetes self-management and to improve patients' goal setting skills⁵ – these are skills that enable patients to identify feasible behavioral changes and implement them to improve glycemic control.

Educational approaches to goal setting that are effective with Latinos are needed.^{6, 7} Although goal setting education is presumed to provide all patients with skills to adopt self-management goals after diabetes education, we do not know if Latino patients adapt, change, or abandon their dietary goals following diabetes education. Although previous studies have identified personal and social barriers experienced by Latino patients when they try to adhere to specific meal plans,⁸⁻¹⁰ we do not know which barriers or motivating factors operate when patients make changes in their meal plans.

Derived from Social Cognitive Theory (SCT), goal setting represents the process of identifying behaviors the patient associates with valued outcomes (expectancies), greater self-efficacy (confidence to perform behaviors), positive reinforcement (e.g., motivators), and other psychosocial constructs presumed to maximize goal (behavior) attainment.¹¹ Goal setting skills provide clients with the tools for self-management that will be taken into real life after diabetes education has concluded. Initially, patients often set these behaviors in cooperation with their diabetes educator. Target behaviors can include meal planning, exercise, self-monitoring of blood sugar, and medication taking.

The behavior change strategies taught in diabetes self-management programs vary greatly and there is poor understanding of how patients may or may not use those strategies in achieving diet-related behavior change.^{12, 13} It is also unknown how patients may change these goals on their own after diabetes education, or what psychosocial factors are associated with a change in goals. In this research, the goal setting process is defined as those outcome behaviors targeted for change during diabetes education. This process requires that the patient establish new behaviors or modifications to current behaviors that are achievable and also promote glycemic control.

Meal planning is a cornerstone of diabetes self-management, yet adhering to a meal plan is the most challenging part of diabetes self-care for many patients.^{7, 14-16} Meal plan adherence is affected by psychosocial factors, potentially including belief in one's ability to manage a chronic illness (self-efficacy), and perceived support of family.^{17, 18} Barriers, a key psychosocial variable, represent psychological or environmental roadblocks that prevent patients from reaching their diabetes self-management goals.¹⁹ Barriers such as the perceptions that dietary instructions given by primary care providers are rigid and that healthy eating is more costly, requiring specialized foods, have been related to lower meal plan adherence.^{10, 20, 21} By contrast, support from a spouse or loved one has been shown to motivate meal plan adherence.^{10, 22}

Meal planning is a particularly difficult area of diabetes self-management for Latino patients²³⁻²⁵, in some cases related to the perceived need to restrict or modify certain traditional foods.^{8, 10} Self-efficacy can also be low among Latinos with type 2 diabetes, especially when dealing with problem-solving situations¹⁷, which often include meal planning. All of this suggests a great need for a more comprehensive understanding of diabetes diet-related goal setting used by Latino patients.

The purpose of this study was to use the in-depth interview method to examine dietary goal setting in Latinos and make comparisons to Caucasian respondents. The data in this paper represent a first step in gathering information on how Latino patients use goal setting, specifically in relation to diet, to control their diabetes. The objectives were: 1) to identify goal setting strategies used in diabetes self-management, including changes in foods and meal patterns, grocery shopping, and food preparation; 2) to describe motivators and barriers to dietary goals, strategies and meal plan adherence; 3) to identify similarities and differences in current and future goal strategies, and motivators and barriers between Latinos with Caucasians as a comparison group; and 4) to suggest approaches to nutrition education for Latino persons with type 2 diabetes.

DESIGN AND METHODS

The conceptual framework for this study was based on a review by Weber-Cullen et al²⁶ of the goal setting process as it relates to dietary changes. They describe goal setting as a process of steps: recognizing the problem (Step 1); setting a goal (Step 2); attempting a goal and self-monitoring (Step 3); and self-reward (Step 4). The present study focused on attempting a goal (Step 3) and the influences on those attempts: strategy formation, self-efficacy, barriers, and resources. This study also addressed the environmental factors that affect attempting a goal and self-monitoring, including social support and workplace issues.

In-Depth Interview Method

The in-depth interview was selected as the research method because it elicits in-depth discussion of goal setting with context. The clinic staff also felt that their clients would be most comfortable with a one-on-one interview. The study design and research methods

were approved by the Washington State University Institutional Human Subjects Review Board and the migrant health clinic administration.

Site Characteristics

The community/migrant health clinic that participated in the project has a population of nearly 500 patients. The clinic serves low-income clients in rural north central Washington State; 60% self-identified as Latino (including Hispanic, Mexican, or of Latin American ancestry) and 70% of those clients speak only Spanish. By clinic staff estimates, there were approximately 200 patients with diabetes who speak only Spanish. The clinic's diabetes education program is run by a registered dietitian and registered nurse; both certified diabetes educators are bilingual in English and Spanish. Diabetes education classes offered at the clinic vary in frequency from month to month due to seasonal work of the patient population. Classes vary in size from 4 to 11 clients. The clinic offers separate classes as needed in English or Spanish.

Participant Recruitment

All participants were recruited from the clinic using announcements made by educators in diabetes education classes. Interested individuals gave signed consent to clinic staff indicating their willingness to be contacted by a researcher. Screening criteria included: 1) diagnosed with type 2 diabetes after the age of 21, and 2) received diabetes education from the clinic within the last eighteen months. All participants recruited for the study were considered low-income. Of the 20 Latinos contacted, 12 agreed to participate. Two failed to come to the scheduled interview. Of the 11 Caucasians contacted, 9 agreed

to participate and 1 failed to come to the scheduled interview. Three Caucasian clients were recruited to pre-test the interview schedule and were not included in the final sample.

Interview Schedule

The interview schedule included a total of 36 open-ended questions. Table 1 shows the questions pertinent to this paper: 1) dietary strategies including changes in foods and meal patterns, grocery shopping, and food preparation (Q1); 2) barriers to managing diabetes through diet, including personal and family barriers (Q2-Q3); 3) motivators to managing diabetes through diet, including personal factors and family/social support (Q4-Q7); 4) use of non-traditional means to manage diabetes (Q8-Q9); and 5) environmental influences on diabetes self-management, including community members' response and workplace issues (Q10-Q11). The goal setting process was assessed as future steps towards managing diabetes and influences on those steps. A carefully staged set of questions were used to explore the idea of goal setting in the future, including future goals and the process patients anticipate using to achieve goals (Q12-Q17, Table 1).

A review of the literature^{27, 28} and input from local practitioners suggested that a social issue may occur novel to Latino communities: that when a Latina changes the family diet to support her diabetes meal plan, she may be perceived as "self-indulgent."²⁷ Fisher et al²⁸ have suggested that this belief may contribute to the higher rates of depression observed among Latinas with diabetes. Resnick et al²⁹ found that Mexican-American women met ADA standards of care for glycemic control less frequently, when compared to whites and blacks. Therefore, a question was included addressing this issue (Q18, Table 1).

Interview Protocol

Individual in-depth interviews were conducted at the clinic in the rooms used for counseling visits by the diabetes educators. One researcher (KBE) interviewed the Caucasian English-speaking clients (7 women, 1 man) and a bilingual research assistant interviewed 10 Latino clients (7 women, 3 men) in Spanish. The bilingual research assistant is a native Spanish speaker and a certified interpreter by the Washington State Department of Social and Health Services. All interviews took an average of forty minutes. All participants were compensated for their time with a \$25 gift certificate to a local grocery store. Demographic information was obtained through a 6-item addendum to the interview schedule and asked at the conclusion of the interview (Table 1).

Data Analysis

Interviews were audio-recorded and later transcribed. Interviews done in Spanish were audio-translated into English by the original interviewer soon after the interviews took place, and then transcribed from the English audio recordings. Content analysis³⁰ was performed to elicit common themes from the interviews. Two of the authors (JAS and KBE) performed content analysis jointly on one transcript to develop an analytical framework of categories. Both researchers then independently conducted a second analysis on a new transcript for an inter-rater reliability coefficient 0.68. One author (KBE), with the assistance of two other graduate student assistants, conducted the remaining content analysis.

RESULTS

Participant Characteristics

The final sample included Latino (n=10) and Caucasian (n=8) males and females ranging in ages from 34 to 69 years (mean age = 53, Table 2). One Latino and two Caucasians reported diabetes management with diet alone; others used combination therapy of oral medications with or without insulin (9 Latinos, 6 Caucasians). Nine participants had children living in the home, and 11 participants were married. Most participants had some form of medical coverage for their diabetes (Medicare, Medicaid and/or private insurance). The participants who had no health coverage were Latino (n=6). Eight Latinos were married compared to only three Caucasians.

Grocery shopping and food purchasing

Both groups reported buying more non-starchy vegetables, using fewer ready-to-eat foods, and purchasing more high fiber foods. Strategies reported by Latinos included buying more food to prepare and eat at home, buying more vegetables and fewer sweets, and purchasing 2% milk, instead of whole milk. Caucasian strategies included buying in smaller portions, buying “more healthy foods” such as vegetables and fruits, and choosing 100% whole wheat bread.

Food preparation and consumption

Most respondents mentioned using lower fat cooking methods and preparing food in smaller portions to avoid overeating. Latinos reported increasing their consumption of non-

starchy vegetables, and also limiting use of lard: “Now I eat whole beans [instead of refried]. We don’t use lard anymore. I use little oil. I cook with more vegetables like broccoli and cabbage.” One Caucasian respondent stated, “I’ll only cook enough for what we’re supposed to eat.”

Reducing intake of carbohydrate foods was reported by both groups as an important goal achievement strategy for improving glycemic control. For Latinos, reducing the number of tortilla servings was a common strategy used: “I only eat 4 or 5 tortillas almost always at dinnertime. I used to eat a lot” [Latino respondent]. Caucasians reported using high fiber foods more often since their diagnosis of diabetes, as stated by this respondent, “There aren’t any foods that I don’t eat, I just eat different amounts of certain things and cut down on the amount of carbs.” Both groups reported restricting “sweets” and “desserts,” as this Latino participant indicated: “I am inhibited about eating and drinking lots of foods, like Coke and Pepsi. I have been inhibited since finding out I have diabetes and I no longer eat pig.” One Latino also reported eating less fruit to aid in diabetes control.

Eating away from home

Latinos reported trying to eat more vegetables when away from home. Eating smaller portions was also reported by both Latinos and Caucasians. One Latino respondent said, “I eat less...if it’s Chinese food I look for a little rice and a little salad.” When eating out at restaurants, Caucasians reported that they would try to take food home or be sure to leave food on their plates to avoid overeating: “If I go to a restaurant, I try to stick to portions because [restaurant] portions are always bigger. I always make sure

there's food left on the plate when I get up, where before it was like 'if I have to pay for this I'm going to eat it.' ” [Caucasian respondent]

Barriers to meal plan

Lack of will power was reported by both groups as a barrier to meal plan adherence. One Latino said, “One has to have a lot of will power when people put things in front of you that you shouldn't eat.” Struggling with reading food labels was mentioned by only 1 Latino respondent: “I look in stores and I can't find everything I need...I can't read the labels on the food packages.”

Specific barriers with eating away from home were mentioned by Latinos, including having difficulty refusing food when at social gatherings. They did not want to offend their friends or family by refusing food that had been offered to them. One Latino respondent reported, “When I eat outside of the house, I eat a bit more because I am ashamed of saying 'no' because I feel sorry and I don't want to say no.” Latinos reported eating more than their meal plan allowed when they were eating away from home: “I eat more than I should when I am away,” and another Latino responded, “I eat at my sister's house after church and I usually eat more than I should there.”

Personal and Social Motivators to the Meal Plan

Motivators to meal plan adherence in this research revealed two domains: internal or personal motivators (e.g., self-efficacy) and external or social motivators. Social motivators may include support or encouragement from family, friends, or health care providers.

Personal motivators to meal plan

Knowing that following their meal plan would help their overall wellbeing was important for Latinos. This respondent exemplified the responses of the Latino group: “If I abandon what I am doing then my blood sugar will go up and if I feel a lot of grief, then my blood sugar changes. If I don’t take care of myself I will get sick and die faster...I educated myself about diabetes because my mother and sister both died of diabetes, so I take care of myself.”

Several Latinos reported that their religious beliefs encouraged them to not only follow their meal plan, but also follow all diabetes self-care regimens as directed. They mentioned that having diabetes discussed at church made them feel better about having diabetes and made them feel as though God wanted them to succeed. One Latino said, “I should get education and take care of myself for God.”

Social motivators to meal plan

For both groups, support from family, friends and health care professionals were important motivators to make changes for improved glycemic control. This support system was also valued for helping the respondent stick to their diabetes meal plan. All clients expressed that they had a good relationship with the health care providers at the clinic and relied on them for their input and praise. One Latino respondent indicated how important support from family can be, “My family offering me support in what I eat is helpful.” A Caucasian respondent said, “When my doctor tells me when I’m doing good, that peps me up. It helps to have a friend who also has diabetes and is trying to lose weight.”

Use of herbal or folk remedies

Most of the Latino respondents (n=8) reported using nopal as a supplement to their standard diabetes medications. Other herbal remedies include pineapple, maguey (*Agave americana* or Century Plant), *Aloe vera* and cat's naval. One Latino respondent reported that she purchases and eats nopales, but did not identify it as an herbal or home remedy. Another Latino stated, "If it doesn't harm me, I would take any home remedy. [The healer] gave me something to drink, but I didn't like it, so I didn't drink it."

None of the Caucasian respondents reported using herbal remedies, but did use vitamin preparations. The following Caucasian respondent replied, "I don't trust half the herbs...I don't know what they'd do...I'm on so much medication now that I don't want to try anything out there that's new without my doctor telling me it's okay."

Experiences with diet or exercise-related goal setting (future goal strategies)

When asked if there were changes they wanted to make in the future, approximately one-half of the respondents reported diet (4 Latinos, 5 Caucasians) or exercise-related changes (5 Latinos, 5 Caucasians). Both groups reported that they would use dietary strategies such as reducing portion sizes and increasing consumption of non-starchy vegetables. One Latino respondent explained, "...it used to be that I wanted to taste everything and I told myself well, just a little bit of that, well, I have to learn that I can't eat everything...little by little I have established goals, and slowly I am achieving those goals."

Reported future goals were the same as current goal strategies for four out of 10 Latinos and five out of 8 Caucasian respondents (Table 4). A Caucasian client reported, "I want to get my diabetes under control by the eating process that I have...just cutting back on [what I eat] and getting on those half portions...just cutting back on the quantity that I'm

having.” For other future goals, Caucasians wanted more clinical indicators of diabetes self-management success such as knowing their A1C and achieving weight loss. Four Caucasians wanted to lose weight but only one Latino reported weight loss as a desired future goal. Several Latinos (4 out of 10) wanted to feel better overall, aside from glycemic control and clinical outcomes related to diabetes. In contrast, no Caucasians mentioned an overall improvement in well-being as a future desired goal (Table 4).

Internal reinforcements (self-efficacy) were expressed by Latinos and Caucasians as an important factor in staying motivated to follow the diabetes meal plan. A Latino respondent stated, “...by establishing goals and following them, it slows down the sickness.” However, lack of self-efficacy also impacts diabetes self-management as indicated by another Latino respondent, “I would put myself in the doctor’s hands so he would tell me what way to make changes because I do not feel capable to say ‘Well, I’m gonna do these changes on my own.’ ”

Both groups talked about increasing physical activity as an important method in achieving diabetes control (9 out of 10 Latinos, 6 out of 8 Caucasians, Table 4). One Latino respondent described the process she would use for increasing her physical activity: “I established a goal that this month I would start walking and then the first day I started the children came with me, we decided to walk afternoons, the first day we walked 10 minutes, then we decided we’d walk for a ½ hour or an hour.” One Caucasian participant described an exercise goal that had helped her lose 144 pounds: “I do that 10,000 step program where I take 10,000 steps a day, count my steps...I do a lot of exercising...a lot of water activities...”

Attitudes towards Latinas who want to lose weight

Latino respondents unanimously felt that Latinas needing to lose weight and change their eating habits for better diabetes control were not being selfish, epitomized by this response: “They are not being selfish if they are trying to lose weight in order to better their lives. They’re being positive about their lives. They are fighting for the health of their bodies.”

DISCUSSION

Current goal strategies tended to be the same as future goal strategies for both groups, suggesting that diet-related goals were established and habituated for these patients who were interviewed within 18 months of diabetes education. Most respondents reported wanting to continue the current goal strategies they were practicing, only with greater regularity or frequency.

Among motivators to making and maintaining dietary goals, family support was integral for Latinos. Weller et al³¹ investigated different Latino groups across four distinct geographical regions, and concluded that diverse Latino groups would benefit from family involvement in diabetes education. In the development of a culturally competent diabetes education program in Starr County, Texas, Brown and Hanis³² reported that Mexican American focus group participants desired involvement of family and the local religious community in their diabetes education.

The findings of this study are consistent with other research indicating that handling social pressure and incorporating traditional foods into the diabetes meal plan are core cultural issues for many Latinos. Latino respondents reported adjusting use of traditional

foods on their own, such as reducing tortilla consumption, using corn oil instead of lard, and eating fewer high-fat meats. In studies on the REACH (Racial and Ethnic Approaches to Community Health) 2010 program, Garvin et al³³ found that focus group participants reported difficulty saying “no” to family and friends who wanted them to eat foods that were not appropriate for diabetes control, especially during social events. In focus groups with Latino patients with type 2 diabetes and their family caregivers, Vincent et al¹⁰ reported that participants found it difficult and confusing to modify the typical Latino diet; those participants who believed they were giving up foods they liked reported feelings of frustration.

Self-efficacy was an important motivator in these findings. Research has demonstrated that improving patient self-efficacy is crucial to improving diabetes self-management outcomes.^{25, 34-36} In their study of 408 ethnically diverse patients with type 2 diabetes (18% Asian/Pacific Islander, 25% African American, 42% Latino/a, and 15% white), Sakar et al³⁵ found that self-efficacy was positively related to diabetes self-management outcomes across ethnic groups. Both Latinos and Caucasians reported that specific factors helped their self-confidence, such as receiving praise from health care providers and loved ones, and a perception of feeling healthier.³⁵ Notably, patients across all ethnic groups had better adherence to diet and other areas of self-management for each 10% increase in self-efficacy.³⁵ Lorig et al³⁷ has also shown self-efficacy to be an important component of the successful Spanish-language chronic disease self-management program, *Tomando Control de Su Salud*. That program includes extensive teaching on culturally appropriate portion control and meal planning and has been well-received by Hispanic participants.^{37, 38}

Portion control and reducing use of high-fat foods were common strategies reported by both groups in this study. In their analysis of the NHANES III data, Nelson³⁹ et al found that fat intake was higher than recommended in Mexican Americans with diabetes. Brown et al⁴⁰ found significant reductions in A1C and fasting blood glucose levels, and higher diabetes knowledge scores in their culturally competent diabetes self-management intervention with 256 Latinos. Cooking demonstrations including healthy adaptations of traditional Mexican American dishes were included as part of the intervention, suggesting that portion control and modified fat intake are appropriate dietary goals for Latino clients.

In the study reported here, Latino interviews revealed use of herbal remedies, which is consistent with other studies showing that Latinos with diabetes often use herbal or traditional remedies in addition to modern medicine.⁴¹⁻⁴³ In a small study of 22 older Mexican Americans along the US-Mexico border in Texas, Poss⁴⁴ et al reported that it was common for these individuals to use herbal remedies, often without telling their medical doctor. A comprehensive review of Mexican herbal remedies by Andrade-Cetto and Heinrich⁴⁵ reported that many of the popular remedies are effective hypoglycemic agents indicating a need to specifically assess use of herbal remedies in Latino clients with diabetes, including possible use as food ingredients.

The results of this small, qualitative and comparative study limit generalization to larger or more diverse groups. The study was cross-sectional in design; participants were not followed prospectively to monitor changes in goals or degree of goal attainment. Levels of acculturation or English literacy were not assessed in this study and may be important factors in goal selection and achievement. The study did not address ability to read food labels, which could substantially impact food choice. Glucose self-monitoring and medication-taking practices were not assessed in-depth, and could partly explain motivators

or barriers to following dietary guidelines. Clinical measures such as A1C, cholesterol or blood pressure were not evaluated in this study and could be used to estimate diabetes control and risk of complications among study participants.

IMPLICATIONS FOR DIABETES EDUCATORS

These findings have several practical implications for diabetes educators. Emphasizing overall well-being as a result of diabetes meal plan adherence, rather than just improved clinical outcomes, may be a powerful approach for educators working with Latino clients. Because most Latino and Caucasian respondents established dietary goals and strategies as a result of goal setting education, setting new goals at follow up education visits may not always be warranted. Spending valuable education time at follow up visits on reviewing current goal achievement strategies, providing encouragement and reducing barriers is essential. Discussing how to revise or modify current goal strategies may also be a useful tool for those clients struggling with goal achievement. Intensive hands-on portion control education would likely be useful, as portion control was a common challenge among the Latino participants in the study reported here. Cooking demonstrations that include family members could give positive reinforcement to a “whole family” approach to diabetes self-management, showing family members and clients with diabetes that healthy portions and traditional foods can fit within a diabetes meal plan. Both groups reported increased use of non-starchy vegetables as current and future goal strategies, suggesting that this could be a dietary goal easily adapted by most clients, regardless of ethnicity. Future research could include in-depth interviews or focus groups to elicit “stories” about the goal setting process, tracking goal progress prospectively with a series of checks such as “same

goal,” “revised goal,” or “made new goal”, and closer examination of goal selection and achievement for patients on diet therapy alone versus medication or combination therapy.

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Table 1 Pertinent Questions from the Interview Schedule

- Q-1. Do you eat differently now that you know you have diabetes? How?
- Q-2. What makes it hard for you to follow your diabetes food plan? What makes it easy?
- Q-3. What problems do you think you might have with trying to follow a food plan?
- Q-4. When you think about changing the way you eat for good control of your diabetes, who would help you? How about family members?
- Q-5. If you wanted to improve your diabetes control, who would be involved? What about family members? Friends?
- Q-6. Whose praise or support do you need to feel successful in controlling your diabetes with a food plan?
- Q-7. How could a health care or medical professional help you, if at all, to better control your diabetes?
- Q-8. Sometimes people use home remedies, like cactus or parsley, to help control their diabetes. What remedies do you use? How do you use it?
- Q-9. Have you seen a healer – a curandero – for help with your diabetes? After you saw the healer, did your diabetes control change?
- Q-10. For people who know that you have diabetes, what do they say about what you are doing to control your diabetes? Are things they say important to you? Why are things they say important to you?
- Q-11. Do you work outside your home? How does your job affect your diabetes control?
- Q-12. Besides making changes in how you eat, what else would you do to gain control over your diabetes?
- Q-13. What changes, if any, do you think you want to make to improve your diabetes control? Why?
- Q-14. How did you decide on those changes?
- Q-15. How would you begin to make these changes?
- Q-16. Who would you want to help you make the changes?
- Q-17. Are there any roadblocks or things that would keep you from making those changes?
- Q-18. Some Latinas with type 2 diabetes are told by their doctor that losing weight could help them control their blood sugar better. If these women want to make changes in their diet to help with losing weight, do you think they are being selfish? Why? Why not?

Demographic Q1. Gender?

Demographic Q2. What is your current age?

Demographic Q3. How old were you when you were diagnosed with diabetes?

Demographic Q4. Do you have a spouse or partner living with you?

Demographic Q5. Do you have a child or children in the household? If Yes, how many?

Demographic Q6. Do you have health insurance that covers your diabetes care? If yes, can you tell me if you have Medicaid, Medicare, the state's Basic Health Plan, or private insurance?

Table 2 Respondent Characteristics

	Latino n=10	Caucasian n=8
Male	1	1
Female	9	7
Age range		
20-29	0	0
30-39	0	3
40-49	2	0
50-59	5	5
60-69	3	0
70-79	0	0
Diet controlled	1	2
Oral medication	9	5
Insulin*	2	5
Health Coverage [§]		
State Medicaid	4	5
Medicare	4	3
Private Insurance	0	2
Unknown	4	0
None	2	0
Those with children in household	5	4
Married	8	3

*One Caucasian reported only insulin therapy without oral medication; all other respondents were managed with combination therapy of insulin and oral medications, or oral medication alone.

[§]Some clients have a combination of types of medical coverage, so health coverage does not necessarily equal number of participants.

Table 3 General Themes from In-depth Interviews

Theme	Latinos	Caucasians
Grocery shopping and food purchasing	<ul style="list-style-type: none"> • buy more food for eating at home • more vegetables • less beef • less sweet foods • use 2% milk • less prepared foods • less fats/oils 	<ul style="list-style-type: none"> • purchase more vegetables • leaner meats • higher fiber • read labels • pay closer attention • buy in smaller amounts • buy low fat foods
Food preparation and consumption	<ul style="list-style-type: none"> • less sweets and desserts • diet soda pop instead of regular • less tortillas • choose smaller portions • eat more greens and vegetables • eat less pork and beef • avoid alcohol • less fruit • more nopale • eat more fish 	<ul style="list-style-type: none"> • less sweets • less carbs • eat breakfast • eat 6 small meals • avoid fatty/fried foods • less red meat • eat out less • don't eat after dinner • don't eat in a hurry • eat three meals a day
Eating away from home	<ul style="list-style-type: none"> • try to eat vegetables • eat less 	<ul style="list-style-type: none"> • always leave food on the plate • ask how foods are prepared • say "no thanks" • try to stick to portions
Barriers to meal plan	<ul style="list-style-type: none"> • feeling hungry • inability to read food labels • difficulty sticking to small portions 	<ul style="list-style-type: none"> • family members not eating the same way • lack of will power to maintain portion sizes • difficulty with planning ahead

	<ul style="list-style-type: none"> • lacking will power when friends/family offer foods • not being able to eat sweets and tortillas • can't say no to people offering food • eat more than I should when away from home 	<ul style="list-style-type: none"> • difficulty saying no to less healthy foods • history of poor eating habits • difficulty with regulating meals and snacks • friends want to help but have wrong information • lack of information (how to prepare vegetables, use low fat foods, shop in grocery store)
Social motivators to meal plan	<ul style="list-style-type: none"> • encourage/support from family/spouse • family members accepting lower fat foods • family eating the same way client eats • grocery stores having large selections of healthy food • support from healthcare provider (MD, CDE, etc). 	<ul style="list-style-type: none"> • spouse/family members encouragement • sharing cooking/food ideas with friends who have diabetes • family/spouse assisting in healthy food preparation • praise from physician, diabetes educators • diabetes magazines
Personal motivators to meal plan (self-efficacy)	<ul style="list-style-type: none"> • reducing symptoms of diabetes • eating more fruits and vegetables because they are good for my health • family supports healthier food choices • knowing that I will always need to follow this meal plan to live healthy with diabetes • following meal plan will help me to become healthy and feel good • following goals slows down the sickness • it has been very easy for me to follow my food plan 	<ul style="list-style-type: none"> • need/want to lose weight • increased food knowledge • desire to feel healthy • want to reduce the amount of medicine/insulin • knowing my A1C • following the meal plan gets easier over time • all foods can fit into plan • eating is more healthy now than when first diagnosed

	<ul style="list-style-type: none"> • stick to plan “for God” 	
Use of herbal or folk remedies	<ul style="list-style-type: none"> • nopal (prickly pear cactus) • pineapple • maguey plant • herbal remedies are ok to use as long as they don't cause harm • don't use herbal remedies without doctor permission 	<ul style="list-style-type: none"> • multivitamin • flax oil • don't know much about herbal remedies • don't trust herbs • only takes what medications the doctor says to take
Experiences with diet or exercise-related goal setting	<ul style="list-style-type: none"> • start slow and work up to doing more exercise • formulate guidelines for myself to eat less and work up to that 	<ul style="list-style-type: none"> • adding more exercise gradually • planning ahead more • weight loss goals including surgical options
Attitudes towards Latinas who want to lose weight	<ul style="list-style-type: none"> • they are doing what is best • it's better for the family if the woman is healthy and able to control her diabetes 	<i>Latino only</i>

Table 4 Current and Future Goal Strategies

Respondent ††	Treatment	Current goal strategies	Future goal strategies
LR #1	Pills	Avoid desserts/sweets/cakes; avoid sugared water; avoid sugared pop [only uses diet pop]; eat lettuce and carrots	Walk; I would make the changes they ask me to make; be with my family; feel less sad; worry less; not to eat too much or too often
LR #2	Pills	Eat more vegetables; drink diet soda; buy more vegetables; eat chicken without skin; eat less fat; eat small portions	Do more exercise; eat less; feel better
LR #3	Diet	eat more greens, more vegetables, and fruits; buy more food to eat at home now; eat smaller portions	do more exercise
LR #4	Pills	just eat corn flakes, no sugar, and a little bit of 2% milk and nothing else; Before I used to eat 6 or 7 tortillas, now I only eat one; buy more food to eat at home; I walk for half and hour in the morning and 15 minutes at midday, and 15 minutes at night.	walk a lot; do daily exercise; continue my diet and do exercises
LR #5	Pills	I eat less; now eat vegetables, juices, no Coke, and juices without much sugar; now I only do fish and a little beef, not much; Now we only use corn oil; I used to eat a lot of tortillas, but now I only 4 or 5 tortillas almost always in the afternoon at dinner time; I always walk in the afternoons; avoid coke	Always walk and to take the medicine that has been prescribed
LR #6	Insulin pills	+ eat very little; I have to buy just greens, just vegetables; I cannot eat anything outside [my house]; buy only things without sugar; very little sugar in milk; whole wheat bread; eat fruit with little sugar	None mentioned except: do what the doctor tells me to do

LR #7	Pills		less fat and more greens and vegetables, whole beans and nopalitas; use more vegetables and less oil; eat less of everything; eat more vegetables, nopales, broccoli, cabbage, all those types of vegetables	I would try to avoid eating a lot. Drink a lot of milk, not too much; eating less of everything; walk more
LR #8	Insulin pills	+	Eat less; drink water or diet pop; use less sugar in the food I cook; not using lard anymore; use 2% milk;	Exercise more; lose weight; feel well; not be sick anymore from high blood sugar
LR #9	Pills		I just eat when I'm hungry	Eat more vegetables like carrots, broccoli, green vegetables; do more activity
LR #10	Pills		Eat lots of green vegetables; eat very few tortillas; drink diet drinks; drink 2% milk; walk a little bit; eat less fruit; eat very little pork	Walk more; feel better
CR #1	Insulin pills	+	Eat smaller quantities of foods; variety of foods [buy more "healthy foods"]; more vegetables, more fruits	I would eat more vegetables; prepare veggies ahead of time; lose weight; reduce the amount of medication I take; eat smaller portions of food
CR #2	Insulin		Less sweets, less goodies; more vegetables; more soups and salads; lower-fat meats like skinless chicken or pork chops; eat more vegetables and fruits	Less fried foods; exercise; watch my diet closer
CR #3	Insulin pills	+	Fewer carbs; eat at different restaurants	Exercise; test my blood sugar more; eat smaller portions so I can take less insulin; lose weight
CR #4	Insulin pills	+	More vegetables and salad; use the George Forman grill	Eat better and smaller portions; test my sugar; exercise more than I do now; maintain my shots and sugar [take my insulin as directed and keep my glucose in good control]; watch my food; less potato chips; less fatty foods

CR #5	Pills	Buy the same food but cook differently; more vegetables; less meat	Exercise more; eat more fresh veggies; get gastric bypass surgery; keep my weight down
CR #6	Diet	Eat more [frequent] meals; eat in the morning; stick to portions when eating out; more vegetables; buy in smaller portions; cook in smaller portions; relax while eating; read food labels; weight loss; I do a lot of water activities;	Test my blood; more water-walking; continued weight loss; more exercise; pay attention to what my doctor says
CR #7	Diet	Try to eat more fruits and vegetables and avoid refined sugars; read food labels; cut back on red meat; eat more organic foods	Add more exercise; buy food and eat what I'm supposed to without even thinking about it; get on a better exercise plan; eat better
CR #8	Insulin pills	+ More organizing/planning; eat out less; eat breakfast; eat at the same time everyday; don't eat after dinner; eat every 3 hours; eat less chips; read/research more[about food/nutrition/diabetes]; don't buy chips; pre-prepare vegetables; avoid sugar; less bread/tortilla products; eat leaner meats; eat fish/chicken 3 times a week; exercising a lot; use mozzarella instead of cheddar cheese; brown rice instead of white; eat low glycemic foods	Take my medicine; follow my meal plan; keep up with doctor appointments; exercise 6 days a week; lose weight

[¶] LR = Latino Respondent

[†] CR = Caucasian Respondent

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MANUSCRIPT 2

BEHAVIORAL INFLUENCES ON DIETARY GOAL ATTAINMENT AMONG LATINOS AND CAUCASIANS WITH TYPE 2 DIABETES

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ABSTRACT

Dietary goal setting among Latinos with type 2 diabetes was investigated using a 40-item questionnaire. The questionnaire was administered on-site to male and female Latino (n = 50) and Caucasian (n = 50) patients with type 2 diabetes recruited from a community migrant health clinic. Patients had received diabetes education (DE) with goal setting within 18 months of the study. Overall, the sample was obese (mean BMI = 34.5 ± 6.9 kg/m²) with inadequate glycemic control (mean A1C = $8.3 \pm 2\%$). Latino patients were more likely to receive a food plan from a health care provider and reported greater perceived influence on overall diabetes management (DM) goals and greater DM goal attainment. Almost all patients (93%) selected food plan changes during DE as an area they would address for diabetes self-management. Ordinal logistic regression models were run for three dependent variables representing different dietary outcomes of diabetes education: stage of change for a food plan, food plan adherence, and goal attainment for a food plan. Model results suggested: 1) that food plan satisfaction needs to be a focus during DE; 2) that more patient involvement in choosing final food plan goals during DE increases food plan satisfaction and is associated with food plan adoption; 3) that dietary changes may start out as complex but may simplify over time; and 4) the patient's self-evaluation of food plan goal attainment has a different basis than food plan adherence. Future research is needed to validate the dietary outcome measures used in this study so that the measures can be used by diabetes education programs for patient assessment, monitoring, and evaluation.

INTRODUCTION

Approximately 2.5 million or 9.5% of Hispanic and Latino American adults have been diagnosed with diabetes.¹ Mexican Americans are 1.7 times as likely to have diabetes as non-Hispanic whites of similar age.¹ Additionally, Latinos with diabetes are at higher risk than non-Hispanic whites for functional impairment secondary to poorly controlled diabetes.² Latinos are also more likely to have undesirable outcomes related to inadequate diabetes self-care, regardless of socioeconomic status.^{3, 4} Type 2 diabetes prevalence has been described as an epidemic among minority populations and those living at low socioeconomic status^{5, 6}, and is predicted to increase beyond 20% among adult Hispanics by 2031.⁷ Adherence to diabetes self-management training principles, particularly meal planning and goal setting, is key to reducing comorbidities and poor health outcomes in all populations with type 2 diabetes. However, the level of success with goal setting and achieving dietary goals is understudied in the Latino population. Therefore, the intention of this research was to gain insight into the dietary goal setting process among Latinos with type 2 diabetes.

Meal planning is a cornerstone of diabetes self-management and is considered a “step-1” approach by physicians for improving blood glucose control and beginning moderate, safe weight loss.⁸ Effective dietary self-management can delay the need for medications as well as the onset of complications, resulting in a more economically feasible disease management system.⁹ However, research indicates that meal plan adherence is considered the most challenging part of diabetes self-management.¹⁰⁻¹³ Meal plan adherence is affected by psychosocial factors, potentially including belief in one’s ability to manage a chronic illness (self-efficacy), and perceived support of family.^{14, 15} Dietary instructions given by primary care providers that are perceived as rigid by patients have

been associated with reduced meal plan adherence.¹⁶ Some patients who report lower adherence to a meal plan indicate that they believe healthy eating is more costly, requiring specialized foods.¹⁷ By contrast, social support from a spouse or loved one has been shown to improve meal plan adherence.¹⁸

Latino patients also have difficulty with meal planning in diabetes self-management partly because of the need to restrict or modify certain traditional foods.¹⁹⁻²¹ Self-efficacy can be low among Latinos with type 2 diabetes, especially when dealing with problem-solving¹⁵, which is key to effective meal planning. With improved understanding of the way Latinos approach dietary change to control diabetes, and the personal, social, and other influences associated with changes they make, diabetes educators will be able to conduct more effective diabetes education and contribute to improved meal plan adherence and glycemic control in Latinos with type 2 diabetes.

A key component of diabetes self-management includes goal setting. Goal setting is a common tool used with most behavior modification counseling techniques; yet, it is not well-evaluated in the nutrition and diabetes literature. Goal setting is part of the educational approach used in diabetes education programs, and involves establishing new behaviors or modifying current behaviors to promote glycemic control. These behaviors can include meal planning, exercise, self-monitoring of blood glucose (SMBG), and medication taking. These new or modified behaviors are set by the patient in cooperation with their health care provider. However, it is clear that poor adherence to self-care goals contributes to poor diabetes health outcomes.^{19, 22, 23} Processes used by the patient during goal setting, subsequent self-care behaviors, and the resulting impact on diabetes control have not been examined. The American Diabetes Association (ADA) also specifically recommends that health care providers work with Latino patients to enhance diabetes self-management

education and goal setting skills. Better understanding of the goal setting process related to managing a meal plan has the potential to enhance Latino patients' preparedness to attain goals after education, improve self-care and glycemic control, enrich quality of life, reduce long-term complications, and minimize health care costs. Better understanding of the process of goal setting may lead to earlier and greater levels of attainment with the behavior changes required for successful management of type 2 diabetes.

There is a great need for culturally competent diabetes education programs taking into account family and gender roles, religious beliefs, and food preferences.²⁴⁻²⁸ Focus groups with Latino patients in Starr County, Texas suggested that participating Latinos held a strong belief that diabetes cannot be controlled.²⁷ In focus group and survey research with Mexican Americans, Larkey et al²⁹ found that faith in God and perceived seriousness of disease symptoms were both strongly related to health-seeking behaviors. Use of folk medicine is often overlooked by diabetes health care professionals when working with Latinos.³⁰ A focus group study with Mexican Americans in Yakima County³¹ reported a popular practice of using herbal remedies such as prickly pear cactus and *Aloe vera* in conjunction with Western medicine. For providers working with both Caucasian and Latino patients with type 2 diabetes, tailoring educational delivery in a culturally appropriate manner is valuable for obtaining support for program development and optimizing outcomes among these two different groups.

OBJECTIVES

Although the long-term goal of diabetes self-management education is to improve patient health status, the intermediate goal is behavior change.³² Eating is a complex set of behaviors and measurement of dietary behavior typically relies on patient self-report;

therefore, the effects of diet on glycemic control are difficult to estimate. Moreover, randomized controlled trials have indicated that educational and behavioral interventions only produce modest improvements in glycemic control among people with type 2 diabetes.³³ Therefore, the objectives of this project were:

- 1) To assess goal setting and self-management behaviors related to diet used by Latino and a comparison group of Caucasians;
- 2) To assess psychosocial influences on diabetes diet self-management and goal setting, including self-efficacy, barriers, and social support;
- 3) To assess similarities and differences in diabetes dietary self-management between Latino and Caucasian Americans;
- 4) To identify methods that can be used by diabetes educators for enhancing goal setting with Latinos, including measures of goal attainment.

METHODS

Survey Sample

This study sampled Latinos and Caucasians with type 2 diabetes who received medical care at a migrant community health clinic in Yakima County, Washington. Yakima County has approximately 39% persons of Hispanic or Latin origin, while Washington state has approximately 9% of persons of Hispanic or Latin origin.³⁴ The clinic's mission is to improve the quality of life for the underserved – a largely low-income, low-literacy, Spanish-speaking population in Yakima. At the time of the study, the clinic's Chronic Disease Electronic Management System (CDEMS) database had 829 clients with diabetes; 503 (61%) patients were self-identified as Hispanic or Latino. Approximately 422 (51%) of the diabetes patients were Spanish speakers. Twenty-six percent of Latino clients with

diabetes were described as migrant or seasonal patients. A sample of 100 individuals was selected from the site, with 50 Latinos and 50 Caucasians as a comparison group. All research procedures were approved by Washington State University's Institutional Human Subjects Review Board and the migrant health clinic administration.

Respondents were recruited using the migrant community health clinic's Chronic Disease Electronic Management System (CDEMS) database, which is designed to assist medical providers and management in tracking the care of patients with chronic health conditions. A query was run with specific criteria to select for Latinos or Caucasians with type 2 diabetes, at least 21 years of age, who had diabetes education within the last 18 months. This query generated a sample pool. Then clinic staff conducted interval sampling by calling every 5th person listed. Respondents were contacted via telephone by clinic staff and scheduled for a survey session.

Survey Questionnaire Development

The survey questionnaire was developed using preliminary data collected from Latino and Caucasian type 2 diabetes patients at a different migrant community clinic in the central Washington region.³⁵ The two clinics are very similar in patient demographic characteristics, including percentages of Latino and Caucasian patients, Spanish vs. English speaking patients, and profile of patient socioeconomic status.^{36, 37} The goal of the preliminary research was to identify dietary goal setting strategies, motivators and barriers to achieving dietary goals, and perceptions about the goal setting experience. Results were used to develop questionnaire measures, with additional variables adapted from the literature.

The 40-item questionnaire assessed the following categories of variables: diabetes education experiences, including type of self-management goals selected, and involvement in setting goals; goal attainment for overall self-management and for a diabetes food plan; dietary experiences, including stage of change relative to a food plan, adherence to and satisfaction with a food plan, dietary strategies, and motivators and barriers relative to following a food plan; adherence to other selected areas of self-management; health self-evaluation; and personal and household demographic characteristics.

Diabetes education experiences were assessed using an adapted version of the AADE7 Self-Care Behaviors framework from the American Association of Diabetes Educators.^{32, 38} Patients indicated if they chose to work on a particular area during diabetes education for each of the 7 items listed: food planning, exercise, monitoring blood sugar, taking medications, performing foot care, obtaining eye care, and stress management (yes/no). Other diabetes education experiences included whether or not a diabetes educator asked the patient what goal(s) he/she wanted to achieve (yes/no), perceived influence on choosing final goals (1 = yes, I had a lot of influence, 2 = yes, I had some influence, 3 = no, I had no influence) and level of confidence in achieving goals (1 = not at all confident, 2 = somewhat confident, 3 = very confident).

Stage of change, based on the transtheoretical model of behavior change³⁹, was adapted for this study as a novel measure of dietary goal setting experience after diabetes education. Stage of change has been used as a theoretical framework in multiple dietary studies^{40, 41} and several multi-ethnic health behavior studies^{14, 42, 43}, including the Diabetes Prevention Program.^{44, 45} This theory estimates the patient's stage of adoption of a behavior change. The six-level stages of change framework, originated by Prochaska et al⁴⁶, was applied to food plan adoption. The initial stage of precontemplation, defined as no

awareness of any need for change⁴⁶, was operationalized in the survey as “I do not follow a meal and do not plan to start in the near future”. The Contemplation stage, defined as considering a change in behavior within the next 6 months, was expressed as “I do not follow a meal plan now, but I have been thinking of starting.” The stage of Preparation (or Determination), defined as considering a change in behavior within the next month, was operationalized to “I am planning to begin following a meal plan in the next month.” The Action stage is defined as behavior change occurring within the past 6 months. In this study, action was estimated as “I have been following a food plan for the past 1 to 6 months.” The Maintenance stage is defined as the desired behavior change occurring more than 6 months ago and was measured as “I have been following a food plan for over 6 months.” The last stage of change, Termination (also known as Relapse), was assessed as “I had been following a food plan, but I no longer do this” in the survey. The 6-level stage of change for a food plan was measured using a 1 to 6 response scale.

Other dietary outcomes and changes were also assessed. For patients using a food plan, number of days of adherence over the previous seven days was reported. Satisfaction with the food plan was assessed (1 = not at all satisfied, 2 = somewhat satisfied, 3 = very satisfied). For all respondents, a total of 15 possible dietary changes derived from preliminary data were assessed, ranging from “eat smaller meals” to “cook with more vegetables and greens” (1 = never tried, 2 = tried, but only a little, 3 = tried some of the time, 4 = tried most of the time). This response scale reflects stages of adoption used in other research on dietary change.^{47, 48}

Potential explanatory variables included motivators to meeting diet and nutrition goals, and barriers to following a diabetes food plan, derived from preliminary data.³⁵ Motivators (8 items) assessed the importance of social support (e.g., receiving

encouragement from doctor, nurse, dietitian to follow diet goals), environmental factors (e.g., grocery stores offer a wide variety of healthy foods), and positive health outcomes (e.g., that the patient gets good blood sugar numbers when he/she follows a diabetes food plan) (1 = not at all important, 2 = somewhat important, 3 = very important). Barriers (15 items) ranged from, “It is too expensive to eat healthy for my diabetes,” “Craving sweets is a problem for me,” to “Reading food labels is too difficult” (1 = never, 2 = rarely, 3 = sometimes, 4 = always).

Adherence to other areas of self-management included three items assessing physical activity and medication taking (e.g., “During the last seven days, how often did you actually take the prescribed medications?”) (1 = all of the time, 2 = most of the time, 3 = some of the time, 4 = none of the time). For health self-evaluation, patients were asked to describe their blood sugar (diabetes) control and their overall health (1 = excellent, 2 = very good, 3 = good, 4 = fair, 5 = poor, 6 = don’t know).

Personal and household demographic characteristics (12 items) were assessed including gender, marital status, children living at home, family living in Mexico or Latin America, family living in the local area, frequency that patient grocery shops or prepares food for him/herself, financial assistance to help pay for diabetes care, time since diagnosis of diabetes, age, and ethnic background (Latino/Hispanic or Caucasian/White). This data was used to describe the patient sample and furnish variables by which to differentiate patient response to behavioral and psychosocial variables.

A three-staged approach was taken for peer review of the questionnaire (English version). At the first stage, experts in community nutrition, survey methodology, Latino culture, and statistics reviewed the questionnaire for application to the research questions, the general target populations, and data analysis. Next, directors and staff members from

the clinic as well as local Spanish translators who work with the clinic population were asked to review the questionnaire, with special emphasis on appropriateness for the local intended audience. Finally, the questionnaire was reviewed by registered dietitians and certified diabetes educators from the clinic and local community.

Pre-testing was conducted with the English and Spanish versions of the questionnaire. Two bilingual Latino patients and three Caucasian patients from the clinic reviewed the questionnaire in English in a cognitive pre-testing process.⁴⁹ Cognitive Pre-testing is a technique where the investigator conducts extensive questioning of the respondent as to how he or she interprets each questionnaire item. As a result of pre-testing, the phrase “food plan” was substituted for “meal plan” to better match the terminology used with the clinic’s population. The survey questionnaire tested out at a 5th grade reading level. The questionnaire was then translated into Spanish and back-translated into English for validity by two different certified interpreters. Any discrepancies in the back-translated version were corrected using the consensus of three bilingual certified interpreters familiar with the patient population. Finally, three Spanish-speaking patients pre-tested the questionnaire in Spanish.

Survey Questionnaire Administration

Surveys were administered onsite at the clinic with clinic staff and K. Briggs Early present to assist with data collection. Participants were scheduled in small groups of 5-8 respondents per session. Upon arrival at the clinic, consent forms were read aloud by a staff member and signed. Lastly, the participant was given the survey and instructed on its completion. Three respondents requested the survey be read aloud to them (1 Caucasian, 2 Latinos). Respondents were offered a \$20 gift certificate for a local grocery store for

completing the data collection. A bilingual native Spanish-speaker employed by the clinic as a medical assistant administered the survey to Spanish-speaking respondents (n = 34 out of 50).

Clinical and anthropometric data were collected from medical records with patient consent and included total cholesterol, LDL cholesterol, systolic and diastolic blood pressure, height, and weight. A one-time point-of-care A1C test (A1CNow[®]) was performed at the time of survey administration.⁵⁰

Data Analysis

Statistical analysis was based on 100 respondent surveys, with anthropometric and clinical measures from patient medical records, and on-site A1C tests. A sample of n=100 provided a power of 0.90 for key variables. Data were analyzed using SAS[®] software.⁵¹ Descriptive statistics were employed to describe participants and summarize the data. Chi-square or t-tests were used to identify ethnic differences in personal and clinical characteristics, and variables relating to diabetes self-care behaviors and perceptions, experience with diabetes education and goals selected during education, and goal setting and attainment for overall diabetes self-care. Kendall's tau *b* was used to test correlations between variables with ordinal response scales. Principle components factor analysis (PCFA) was used to identify factor patterns of explanatory variables (motivators, barriers, dietary changes). PCFA in this study utilized orthogonal rotation to elicit independent factor patterns, and an eigenvalue cut-off = 1. Factor loadings used for interpretation were $\geq |0.45|$.⁵² Factor scores were tested for correlations with selected ordinal variables using Kendall's tau *b*. Factor scores were further used in regression models.

For each dependent variable – food plan adherence, stage of change relative to a food plan, and goal attainment with a food plan – explanatory variables were identified that had significant bivariate relationships (by chi-square, Kendall's tau *b*, or t-test) with the dependent variable. These explanatory variables were identified for purposes of testing predictive models for each dependent variable using ordinal logistic regression. In a preliminary step to model testing, orthogonal polynomial contrasts were run with each explanatory variable and the dependent variable to identify whether the relationship had a significant linear (or other) component.⁵³ A significant but non-linear finding was considered grounds for excluding the explanatory variable from the model due to difficulty with interpretation. Ordinal logistic regression models were run using stepwise selection.⁵³ Significance level for all tests was set at $p < 0.05$.

RESULTS

Personal and Demographic Characteristics

Personal and demographic characteristics for the final sample of 50 Latino and 50 Caucasian patients are shown in Table 1. Average respondent age was 52 ± 12 years; most (57%) ranged from 40-59 years of age, with no significant ethnic difference in mean age. There were significantly more male Latinos (40%) than Caucasians (20%) in the sample ($p < 0.05$). Most respondents had some financial assistance with diabetes care (80% of Latinos, 84% of Caucasians). Most Latinos (86%) but only one Caucasian (2%) reported having family living in Mexico or Latino America ($p < 0.0001$). Latinos had significantly more children under the age of 18 living at home ($p < 0.05$). There were no ethnic differences in frequency of respondents who do grocery shopping or food preparation for themselves.

Few differences were found between Latinos and Caucasians in characteristics of diabetes, including self-care behaviors and perceptions. There were no significant ethnic differences in average years since diagnosis with diabetes (8.61 ± 8.3 years). Also, there were no significant ethnic differences in treatment of diabetes with oral medication (82% for the sample) or insulin (33%) (Table 2). Latinos were much less likely to adhere to a prescribed oral medication regimen ($p < 0.0001$). In response to “During the last seven days, how often did you actually take the prescribed medications?” most Latinos (53%) reported “none of the time.” Only 33% of the total sample reported taking insulin; however, insulin adherence was greater than oral medication adherence. Most Latinos (76%) and Caucasians (88%) reported taking “all” or “most” of their prescribed insulin doses. Forty-six percent of respondents reported that they don’t pay bills due to the cost of diabetes medications, with no significant ethnic difference. There were no significant ethnic differences between Latinos or Caucasians in reported physical activity level, which averaged 3.1 ± 2.5 days for the sample (Table 2). Only 28% of respondents reported engaging in physical activity five or more days per week.

Clinical data suggested that there were some ethnic differences in diabetes control but few differences in cardiovascular disease risk factors. Mean A1C for the entire sample was $8.3 \pm 2\%$ and only 41% of the respondents had an A1C of 7% or less. There was no significant gender difference in A1C. Mean A1C value for Latinos (8.7%) exceeded that for Caucasians (7.8%) ($p < 0.05$) (Table 2). Notably, most Latinos (63%) rated their diabetes control as “fair” or “poor” while most Caucasians (59%) rated their diabetes control as “good,” “very good,” or “excellent” ($p < 0.05$) (Table 2). There were no significant ethnic differences in cardiovascular disease risk factors, and mean values for the sample fell within the desired range for people with diabetes, including total cholesterol (187 ± 49 mg/dL), LDL

cholesterol (102.5 ± 32 mg/dL), mean systolic blood pressure (131 ± 21 mmHg), and mean diastolic blood pressure (79 ± 9 mmHg). Mean BMI was 34.5 ± 6.9 kg/m², and 79% of the sample was obese. There were no significant ethnic differences in how respondents rated overall health status, with 60% reporting “poor” to “fair” (Table 2).

Goal Setting Experiences with Overall Diabetes Self-Management

The majority of respondents (79%) received individual diabetes education, with some ethnic differences in other diabetes education formats reported by patients. Specifically, Latinos were significantly less likely to have received group instruction (46%) ($p < 0.05$) or follow-up diabetes education (16%) ($p < 0.01$) compared to Caucasians (58% and 34%, respectively). During their education, most respondents chose all seven areas of self-management to try to improve for diabetes control: food planning (93%), exercise (89%), self-monitoring of blood glucose (87%), foot care (74%), medication taking (69%), eye care (69%), and stress management (53%). Significantly more Latino (100%) than Caucasian (86%) respondents reported food planning as a desired area of self-management to address ($p < 0.01$).

Specific educational experiences relating to setting goals for overall self-management are shown in Table 3. Latinos (88%) were more likely than Caucasians (70%) to report that the diabetes educator asked them what goals they wanted to achieve ($p < 0.05$). Only a small number of respondents reported that they had no influence on choosing what final goals they should work on (8%). When asked about level of goal attainment for overall diabetes self-management, more Latinos (32%) than Caucasians (26%) reported goal attainment beyond what they agreed to do ($p < 0.05$). Most respondents were at least “somewhat confident” in their ability to achieve diabetes goals (Latinos 60%,

Caucasians 68%). There were no significant ethnic differences in level of perceived self-confidence in ability to achieve goals (self-efficacy measure).

Measures of goal setting for overall diabetes management were significantly inter-correlated. Patients who reported that the diabetes educator asked them what goal(s) they wanted to achieve were more likely to feel that they had a greater influence on choosing final goals ($p < 0.0001$). Further, greater confidence in achieving goals related to greater reported goal attainment ($\tau b = 0.28$, $p < 0.01$).

Stage of Change for a Food Plan

Stage of change for a food plan was a novel measure in this study that captured stage of adoption of a food plan after diabetes education (Table 4). Most patients (57%) were in the action or maintenance stage of change for a food plan, with no significant ethnic difference. However, as assessed by stage of change, 26% had never followed a food plan and 10% had followed a food plan in the past, but were not currently doing so.

Goal Setting Experiences with a Food Plan

Of respondents that received a food plan from a health care provider (doctor, dietitian, or nurse) (82%), Latinos (96%) were more likely than Caucasians (68%) to have received a plan ($p < 0.001$) (Table 5). Overall, respondents were at least “somewhat satisfied” with the food plan they received (63% of Latinos, 53% of Caucasians); however, 12% were not at all satisfied. When asked about goal attainment for their food plan, most respondents (77% of Latinos, 62% of Caucasians) were doing “about what they agreed to do” or more (n.s. ethnic difference).

Most (84%) patients following a food plan reported that they were asked by their diabetes educator what food plan changes they wanted to achieve (Table 5). However, Latinos (67%) were significantly more likely than Caucasians (41%) to report that they had “some” rather than “a lot” of influence on choosing their final food plan goals ($p < 0.05$).

Attitudes Towards a Food Plan

Attitudes towards following a diabetes food plan were generally positive and did not differ significantly by ethnicity (data not shown). Most respondents “somewhat” (31%) or “strongly” (39%) agreed that making healthy food choices was easy for them (self-efficacy measure). Further, the majority also “somewhat” (20%) or “strongly” (74%) agreed that they wanted to make changes in their diet for better diabetes control.

Measures Related to Stage of Change for a Food Plan

As expected, a more advanced stage of change for a food plan was significantly related to greater goal attainment for the food plan ($\tau b = 0.30$, $p < 0.01$). Moreover, advanced stage of change correlated with greater perceived influence on choosing final food plan goals ($\tau b = -0.30$, $p < 0.01$) and a higher degree of satisfaction with the food plan ($\tau b = 0.30$, $p < 0.01$). A health care provider as source of the diabetes food plan had no significant association with stage of change for the food plan. Also, patients who did not select any food plan goals during diabetes education were nearly equally divided into those who tried a food plan and those who didn't ($n = 3$, $n = 4$, respectively). More advanced stage of change was also related to measures of overall diabetes self-management, including greater perceived influence on choosing final goals set during diabetes education ($\tau b = -0.17$, $p < 0.05$), greater confidence in achieving goals ($\tau b = 0.18$, $p < 0.05$), and

greater goal attainment for overall diabetes self-management ($\tau b = 0.25, p < 0.01$). Furthermore, patients indicating a later stage of change for a food plan were more likely to report that the diabetes educator asked them what overall self-management goals they wanted to achieve ($p < 0.01$).

Measures Related to Goal Attainment for a Food Plan

Greater goal attainment for a food plan significantly related to greater influence on choosing final food plan goals ($\tau b = -0.22, p < 0.05$) and greater satisfaction with a food plan ($\tau b = 0.46, p < 0.0001$). Of those patients who were asked by their diabetes educator about what food plan changes they wanted to make, 87% reported doing more than they agree to do for goal attainment with a food plan ($p < 0.05$).

Goal attainment for a food plan also related to several measures of overall diabetes self-management. Respondents who reported a greater degree of food plan goal attainment were more likely to report greater perceived influence on choosing final diabetes goals ($\tau b = -0.20, p < 0.05$), greater confidence in ability to achieve diabetes goals ($\tau b = 0.23, p < 0.05$), and greater goal attainment for diabetes self-management overall ($\tau b = 0.46, p < 0.0001$).

Measures Related to Influence on Choosing Final Food Plan Goals

It was hypothesized that if the patients felt that they had greater influence on choosing final food plan goals during diabetes education, they would have a more positive experience and greater goal attainment with the food plan afterwards. As anticipated, greater influence on choosing food plan goals related to greater food plan satisfaction ($\tau b = -0.30, p < 0.01$) and greater goal attainment for the food plan ($\tau b = -0.22, p < 0.05$).

Food Plan Adherence and Related Measures

Food plan adherence was assessed as a traditional measure of patient dietary self-management in this study. For those patients who received a food plan from a health care provider (96% of Latinos, 68% of Caucasians), mean food plan adherence was 4.2 ± 2.4 days per week (n.s. ethnic difference). Greater food plan adherence over the last 7 days significantly related to greater satisfaction with a food plan ($\tau b = 0.52, p < 0.0001$) and greater goal attainment for a food plan ($\tau b = 0.43, p < 0.0001$). However, food plan adherence was not significantly related to greater perceived influence on choosing final food plan goals. Also, adherence to a food plan did not significantly relate to whether or not the patient was asked what food plan changes they wanted to make by the diabetes educator.

Food plan adherence also significantly related to certain measures of overall diabetes self-management. For example, greater food plan adherence significantly related to greater perceived confidence in achieving diabetes goals ($\tau b = 0.21, p < 0.05$) and reported goal attainment ($\tau b = 0.33, p < 0.001$). Adherence to a food plan did not significantly correlate with perceived influence on choosing final self-management goals or diabetes education instructional format.

Relationship of Dependent Dietary Variables to Diabetes Control

Because diet is one of the cornerstone diabetes self-management areas³², the correlation of A1C as a measure of diabetes control was tested for correlations with the three dependent dietary variables. The correlation between goal attainment for a food plan and A1C was not significant. Stage of change for a food plan and A1C were also not significantly related. The correlation between food plan adherence and A1C approached significance ($\tau b = -0.151, p = 0.061$) in the anticipated direction.

Reported Dietary Strategies

Numerous dietary strategies were reported by respondents to control blood sugar (Table 6). Response choices were designed to reflect experiences with adoption of the strategy. Many had tried most of the time to cook with less fat or oil (67%), eat low-sugar or sugar-free foods (64%), or eat more fresh or frozen fruit (56%). By contrast, eating less bread, rice or pasta was the least frequently reported strategy (only 35% tried most of the time). It is important to note that a variety of types of foods were reportedly “tried most of the time” by many patients, including eating leaner meats (54%), eating more vegetables or greens (53%), and eating higher fiber foods (45%). Only 13% never tried to cook with or use a different type of fat or oil (greatest percent of “never tried” responses). In the only response differing by ethnicity, Latinos (62%) were significantly more likely to report “tried most of the time” for eating less canned fruit compared to Caucasians (28%) ($p < 0.01$). Greater adoption of all dietary strategies correlated significantly with greater food plan adherence ($p < 0.05$) except “cook with a different type of fat or oil”. Receiving a food plan from a health care provider was not significantly related to any dietary strategies. Strategies that were significantly more frequent with greater goal attainment for a food plan included eating smaller meals ($\tau b = 0.32, p < 0.001$), cooking with more vegetables or greens ($\tau b = 0.23, p < 0.05$), eating leaner meats ($\tau b = 0.26, p < 0.01$), eating higher fiber foods ($\tau b = 0.21, p < 0.05$), grilling meats instead of frying ($\tau b = 0.22, p < 0.05$), and eating less bread, rice and cereal ($\tau b = 0.21, p < 0.05$).

Principle components factor analysis (PCFA) was conducted to identify factor patterns of dietary change strategies (Table 7). For this application, PCFA reveals clusters of behaviors as a more accurate representation of complex human behavior. PCFA extracts the maximum variance for each pattern from the set of variables tested. Therefore,

PCFA is also a data reduction technique in an exploratory study where sets of variables represent underlying constructs. Three patterns emerged, representing 55.4% of the total variance in the original variable set. The first factor pattern, “Modify fat, sugar and fiber,” revealed an emphasis on modifications to food ingredients, including changes in the type or quantity of fat used in food preparation, and use of higher fiber foods, leaner meats, and lower-sugar or sugar-free foods. By contrast, the second factor pattern reflected a focus on modifications of certain food groups – specifically increasing non-starchy vegetable and fruit consumption – concomitant with reducing meal size (“Eat more vegetables, smaller meals”). For the third factor pattern, “Eat less high sugar, high carbohydrate foods”, eating less canned fruit, avoiding regular juice or soda pop, and eating less bread were interpreted as an effort to reduce high carbohydrate foods.

Factor scores from factor patterns of dietary strategies were tested for correlation with food plan measures to identify patterns of dietary changes characterizing experiences with a food plan. A more positive factor score indicates that the patient’s responses were more closely aligned with the factor pattern. Patients who reported greater influence on choosing final food plan goals also tended to report trying dietary strategies that included “Modify fat, sugar and fiber” ($\tau b = -0.24, p < 0.01$) and “Eat more vegetables, smaller meals” ($\tau b = -0.20, p < 0.05$). Patients reporting greater attainment of the food plan were more likely to “Eat more vegetables and smaller meals” ($\tau b = 0.19, p < 0.05$). Respondents who reported greater satisfaction with a food plan tended to try all three dietary factor patterns more extensively: “Modify fat, sugar and fiber” ($\tau b = 0.34, p < 0.001$), “Eat more vegetables, smaller meals” ($\tau b = 0.34, p < 0.001$), and “Eat less high sugar, high carbohydrate foods” ($\tau b = 0.22, p < 0.05$).

Factor scores also related to selected goal setting experiences for overall diabetes self-management. Patients reporting a greater influence on choosing final goals for diabetes self-management tended also to “Modify fat, sugar and fiber” (tau b = -0.25, $p < 0.01$) and “Eat more vegetables, smaller meals” (tau b = -0.18 $p < 0.05$). Patients with greater perceived confidence in achieving overall diabetes goals also tried to “Eat more vegetables, smaller meals” (tau b = 0.17, $p < 0.05$) and “Eat less high sugar, high carbohydrate foods” (tau b = 0.23, $p < 0.01$). Greater reported goal attainment for overall diabetes management was associated with the dietary strategy of “Eat more vegetables, smaller meals” (tau b = 0.19, $p < 0.05$). Respondents who reported that they were not asked by their diabetes educator what food plan changes they wanted to accomplish were more likely to “Eat less high sugar, high carbohydrate foods” ($t = 2.09$, $df = 80$, $p < 0.05$). Respondents who tried to “Modify fat, sugar and fiber” were more likely to have a positive attitude toward making healthy food choices (tau b = 0.22, $p < 0.01$) and greater perceived influence on goal selection for overall diabetes management (tau b = -0.25, $p < 0.01$).

Herbal Remedies

Interest in herbal or home remedies and the frequency of their use were assessed with two questions in the questionnaire. When asked, “Do you use herbal or home remedies for treating blood sugar?” the majority (79%) of respondents reported that they “never” or “rarely” used them. However, most respondents (59%) indicated they would “probably” or “definitely” try any home remedy if it didn’t cause them harm. Latinos (34%) were more likely to respond “sometimes” or “always” to use of herbal or home remedies for diabetes, compared to Caucasians (8%) ($p < 0.01$). Latinos (35%) were also much more likely than Caucasians (18%) to respond “probably yes” or “definitely yes” when asked if

they would be interested in trying herbal remedies if it didn't harm them ($p < 0.01$). Men (33%) were more likely to use herbal remedies compared to women (16%) ($p < 0.05$).

Barriers to Following a Food Plan

Overall, the most frequent barriers to following a diabetes food plan related to social eating situations and self-regulation of food intake (Table 8). Most respondents (55%) responded "sometimes" or "always" to "When people eat foods I'm not supposed to have, I want to eat them too" (Latinos 64%) (Caucasians 46%) ($p < 0.05$). Another social eating situation that was evaluated, "People close to me don't understand about my diet," revealed that most respondents (54%) "sometimes" or "always" found this a barrier, but there was no significant ethnic difference. Barriers associated with self-regulation included difficulty at least "sometimes" with giving up foods that the patient likes, reported by 82% of Caucasians but only 54% of Latinos ($p < 0.05$). Additionally, craving sweets was a barrier to following a food plan at least "sometimes" for 80% of Caucasians but only 44% of Latinos ($p < 0.01$). Although most Caucasians (68%) and Latinos (64%) responded "sometimes" or "always" to "I don't have the will power to follow my diet," the percentage reporting "never" to this barrier differed greatly between Caucasians (6%) and Latinos (30%) ($p < 0.01$). Most Caucasians (74%) tended to report they had difficulty with meal and snack time scheduling at least "sometimes" compared to only 48% of Latinos ($p < 0.01$). Knowing how to cook or prepare food for a diabetes food plan was "never" a barrier to following a diabetes food plan for 58% Latinos compared to 22% of Caucasians ($p < 0.01$). Forgetting to eat was "never" or "rarely" a barrier for most (63%) respondents.

It was of interest to identify patterns of barriers and test their relationship with food plan adherence; therefore, a PCFA was conducted with dietary barriers (Table 9). Four

patterns were isolated, representing 61% of the total variance. The first factor pattern, “Food cravings,” reflected frequent difficulty with giving up certain foods patients like, craving high fat foods, craving sweets, and eating more when stressed. The second factor pattern, “Difficulties eating with others,” suggested that respondents feel difficulties with the contrast in how they eat compared to other people – primarily with cooking one way for themselves and a different way for others, seeing other people eat foods they can’t have, lack of will power, and reducing portion sizes. Interpretation of the third factor pattern, “Knowledge limits to shopping and cooking,” was derived primarily from variables assessing knowledge gaps with shopping or food preparation, and difficulty reading food labels. The highest loading variable on the last factor pattern (“Expensive to eat healthy”) expressed the idea that it is too expensive to eat healthy for a diabetes food plan; however, this pattern also included forgetting to eat, and eating more when stressed. Lower food plan adherence was associated with greater frequency of all individual barriers ($p < 0.05$) except knowing how to shop for food for a diabetes food plan, forgetting to eat, and craving sweets.

Motivators to Following a Food Plan

Important motivators to following a food plan included feeling healthier overall, improving glycemic control, and receiving social support and encouragement (Table 10). Getting good blood sugar numbers when following a food plan for diabetes was rated as “very important” by most respondents (Latinos 90%, Caucasians 76%, $p < 0.05$). More Latinos than Caucasians rated as “very important” a number of social support issues, including the support of people close to them (Latinos 90%, Caucasians 59%, $p < 0.001$), encouragement from a dietitian, nurse or doctor (Latinos 83%, Caucasians 61%, $p < 0.05$), and having other people with diabetes around them (Latinos 70%, Caucasians 42%,

$p < 0.05$). Support with food-related issues was also more important to Latino patients, and included having people close to them eat the same way (Latinos 68%, Caucasians 30%, $p < 0.001$) and having someone help with food preparation (Latinos 44%, Caucasian 20%, $p < 0.05$).

A PCFA was conducted with motivators to explore patterns of these explanatory variables (Table 11). Two factor patterns were extracted that explained 56% of the total variance in the original variable set. The first factor pattern, "Personal diabetes control," encompassed feeling healthier when following a food plan, getting good blood sugar numbers when following a food plan, and receiving encouragement from a dietitian, nurse or doctor for trying to follow diet goals. The second factor pattern, "Family and social support," addressed the importance of people close to patient – those who are eating the same way, supporting efforts to follow diet goals, providing help with food preparation, and who have diabetes. Food plan adherence was not significantly correlated with factor scores from either of the motivator factor patterns.

Inter-relationships of Dependent Dietary Variables

It was important to note the inter-correlations among the three dependent dietary variables. Stage of change for a food plan was significantly and positively correlated with goal attainment for a food plan ($\tau b = 0.30$, $p < 0.01$), and food plan adherence ($\tau b = 0.28$, $p < 0.01$). Furthermore, goal attainment for a food plan significantly related to food plan adherence ($\tau b = 0.43$, $p < 0.0001$). The two variables for goal attainment were also inter-related ($\tau b = 0.46$, $p < 0.0001$).

Ordinal Logistic Regression Models

Independent variables that significantly related to stage of change for a food plan, food plan adherence, or goal attainment for a food plan were identified. Orthogonal polynomial contrasts were run for each dependent-independent variable pair and indicated that all relationships had a significant linear component. Ordinal logistic regression models for the three dependent variables are shown in Table 12. The table displays the significance of the overall model, the predictor variables with Maximum Likelihood Estimates for β coefficients and p-values, and the model R^2 . For the first model, greater food plan adherence was related to, in order of predictive value, greater satisfaction with the food plan ($p < 0.001$), greater likelihood to “Eat more vegetables, smaller meals” (dietary strategy factor pattern 2) ($p < 0.01$), less frequency of “Difficulties eating with others” (dietary barrier factor pattern 2) ($p < 0.05$), and more frequent physical activity adherence ($p < 0.05$). The second model shows that greater goal attainment for a food plan was related to greater food plan satisfaction ($p < 0.01$) and greater goal attainment for overall diabetes self-management ($p < 0.01$). Lastly, the third model indicated that more advanced stage of change was predicted by greater patient influence on choosing final food plan goals during diabetes education ($p < 0.01$), greater likelihood to “Modify fat, sugar and fiber” (dietary strategy factor pattern 1) ($p < 0.05$), and greater importance of “Personal diabetes control” as motivation for meeting diet and nutrition goals (dietary motivator factor pattern 1) ($p < 0.05$).

DISCUSSION

Sample Characteristics

Clinical characteristics of respondents were generally reflective of an obese sample with inadequate glycemic control. Latino respondents in this study had a higher mean A1C (8.7%) compared to 304 Hispanics after participation in Project Dulce⁵⁴ (7.8%), a California-based program that targeted low-income and underserved people with type 2 diabetes. However, the current sample of Latinos had a lower average A1C compared to Latino participants in the Starr County, Texas Health Initiative studies (11.8%), a comprehensive longitudinal and culturally competent diabetes education intervention involving 256 rural Latinos.²⁷ Latinos in this study had higher mean A1C (8.7%) values than Caucasian respondents (7.8%), similar to ethnic disparities reported for Mexican American Latinos in NHANES III (7.96% for Latinos, 7.6% for Caucasians) and NHANES 1999-2002 (8.09% for Latinos, 7.3% for Caucasians).⁵⁵ Data for Hispanics in the Washington State Diabetes Disparities Report⁵⁶ had similar glycemic control (A1C 8.8%) compared to participants in the current study (8.7%); however, non-Hispanic whites in Washington had a lower mean A1C (6.2%) compared to this Caucasian sample (7.8%).

The mean BMI in this study characterized patients as obese (BMI 34.5 ± 6.9 kg/m²), and was higher than the mean BMI (32.5 ± 7.5 kg/m²) reported for participants in Project Dulce⁵⁴ and in the Starr County studies (32.2 ± 6.1 kg/m²).²⁷ This study's population also had a higher mean BMI than persons with type 2 diabetes from NHANES III (1988-1994) and NHANES 1999-2000 (average BMI 30.2 and 32.4 kg/m², respectively).⁵⁷

Goal Setting

Patients who felt they had more influence on choosing final food plan goals during diabetes education also had greater satisfaction and greater goal attainment with the food plan. No studies were found that examined diet-related goal attainment among rural Latinos with type 2 diabetes. Much of the literature on Latinos has focused instead on outcomes related to changes in diabetes knowledge⁵⁸, glycemic control⁵⁹, or physical activity.⁶⁰ Diabetes educators working with Latino patients in Chelan⁶¹ and Yakima^{62, 63} counties (where preliminary and survey stages of this project were conducted, respectively) reported that some Latino patients seem to prefer a “tell me what to do” approach to diabetes education, while others choose to be more actively involved in the goal setting process. Two diabetes educators who are also Mexican American explained that patient goal setting is not typically conducted in medical practices in Mexico^{61, 62}, possibly due to the continued use of the biomedical model for patient care.⁶⁴ Mexican patients reportedly are less likely to participate in their own medical decision making, such that active participation in diabetes self-management goal setting may be an atypical experience for them.⁶¹

The process of achieving diabetes dietary goals should be a patient-driven process that takes into account cultural factors in a socially supportive environment to promote patient success.^{23, 28, 65, 66} Results underscore that social support is an especially important motivator for Latinos to meet diet and nutrition goals. Moreover, inadequate social support becomes a barrier to goal attainment. Latino patients in this study were less likely to report having “a lot” of influence on choosing final food plan goals during diabetes education and also had a higher need for social support to aid with diabetes self-management regimen adherence compared to Caucasian patients. Findings are consistent with other studies that illustrate the need for social support and collaborative goal setting to attain diabetes self-

management goals among Latino populations^{28, 66-69} Personal diabetes control, including feeling better overall and getting blood sugar values that indicate improved glycemic control, were important motivators for all patients in this study.

Food Plan Adherence

Respondents reported mean food plan adherence of 4 days per week (n.s. difference for ethnicity). This adherence rate is similar to the findings of Travis⁷⁰ with 75 type 2 diabetes patients in Southwestern Pennsylvania (ethnicity not reported) where 39% reported following a diabetes diet 4-6 days per week. In addition, Shaw et al⁷¹ found that a group of 208 urban (21% white) and rural (92% white) type 2 patients reported a mean diet adherence of 4 days per week. Four days per week was considered a “moderate” level of adherence in that study.⁷¹ Dietary practices among NHANES III (1988-1994) Mexican Americans, assessed with a 24-hour recall and a food frequency questionnaire, revealed that most Latino adults with type 2 diabetes had a high fat diet with less than 5 servings of fruits and vegetables per day.⁷² Interestingly, in this study Latinos were as likely as Caucasians to report that they eat more vegetables and smaller meals as diet strategies for diabetes control.

Ordinal logistic regression analysis revealed predictors significant for food plan adherence: greater satisfaction with the food plan, eating more vegetables and smaller meals, less frequent barriers related to eating with others, and greater frequency of physical activity. Satisfaction with a food plan was most strongly predictive of food plan adherence. In their study of dietary satisfaction among 239 patients with type 2 diabetes at a primary care clinic, Ahlgren et al⁷³ reported that patients had a greater level satisfaction with their diabetes food plan than they had with their own ability to follow food plan. Ahlgren et al⁷³

concluded that educators may be doing a good job providing a satisfying food plan to patients during diabetes education, but patients need more assistance trying and maintaining dietary strategies and overcoming barriers to following the food plan.

In a comprehensive review of lifestyle changes related to obesity, eating behavior, and physical activity in people with diabetes, Wing et al⁷⁴ reported a synergistic effect of diet and exercise, hypothesizing that one lifestyle behavior (diet or exercise) may act as a catalyst to the other. This positive interaction of physical activity and diet is in contrast with other research that has demonstrated less behavior change when patients try combining two or more behavioral goals.⁷⁴ A possible synergistic effect was also observed in the current research, as shown by the ordinal logistic regression modeling – food plan adherence was predicted by greater likelihood of eating more vegetables and smaller meals and more frequent physical activity. However, patients in the current study reported fewer mean days of adherence to physical activity (3.1 ± 2.5 days) than to food plan adherence (4.2 ± 2.4 days), reflecting other research that reports less adherence to physical activity than diet for diabetes control.⁷¹

Significant patterns of barriers to dietary adherence, including “Food cravings,” “Difficulties eating with others,” “Knowledge limits to shopping and cooking,” and “Expense of eating healthy,” were comparable to dietary barriers reported by others examining Latino groups with diabetes.^{69, 75} In their focus group-style educational intervention performed with 48 northern Mexican type 2 diabetes patients and 38 of their relatives, Albarran et al⁷⁵ reported that lack of support from family and a belief that special foods were required for an adequate diabetes diet were common barriers. Focus group participants, who were in poor glycemic control (mean A1C of 13%) and obese (mean BMI of 30 kg/m^2), also reported that they believed they needed to purchase special foods because they had diabetes, but that

they could not afford them.⁷⁵ In the Starr County studies with rural Latinos, Brown et al²⁸ also concluded that social support for a culturally appropriate diet was essential for diabetes self-management success among Mexican Americans.

Dietary Strategies

In the present study, patterns of dietary strategies for the sample included trying to modify fat, sugar and fiber, eat more vegetables or greens and smaller meals, and eat less high sugar and high carbohydrate foods. Similar dietary strategies were reported among 348 participants (African American, Asian, and Latino) after completion of a culturally appropriate, comprehensive intervention, the Racial and Ethnic Approaches to Community Health (REACH 2010) in King County, WA.⁷⁶ Specifically, REACH participants significantly increased intakes of vegetables, fruit, lean meats, and low fat foods after the intervention. REACH participants also reported reducing sugar intake as a way to improve diabetes control.⁷⁶

Physical Activity Adherence

Physical activity adherence was an area of diabetes self-management that highly related to food plan adherence in this study. Among persons with type 2 diabetes from the NHANES III (1988-1994), Nelson et al⁷² found that only 28% of Mexican Americans obtained the recommended amount of physical activity (5 or more days per week), very similar to the results of this study. Shaw et al⁷¹ found that physical activity had the lowest adherence rate among all six areas of diabetes self-care in their population of patients from both urban and rural areas, mostly related to lack of environmental (neighborhood) support. The Washington State Diabetes Disparities Report⁵⁶ noted that recommended levels of

physical activity were achieved by only 44% of Washington residents with diabetes, compared to 64% of residents without diabetes.

Utility of Dependent Variables as Measures of Goal Setting Experience

Different measures of patient dietary outcomes after diabetes education can test the potential gap between patient decisions made during diabetes education and patient behavior change after diabetes education. For instance, 93% of the sample said that they chose to focus on the area of food planning during diabetes education, yet 18% reported that they did not receive a food plan from a health care provider. This gap may represent a goal setting process where the patient did not ultimately agree to or decide upon specific food plan changes, even after discussion with the educator. Alternatively, it may be that the patient decided on dietary changes, but did not think of these changes as a food plan. Further, 26% of the patients by the stage of change measure were not ready to adopt a food plan even months after diabetes education. Although 23 out of 33 non-adopters (by stage of change) were in the Contemplation or Preparation stage for following a food plan, there is a need to further examine factors influencing these individuals such that diabetes education did not result in adoption of a food plan.

Among patients receiving a food plan (n=82), there was an average adherence of 4 days per week; yet 71% reported food plan goal attainment as what they'd agreed to do or more with their educator. This gap is also a key focus for follow up education, monitoring, and research. Further investigation is warranted to determine specific dietary practices and frequency of those practices as they relate to levels of goal attainment with the food plan.

The predictors of the three dependent variables shown in ordinal logistic models underscore the different patient outcomes they are estimating. Transition from

contemplating a food plan to adopting it (model for stage of change) appears related to greater influence on choosing final food plan goals, a dietary strategy to modify fat, sugar and fiber, and motivation from the personal diabetes control results that stem from good blood sugar numbers and feeling better as a result of following a food plan. This dietary strategy and these motivators are core messages in diabetes education. Notably, regression models for food plan adherence and goal attainment, which capture influences on food plan outcomes among “adopters,” related most strongly to food plan satisfaction; this appears to be an important theme for maintaining diabetes diet management. A greater influence on choosing final food plan goals during diabetes education may increase the probability that the patient feels satisfied with the food plan after adoption. The adherence model may reflect what are typical influences on dietary self-management among patients who practice a food plan specifically and routinely, whereas the goal attainment model represents measures relative to when the patient feels accomplished. Goal attainment for a food plan is not necessarily interpreted by the patient as a frequency measure the way adherence is, but may be interpreted as a totality of effort. The models for adherence and goal attainment help characterize the early adoptive experience in goal setting, defined for this study as within 18 months of the patient’s most recent diabetes education visit.

Dietary strategies associated with adoption of a food plan (the stage of change model) were not the same as those associated with adherence (adherence model). Transition to trying a food plan (stage of change model) related to modifying fat, sugar and fiber, whereas greater food plan adherence related to eating more vegetables and smaller meals. This difference may reflect an early adoption stage where patients have more enthusiasm for trying more complex dietary changes, especially those that are core measures in diabetes education. By contrast, those patients following a food plan with

greater frequency of adherence appear to be trying simpler strategies as the main dietary self-management effort. These findings imply two ideas: first, that patients may change goals after diabetes education, a finding reported elsewhere for patients receiving goal setting education^{77, 78}, and that patients may revert to simpler strategies over time that are easier to maintain.

LIMITATIONS

There were several limitations to this study. The sample was small and drawn as a convenience sample, precluding extrapolation of results to other local or national groups. Baseline A1C and body weight were not assessed prior to diabetes education. Respondents in the study had received their most recent diabetes self-management education no more than 18 months prior to data collection; however, previous diabetes education experiences and associated changes were not measured. Patient evaluation of their past diabetes education experiences was also not assessed. Time since last diabetes education visit was not identified, precluding analyses of goal setting experiences and their influences tracked along a time line or by number of months since diabetes goal setting education. In addition, the patient's evaluation of how important it is to them to influence their own goal selection was not assessed; this is a measure that could have further delineated ethnic differences and implications for practice. Poverty level was not measured and poverty has been closely linked to increased levels of obesity.⁷⁹ Weight management history and experience were also not examined. Assessment of specific food and nutrient intakes was not performed, so it is difficult to make dietary adherence comparisons with NHANES data. Further, medical file data may reflect some inconsistencies in timing and testing protocols, although this bias is less critical when the data are solely used to

characterize the sample. The PCFA analyses included the entire sample of 100 because the ethnic sub-sample of 50 was too small for analysis. This precluded isolating patterns of response for Latinos versus Caucasians. There may have been a seasonal effect on food intake not taken into account in assessment of diet strategies. Level of acculturation, which may have differentiated responses by Latinos, was also not assessed.

IMPLICATIONS

There are several implications of this research for practicing diabetes educators. While discussing likely dietary changes and anticipating barriers to dietary change with patients, educators should encourage patients to think about how often they could do those changes. This may also help patients anticipate barriers to trying and maintaining food plan goals. Results also suggest that educators should teach a variety of dietary strategies because patients in this study were trying a variety of dietary behaviors to aid in their diabetes control. Educators may need to encourage patients to select self-management goals and desired behavior changes; in this research, influence on final goals appeared strongly linked to patient adherence to and satisfaction with the food plan. Continued use of the food plan will likely improve diabetes control. Emphasizing clinical and overall wellbeing is also important early in diabetes education. Educators may want to actively incorporate the entire family or key social supporters for the patient in their diabetes educational sessions, especially with Latino patients. Follow-up education should also be emphasized, as it enables the educator to support appropriate dietary change, minimize barriers, and enhance food plan satisfaction. Food plan satisfaction, an important component to food plan adherence in this study, has been measured using the Diabetes Dietary Satisfaction and Outcomes Measure (DDSOM) in previous research.⁷³ The DDSOM could be adopted

for patient monitoring to identify indices of patient satisfaction with the food plan. This may be a tool to estimate patient satisfaction with the food plan during diabetes education (and before the patient tries their food plan), as well as during follow-up. Testing the DDSOM in a more ethnically diverse population would also provide valuable information for those educators and researchers targeting populations at higher risk for diabetes disparities.

Future research for both educators and researchers would include identifying changes in goals during the post-diabetes education experience along a time line. To anticipate this, educators conducting follow-up education visits with patients need to track changes in dietary strategies and determine if patients are abandoning complicated dietary strategies in favor of simpler strategies. Applying goal attainment to individual dietary strategies where they are known to be commonly attempted (such as reducing portion sizes or eating more vegetables) would also be useful. Identifying degree of goal attainment or changes in goals, specific to diet or other areas of lifestyle change, could be helpful for diabetes education program managers. Lastly, diabetes education centers serving Latino populations need to pilot test educational approaches that incorporate more social support.

Table 1. Social and Demographic Characteristics of the Sample

<u>Variable</u>	<u>Percentage (Frequency)</u>		
	<u>Total</u> (n=100)	<u>Latino</u> (n=50)	<u>Caucasian</u> (n=50)
Male	30 (30)	40 (20)	20 (10)
Female	70 (70)	60 (30)	80 (40)
Age by decade	52 ± 12.1	50 ± 12.2	54 ± 11.7
20-29	3 (3)	2 (1)	4 (2)
30-39	11 (11)	16 (8)	6 (3)
40-49	30 (30)	36 (18)	24 (12)
50-59	27 (27)	26 (13)	28 (14)
60-69	22 (22)	14 (7)	30 (15)
70-79	6 (6)	6 (3)	6 (3)
80-89	1 (1)	0	2 (1)
Marital status			
Married	31 (31)	24 (12)	38 (19)
Separated	27 (27)	42 (21)	12 (6)
Divorced	18 (18)	16 (8)	20 (10)
Widowed	11 (11)	8 (4)	14 (7)
Never married	9 (9)	4 (2)	14 (7)
Living with partner	4 (4)	6 (3)	2 (1)

Table 1. Social and Demographic Characteristics of the Sample continued

<u>Variable</u>	<u>Percentage (Frequency)</u>		
	<u>Total</u> (n=100)	<u>Latino</u> (n=50)	<u>Caucasian</u> (n=50)
Children under 18 living in home			
None	63 (63)	50 (25)	76 (38)
One	10 (10)	10 (5)	10 (5)
Two	15 (15)	22 (11)	8 (4)
Three or more	12 (12)	18 (9)	6 (3)
Financial assistance for diabetes care			
None	18 (18)	20 (10)	16 (8)
Yes	80 (80)	80 (39)	84 (41)
Don't know	2 (2)	1 (1)	1 (1)
Family living in Mexico/Latin America	44 (44)	86 (43)	2(1)
Family living locally	91 (91)	90 (45)	92 (46)
Grocery shopping for self			
Never	2 (2)	2 (1)	2 (1)
Some of the time	21 (21)	16 (8)	6 (13)
Most of the time	26 (26)	6 (18)	16 (8)
All of the time	51 (51)	6 (23)	56 (28)

Table 1. Social and Demographic Characteristics continued

<u>Variable</u>	<u>Percentage (Frequency)</u>		
	<u>Total</u> (n=100)	<u>Latino</u> (n=50)	<u>Caucasian</u> (n=50)
Food preparation for self			
Never	6 (6)	8 (4)	4 (2)
Some of the time	24 (24)	26 (13)	22 (11)
Most of the time	33 (33)	32 (16)	34 (17)
All of the time	37 (37)	34 (17)	40 (20)

Table 2. Diabetes Self-Care Behaviors and Perceptions

<u>Variable</u>	<u>Percentage (Frequency)</u>		
	<u>Total</u> (n=100)	<u>Latino</u> (n=50)	<u>Caucasian</u> (n=50)
A1C*	8.3 ± 2	8.7 ± 2	7.8 ± 1.8
Taking oral meds	82 (82)	86 (43)	78 (39)
If taking oral meds, adherence***			
All of the time	55 (45)	19 (8)	95 (37)
Most or Some time	17 (14)	28 (12)	5 (2)
None of the time	28 (23)	53 (23)	0 (0)
Taking insulin	33 (33)	48 (16)	52 (17)
If taking insulin, adherence			
All of the time	70 (23)	69 (11)	71 (12)
Most or Some time	24 (8)	19 (3)	29 (5)
None of the time	6 (2)	13 (2)	0
Days of at least 30 min physical activity	3.1 ± 2.5	3.3 ± 2.4	2.9 ± 2.6
Sometimes don't pay bills due to cost of meds	46 (38)	50 (22)	41 (16)

Table 2. Diabetes Self-Care Behaviors and Perceptions continued

<u>Variable</u>	<u>Percentage (Frequency)</u>		
	<u>Total</u> (n=100)	<u>Latino</u> (n=50)	<u>Caucasian</u> (n=50)
Self-evaluation of glycemic control*			
Excellent	3 (3)	2 (1)	4 (2)
Very good	17 (17)	16 (8)	18 (9)
Good	27 (27)	18 (9)	36 (18)
Fair	33 (33)	46 (23)	20 (10)
Poor	17 (17)	14 (7)	20 (10)
Don't know	3 (3)	4 (2)	2 (1)
Self-evaluation of overall health			
Excellent	1 (1)	0	2 (1)
Very good	12 (12)	18 (9)	6 (3)
Good	25 (25)	24 (12)	26 (13)
Fair	38 (38)	38 (19)	38 (19)
Poor	22 (22)	20 (10)	24 (12)
Don't know	2 (2)	0	4 (2)

*p<0.05, ***p< 0.0001 for ethnic differences

Table 3. Goal Setting Experiences with Overall Diabetes Self-Management

<u>Variable</u>	<u>Percentage (Frequency)</u>		
	<u>Total</u> (n=100)	<u>Latino</u> (n=50)	<u>Caucasian</u> (n=50)
Educator asked what goals you wanted to achieve during diabetes education*	79 (79)	88 (44)	70 (35)
Influence on choosing final goals during diabetes education			
Yes, I had a lot of influence	55 (55)	48 (24)	62 (31)
Yes, I had some influence	37 (37)	46 (23)	28 (14)
No, I had no influence	8 (8)	6 (3)	10 (5)
Self-confidence in achieving goals			
Not at all confident	8 (8)	8 (4)	8 (4)
Somewhat confident	64 (64)	60 (30)	68 (34)
Very confident	28 (28)	32 (16)	24 (12)
Perceived level of goal attainment*			
Much less than what I agreed to do	16 (16)	8 (4)	24 (12)
Somewhat less	13 (13)	10 (5)	16 (8)
About what I agree to do	42 (42)	50 (25)	34 (17)
Somewhat more	19 (19)	18 (9)	20 (10)
Much more than what I agreed to do	10 (10)	14 (7)	6 (3)

* p<0.05 for ethnic difference

Table 4. Stage of Change for Food Plan

<u>Variable</u>	<u>Percentage (Frequency)</u>		
	<u>Total</u> (n = 100)	<u>Latino</u> (n = 50)	<u>Caucasian</u> (n = 50)
Stage of change for food plan			
Do not follow a food plan, and do not plan to start in the near future ¹	10 (10)	12 (6)	8 (4)
Do not follow a food plan now, but thinking of starting ²	16 (16)	18 (9)	14 (7)
Planning to begin following a food plan in the next month ³	7 (7)	8 (4)	6 (3)
Have been following a food plan for the past 1 to 6 months ⁴	30 (30)	30 (15)	30 (15)
Have been following a food for over 6 months ⁵	27 (27)	28 (14)	26 (13)
Had been following a food plan, but no longer do this ⁶	10 (10)	4 (2)	16 (8)

¹ Precontemplation

² Contemplation

³ Preparation

⁴ Action

⁵ Maintenance

⁶ Termination

Table 5. Goal Setting Experiences with a Food Plan¹

<u>Variable</u>	<u>Total</u>	<u>Percentage (Frequency)</u>	
		<u>Latino</u>	<u>Caucasian</u>
	n=82	n=48	n=34
	82 (82)	96 (48)	68 (34)
Goal attainment for food plan			
Much less than what I agreed to do	17 (14)	15 (7)	21 (7)
Somewhat less	12 (10)	8 (4)	18 (6)
About what I agree to do	46 (38)	52 (25)	38 (13)
Somewhat more	16 (13)	15 (7)	18 (6)
Much more than what I agreed to do	9 (7)	10 (5)	6 (2)
Input on food plan changes	84 (69)	90 (43)	76 (26)
Influence on choosing final food plan goals			
Yes, I had a lot of influence*	38 (31)	30 (14)	50 (17)
Yes, I had some influence	56 (46)	67 (32)	41 (14)
No, I had no influence	6 (5)	4 (2)	9 (3)
Satisfaction with food plan			
Very satisfied	29 (24)	29 (14)	29 (10)
Somewhat satisfied	59 (48)	63 (30)	53 (18)
Not at all satisfied	12 (10)	8 (4)	18 (6)

¹ Based on the subsample (n=82) of patients who received a diabetes food plan from a health care provider (physician, nurse or dietitian) (ethnic difference, p<0.05).

* p < 0.05 for ethnic difference

Table 6. Reported Dietary Strategies

<u>Dietary Strategy</u>	<u>Percentage (Frequency)</u>		
	<u>Total</u> (n = 100)	<u>Latino</u> (n = 50)	<u>Caucasian</u> (n = 50)
Cook with or use less fat or oil			
Tried most of the time	67 (67)	64 (32)	70 (35)
Tried some of the time	23 (23)	22 (11)	24 (12)
Tried a little	8 (8)	10 (5)	6 (3)
Never tried	2 (2)	4 (2)	0
Eat low-sugar or sugar-free foods			
Tried most of the time	64 (64)	68 (34)	60 (30)
Tried some of the time	18 (18)	18 (9)	18 (9)
Tried a little	16 (16)	10 (5)	22 (11)
Never tried	2 (2)	4 (2)	0
Eat more fresh or frozen fruits			
Tried most of the time	56 (56)	60 (30)	52 (26)
Tried some of the time	30 (30)	28 (14)	32 (16)
Tried a little	12 (12)	10 (5)	14 (7)
Never tried	2 (2)	2 (1)	2 (1)

Table 6. Reported Dietary Strategies continued

<u>Dietary Strategy</u>	<u>Percentage (Frequency)</u>		
	<u>Total</u> (n = 100)	<u>Latino</u> (n = 50)	<u>Caucasian</u> (n = 50)
Eat leaner meats			
Tried most of the time	54 (54)	54 (27)	54 (27)
Tried some of the time	33 (33)	28 (14)	38 (19)
Tried a little	11 (11)	14 (7)	8 (4)
Never tried	2 (2)	4 (2)	0
Eat more vegetables or greens			
Tried most of the time	53 (53)	52 (26)	54 (27)
Tried some of the time	34 (34)	38 (19)	30 (15)
Tried a little	11 (11)	10 (5)	12 (6)
Never tried	2 (2)	0	4 (2)
Cook with or use different type of fat or oil			
Tried most of the time	53 (53)	44 (22)	62 (31)
Tried some of the time	23 (23)	26 (13)	20 (10)
Tried a little	11 (11)	16 (8)	6 (3)
Never tried	13 (13)	14 (7)	12 (6)

Table 6. Reported Dietary Strategies continued

<u>Dietary Strategy</u>	<u>Percentage (Frequency)</u>		
	<u>Total</u> (n = 100)	<u>Latino</u> (n = 50)	<u>Caucasian</u> (n = 50)
Cook with more vegetables or greens			
Tried most of the time	49 (49)	56 (28)	42 (21)
Tried some of the time	39 (39)	36 (18)	42 (21)
Tried a little	9 (9)	6 (3)	12 (6)
Never tried	3 (3)	2 (1)	4 (2)
Grill meats instead of frying			
Tried most of the time	47 (47)	52 (26)	42 (21)
Tried some of the time	37 (37)	34 (17)	40 (20)
Tried a little	5 (5)	4 (2)	6 (3)
Never tried	11 (11)	10 (5)	12 (6)
Eat smaller meals			
Tried most of the time	46 (46)	46 (23)	46 (23)
Tried some of the time	38 (38)	36 (18)	40 (20)
Tried a little	13 (13)	14 (7)	12 (6)
Never tried	3 (3)	4 (2)	2 (1)

Table 6. Reported Dietary Strategies continued

<u>Dietary Strategy</u>	<u>Percentage (Frequency)</u>		
	<u>Total</u> (n = 100)	<u>Latino</u> (n = 50)	<u>Caucasian</u> (n = 50)
Avoid regular fruit juice or soda pop			
Tried most of the time	46 (46)	42 (21)	50 (25)
Tried some of the time	21 (21)	24 (12)	18 (9)
Tried a little	22 (22)	20 (10)	24 (12)
Never tried	11 (11)	14 (7)	8 (4)
Eat less canned fruit**			
Tried most of the time	45 (45)	62 (31)	28 (14)
Tried some of the time	30 (30)	16 (8)	44 (22)
Tried a little	22 (22)	18 (9)	26 (13)
Never tried	3 (3)	4 (2)	2 (1)
Eat higher fiber foods			
Tried most of the time	45 (45)	46 (23)	44 (22)
Tried some of the time	33 (33)	28 (14)	38 (19)
Tried a little	18 (18)	22 (11)	14 (7)
Never tried	4 (4)	4 (2)	4 (2)

Table 6. Reported Dietary Strategies continued

<u>Dietary Strategy</u>	<u>Percentage (Frequency)</u>		
	<u>Total</u> (n = 100)	<u>Latino</u> (n = 50)	<u>Caucasian</u> (n = 50)
Eat low fat foods			
Tried most of the time	42 (42)	40 (20)	44 (22)
Tried some of the time	42 (42)	44 (22)	40 (20)
Tried a little	13 (13)	12 (6)	14 (7)
Never tried	3 (3)	4 (2)	2 (1)
Avoid fried foods			
Tried most of the time	36 (36)	44 (22)	28 (14)
Tried some of the time	41 (41)	32 (16)	50 (25)
Tried a little	18 (18)	16 (8)	20 (10)
Never tried	5 (5)	8 (4)	2 (1)
Eat less bread, rice, or pasta			
Tried most of the time	35 (35)	36 (18)	34 (17)
Tried some of the time	40 (40)	38 (19)	42 (21)
Tried a little	25 (25)	26 (13)	24 (12)
Never tried	0	0	0

Table 7. Principle Components Factor Analysis for Dietary Strategies

Factor 1 Pattern		Factor 2 Pattern		Factor 3 Pattern	
<u>“Modify fat, sugar and fiber”</u>		<u>“Eat more vegetables, smaller meals”</u>		<u>“Eat less high sugar or high carbohydrate foods”</u>	
¹ 0.79	Cook with or use less fat or oil	0.83	Eat more vegetables or greens	0.85	Eat less canned fruit
0.69	Eat higher fiber foods	0.69	Cook with more vegetables and greens	0.69	Avoid regular fruit juice or soda pop
0.66	Cook with or use different type of fat or oil	0.62	Eat smaller meals	0.54	Eat less bread, rice, or pasta
0.64	Eat low-sugar or sugar-free foods	0.61	Eat more fresh or frozen fruits		
0.53	Eat low fat foods	0.59	Grill meats instead of frying		
0.48	Eat leaner meats				
Variance accounted for:					
20.5%		19.8%		15.1%	

¹ Factor loadings

Table 8. Barriers to Following a Food Plan

<u>Barrier Statement</u>	<u>Percentage (Frequency)</u>		
	<u>Total</u> (n=100)	<u>Latino</u> (n=50)	<u>Caucasian</u> (n=50)
When people eat foods I'm not supposed to have, I want to eat them too*			
Always	24 (24)	24 (12)	24 (12)
Sometimes	31 (31)	22 (11)	40 (20)
Rarely	23 (23)	20 (10)	26 (13)
Never	22 (22)	34 (17)	10 (5)
People close to me don't understand about my diet			
Always	24 (24)	20 (10)	28 (14)
Sometimes	31 (31)	34 (17)	28 (14)
Rarely	12 (12)	10 (5)	14 (7)
Never	33 (33)	36 (18)	30 (15)
It is too expensive to eat healthy for my diabetes			
Always	23 (23)	26 (13)	20 (10)
Sometimes	43 (43)	30 (15)	56 (28)
Rarely	13 (13)	16 (8)	10 (5)
Never	21 (21)	28 (14)	14 (7)

Table 8. Barriers to Following a Food Plan continued

<u>Barrier Statement</u>	<u>Percentage (Frequency)</u>		
	<u>Total</u> (n=100)	<u>Latino</u> (n=50)	<u>Caucasian</u> (n=50)
Craving sweets is a problem for me **			
Always	23 (23)	16 (8)	30 (15)
Sometimes	39 (39)	28 (14)	50 (25)
Rarely	19 (19)	26 (13)	12 (6)
Never	19 (19)	30 (15)	8 (4)
I eat more than I should when I am stressed ***			
Always	23 (23)	14 (7)	32 (16)
Sometimes	36 (36)	24 (12)	48 (24)
Rarely	19 (19)	24 (12)	14 (7)
Never	22 (22)	38 (19)	6 (3)
It is difficult to follow a schedule for meals and snacks **			
Always	22 (22)	22 (11)	22 (11)
Sometimes	39 (39)	26 (13)	52 (26)
Rarely	21 (21)	20 (10)	22 (11)
Never	18 (18)	32 (16)	4 (2)

Table 8. Barriers to Following a Food Plan continued

<u>Barrier Statement</u>	<u>Percentage (Frequency)</u>		
	<u>Total</u> (n=100)	<u>Latino</u> (n=50)	<u>Caucasian</u> (n=50)
It is hard to cook one way for me and a different way for others (such as family or friends)			
Always	22 (22)	18 (9)	26 (13)
Sometimes	26 (26)	24 (12)	28 (14)
Rarely	18 (18)	14 (7)	22 (11)
Never	34 (34)	44 (22)	24 (12)
Knowing how to cook or prepare food for my diabetes food plan is difficult**			
Always	22 (22)	8 (4)	16 (8)
Sometimes	26 (26)	22 (11)	32 (16)
Rarely	18 (18)	12 (11)	30 (15)
Never	34 (34)	58 (29)	22(11)
It is difficult to give up certain foods that I like*			
Always	15 (15)	14 (7)	16 (8)
Sometimes	53 (53)	40 (20)	66 (33)
Rarely	19 (19)	24 (12)	14 (7)
Never	13 (13)	22 (11)	4 (2)

Table 8. Barriers to Following a Food Plan continued

<u>Barrier Statement</u>	<u>Percentage (Frequency)</u>		
	<u>Total</u> (n=100)	<u>Latino</u> (n=50)	<u>Caucasian</u> (n=50)
Reducing portion sizes is too difficult			
Always	15 (15)	16 (8)	14 (7)
Sometimes	31 (31)	28 (14)	34 (17)
Rarely	25 (25)	20 (10)	30 (15)
Never	29 (29)	36 (18)	22 (11)
I don't know how to shop for food for my diabetes food plan			
Always	15 (15)	20 (10)	10 (5)
Sometimes	29 (29)	24 (12)	34 (17)
Rarely	22 (22)	18 (9)	26 (13)
Never	34 (34)	38 (19)	30 (15)
I don't have the will power to follow my diet**			
Always	14 (14)	16 (8)	12 (6)
Sometimes	52 (52)	48 (24)	56 (28)
Rarely	16 (16)	6 (3)	26 (13)
Never	18 (18)	30 (15)	6 (3)

Table 8. Barriers to Following a Food Plan continued

<u>Barrier Statement</u>	<u>Percentage (Frequency)</u>		
	<u>Total</u> (n=100)	<u>Latino</u> (n=50)	<u>Caucasian</u> (n=50)
Craving high fat foods is a problem for me			
Always	13 (13)	12 (6)	14 (7)
Sometimes	37 (37)	34 (17)	40 (20)
Rarely	24 (24)	22 (11)	26 (13)
Never	26 (26)	32 (16)	20 (10)
Reading food labels is too difficult*			
Always	13 (13)	12 (6)	14 (7)
Sometimes	27 (27)	18 (9)	36 (18)
Rarely	23 (23)	20 (10)	26 (13)
Never	37 (37)	50 (25)	24 (12)
I forget to eat*			
Always	4 (4)	4 (2)	4 (2)
Sometimes	33 (33)	24 (12)	42 (21)
Rarely	22 (22)	18 (9)	26 (13)
Never	41 (41)	54 (27)	28 (14)

*p<0.05, ** p < 0.01, ***p<0.0001, for ethnic difference

Table 9. Principle Components Factor Analysis for Barriers to Following a Food Plan

Factor Pattern 1		Factor Pattern 2		Factor Pattern 3		Factor Pattern 4	
<u>“Food cravings”</u>		<u>“Difficulties eating with others”</u>		<u>“Knowledge limits to shopping and cooking”</u>		<u>“Expense of eating healthy”</u>	
¹ 0.80	Difficult to give up certain foods that I like	0.75	Hard to cook one way for me and a different way for others (family or friends)	0.76	Don’t know how to shop for food for my diabetes	0.75	Too expensive to eat healthy for my diabetes
0.78	Craving high fat foods is a problem for me	0.63	When people eat foods I’m not supposed to have, I want to eat them too	0.63	Reading food labels is too difficult	0.62	I forget to eat
0.77	Craving sweets is a problem for me	0.56	I don’t have the will power to follow my diet	0.53	Knowing how to cook/prepare food for diabetes food plan is difficult	0.46	I eat more than I should when stressed
0.51	I eat more than I should when stressed	0.46	Reducing portion sizes is too difficult	0.45	Reducing portion sizes is too difficult		
Variance accounted for:							
20%		16%		13%		12%	

¹ Factor loadings

Table 10. Motivators to Following a Food Plan

<u>Motivator</u>	<u>Percentage (Frequency)</u>		
	<u>Total</u> (n=100)	<u>Latino</u> (n=50)	<u>Caucasian</u> (n= 50)
You feel healthier when following your food plan			
Very Important	81 (81)	86 (42)	80 (39)
Somewhat Important	17 (17)	14 (7)	20 (10)
Not at all Important	2 (2)	1 (2)	1 (2)
You get good blood sugar numbers when you follow your diabetes food plan*			
Very Important	80 (80)	90 (43)	76 (37)
Somewhat Important	17 (17)	10 (5)	24 (12)
Not at all Important	3 (3)	2 (4)	1 (2)
Grocery stores have a wide variety of healthy foods			
Very Important	76 (76)	82 (41)	70 (35)
Somewhat Important	16 (16)	12 (6)	20 (10)
Not at all Important	8 (8)	6 (3)	10 (5)
People close to you support your efforts to follow your diet goals**			
Very Important	74 (74)	90 (45)	59 (29)
Somewhat Important	25 (25)	10 (5)	41 (20)
Not at all Important	1 (1)	0	1 (2)

Table 10. Motivators to Following a Food Plan continued

<u>Motivator</u>	<u>Percentage (Frequency)</u>		
	<u>Total</u> (n=100)	<u>Latino</u> (n=50)	<u>Caucasian</u> (n= 50)
You receive encouragement from your dietitian, nurse, or doctor for trying to follow your diet goals*			
Very Important	70 (70)	83 (40)	61 (30)
Somewhat Important	27 (27)	17 (8)	39 (19)
Not at all Important	3 (3)	2 (4)	1 (2)
You have other people with diabetes around you for support**			
Very Important	56 (56)	70 (35)	42 (21)
Somewhat Important	27 (27)	18 (9)	28 (14)
Not at all Important	17 (17)	12 (6)	22 (11)
People close to you eat the same way you do**			
Very Important	49 (49)	68 (34)	30 (15)
Somewhat Important	30 (30)	20 (10)	40 (20)
Not at all Important	21 (21)	12 (6)	30 (15)
Someone helps with food preparation			
Very Important	32 (32)	44 (22)	20 (10)
Somewhat Important	32 (32)	32 (16)	32 (16)
Not at all Important	36 (36)	24 (12)	48 (24)

*p<0.05, ** p < 0.01, *** p<0.0001, for ethnic difference

Table 11. Principle Components Factor Analysis for Motivators to Food Plan

Factor 1 Pattern		Factor 2 Pattern	
<u>“Personal Diabetes Control”</u>		<u>“Family & Social Support”</u>	
¹ 0.87	Feel healthier when following food plan	0.82	People close to you eat the same way you do
0.80	Good blood sugar numbers when following food plan	0.69	People close to you support your efforts to follow diet goals
0.70	Grocery stores have a wide variety of healthy foods	0.66	Someone helps with food preparation
0.57	Receive encouragement from dietitian, nurse or doctor for trying to follow diet goals	0.51	You have people with diabetes around you for support
Variance accounted for:			
31%		25%	

¹ Factor loadings

Table 12. Stepwise Ordinal Logistic Regression Models for Predictors of Dependent Variables

Model: Food Plan Adherence

Likelihood Ratio (significance of the model): $p < 0.0001$

<u>Variable</u>	<u>β Coefficient</u>	<u>P-value</u>
Satisfaction with the food plan	1.4581	0.0007
Dietary strategy factor score:		
“Eat more vegetables, smaller meals”	0.7148	0.0031
Barrier factor score:		
“Difficulties eating with others”	-0.5146	0.0207
Physical activity adherence	0.2077	0.0247
Model $R^2 = 0.49$		

Model: Goal Attainment for a Food Plan

Likelihood Ratio (significance of the model): $p < 0.0001$

<u>Variable</u>	<u>β Coefficient</u>	<u>P-value</u>
Satisfaction with the food plan	1.3070	0.0025
Goal attainment for overall diabetes management	0.7661	0.0014
Model $R^2 = 0.39$		

Table 12. Stepwise Ordinal Logistic Regression Models for Predictors of Dependent Variables continued

Model: Stage of Change for a Food Plan

Likelihood Ratio (significance of the model): $p < 0.0001$

<u>Variable</u>	<u>β Coefficient</u>	<u>P-value</u>
Influence on choosing final food plan goals	-0.9934	0.0076
Dietary strategy factor score:		
“Modify fat, sugar or fiber”	0.4739	0.0273
Motivator factor score:		
“Personal diabetes control”	0.5591	0.0105

Model $R^2 = 0.26$

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SUMMARY

Type 2 diabetes has increased over the last 15 years among Latinos in the U.S., a group that is at high risk for having poorly controlled diabetes regardless of socioeconomic status. The American Diabetes Association (ADA) recommends a focus on enhancing Latino patients' goal setting skills – these are skills that enable patients to identify feasible behavioral changes and implement them to improve glycemic control. Successful dietary goal setting - identifying and instigating dietary changes - is core to diabetes control, yet understudied for all patient populations.

The purpose of this project was to assess goal setting in relation to a food plan and related factors among Latinos with type 2 diabetes. A preliminary qualitative stage of the project was conducted with male and female Latinos (n=10) and a comparison group of Caucasians (n=8) from a community migrant clinic to identify goal setting experiences during and after diabetes education (DE) and related personal, social, and environmental influences. Individual in-depth interviews were conducted using Social Cognitive Theory constructs. Findings included specific dietary goals practiced by patients, and important motivators (including self-efficacy and social support) and barriers (including personal control over eating) related to making overall dietary change.

Selected variables from the preliminary qualitative stage were used to design a survey instrument for the follow-up quantitative stage of the project. A 40-item questionnaire was administered to male and female Latino (n = 50) and Caucasian (n = 50) patients with type 2 diabetes who had received diabetes education within the previous 18 months at a similar community migrant health clinic. Questionnaires were administered on-site at the clinic in English or Spanish with the aid of an interpreter when requested by the

patient. Data included a one-time on-site A1C value and selected cardiovascular (CVD) risk factors from clinic records.

The sample was overall obese (mean BMI 34.5 ± 6.9 kg/m²). No significant ethnic differences were noted for CVD risk factors; however, Latino patients had a significantly higher mean A1C value (8.7%) than Caucasians (7.8%). Latino patients were more likely to receive a food plan from a health care provider and reported significantly greater perceived influence on overall diabetes management (DM) goals and greater DM goal attainment. Almost all patients (93%) selected food plan changes during DE as an area they would address for diabetes self-management (100% Latinos, 86% Caucasians, $p < 0.01$).

Ordinal logistic regression models were run for three dependent variables representing different dietary outcomes of DE – stage of change for a food plan, food plan adherence, and goal attainment for a food plan – using goal setting experiences during diabetes education and factor scores from Principal Components Factor Analysis (PCFA) patterns of motivators, barriers, and dietary changes as predictor variables. Stage of change for a food plan, a self-estimate of the patient's stage of adoption of a food plan, was predicted by greater patient influence on choosing final food plan goals during DE, adoption of a dietary pattern of modifying fat, sugar and fiber, and a motivator pattern reflecting clinical and physical signs of improved personal diabetes control. Among patients receiving a food plan from a health care provider, more frequent food plan adherence was predicted by greater food plan satisfaction, a dietary pattern of eating more vegetables and smaller meals, less frequent barriers stemming from difficulties eating with others, and higher frequency of physical activity adherence. Lastly, goal attainment for a food plan - the patients' self-evaluation of the extent to which they were following a food plan relative to

what they said they would do during DE - related to food plan satisfaction and overall goal attainment for diabetes self-management.

Differences in these dependent variables and their predictors suggest several aspects of patient experience with goal setting, as follows: 1) that food plan satisfaction needs to be a focus during DE; 2) that more involvement of the patient in choosing final food plan goals during DE increases satisfaction with the food plan and is associated with actual adoption of the plan; 3) that dietary changes by adopters may start out as complex (modifying fat, sugar and fiber was more characteristic of adopters than non-adopters) but may simplify over time (greater food plan adherence was associated with eating more vegetables and smaller meals); and 4) the patient's self-evaluation of food plan goal attainment has a different basis than food plan adherence. Future research is needed to validate the dietary outcome measures used in this study, including the dietary strategies used at different stages of dietary change and the factors influencing stages of change, so that the measures can be used by diabetes education programs for patient assessment, monitoring, and evaluation.

APPENDIX A

INTERVIEW SCHEDULE FOR MANUSCRIPT 1

Interview Schedule for Individual In-depth Interviews

Interviewer:

- ◆ Reviews purpose of interview
- ◆ Administers Informed Consent
- ◆ Ask participant if they have any questions or concerns before beginning

Warm-up Question:

- ◆ Since you were diagnosed with diabetes, name one thing that has changed.

Now, I'd like to ask you some questions about your food plan and diabetes.

Q-1. Do you eat differently now that you know you have diabetes? [IF YES] How?
[USE PROBES] What about:

- ◆ Eating or drinking between meals
- ◆ The food you buy
- ◆ Eating away from home
- ◆ Cooking

Q-2. Have you heard about food plans that can help control your diabetes? [IF YES]
What have you heard?

Q-3. Do you follow a food plan now, or have you ever followed one, to help control your diabetes? [IF YES, ASK Q-4, Q-5, & Q-6, OMIT Q-7. IF NO, GO TO Q-7]

Q-4. How would you describe your food plan?

Q-5. What makes it hard for you to follow your diabetes food plan? What makes it easy?

Q-6. How do you think you could follow your food plan better?

Q-7. [IF ANSWERED NO TO Q-3] What problems do you think you might have with trying to follow a food plan?

[USE PROBES] How about:

- ◆ Making changes in what you eat
- ◆ The costs of making these changes
- ◆ Changing your cooking style
- ◆ How your family reacts

Q-8. When you think about changing the way you eat for good control of your diabetes, who would help you? How about family members?

Q-9. Whose praise or support do you need to feel successful in controlling your diabetes with a food plan?

Next, I'd like to ask you more questions about what you need to control your diabetes.

Q-10. Besides making changes in how you eat, what else would you do to gain control over your diabetes?

Q-11. If you were in better control of your diabetes, how would your life be different?

Q-12. What do you need to help you control your diabetes?

Q-13. Have you told anyone that you have diabetes? [USE PROBES] Your family? Your friends? Church leader? Why or why not? [FOR PEOPLE WHO CHOSE TO INFORM OTHERS] Why did you tell those people? Is there anyone you chose not to tell? Why not?

Q-14. For people who know that you have diabetes, what do they say about what you are doing to control your diabetes? Are things they say important to you? [IF YES] Why are things they say important to you?

Q-15. If you wanted to take better care of your diabetes, do you think your family would be helpful to you? [IF YES] In what ways?

Q-16. Do you work outside your home? [IF YES] How does your job affect your diabetes control?

Q-17. Sometimes people use home remedies, like cactus or parsley, to help control their diabetes. What remedies do you use? [FOR EACH REMEDY LISTED] How do you use it?

Q-18. Have you seen a healer – a *curandero* – for help with your diabetes? [IF YES] After you saw the healer, did your diabetes control change?

Q-19. Does your doctor have you taking medicine or insulin to help control your diabetes?
[IF YES, GO TO Q-20].
[IF NO, GO TO Q-24].

Q-20. Are you able to take your medicine the way your doctor instructed?

Q-21. Can you treat high blood sugars on your own, or do you want help from someone else? [IF YES] Who would you want help from?

Q-22. Can you treat low blood sugars on your own, or do you want help from someone else? [IF YES] Who would you want help from?

Q-23. What do you think might happen if you stopped taking your medications? Are there any circumstances under which you would change the amount or type of medicines you take?

Q-24. If you wanted to get some diabetes education, where would you be willing to go for education?

[USE PROBES]

How about:

- ◆ Community center
- ◆ Clinic
- ◆ Church
- ◆ Other

Q-25. If you wanted to learn more about how to control your diabetes, who would you prefer to learn from? [USE PROBES] A doctor? A nurse? A dietitian/nutritionist? Someone else?

Now I'd like to ask you how you feel about controlling your diabetes in the future.

Q-26. What changes, if any, do you think you want to make to improve your diabetes control? Why?

[ASK Q27-Q29 FOR EACH CHANGE THE PATIENT IDENTIFIES]

- Q-27. How did you decide on those changes? [LET RESPONDENT ANSWER, THEN USE PROBES];
- ◆ Did a health care professional tell you what to do?
 - ◆ A family member?
 - ◆ A friend?
 - ◆ Your job?
- Q-28. How would you begin to make these changes?
- Q-29. Who would you want to help you make the changes?
- Q-30. Are there any roadblocks or things that would keep you from making those changes?

Q-31. If you wanted to improve your diabetes control, who would be involved? [USE PROBES] What about family members? Friends?

Q-32. How could a health care or medical professional help you, if at all, to better control your diabetes?

Q-33. Would you come back again on a regular basis to let the health care professionals see how your diabetes control is going? [IF YES] Why? [IF NO] Why not?

- ◆ Would you stop coming once you made the changes you wanted?
- ◆ What if you were not able to make the changes?

Q-34. Do you feel that your diabetes control is not as good as it could be because of stress in your life? [IF YES] Please name 2 things that are causing you stress.

Q-35. Some Latinas with type 2 diabetes are told by their doctor that losing weight could help them control their blood sugar better. If these women want to make changes in their diet to help with losing weight, do you think they are being selfish? [IF YES] Why? [IF NO] Why not?

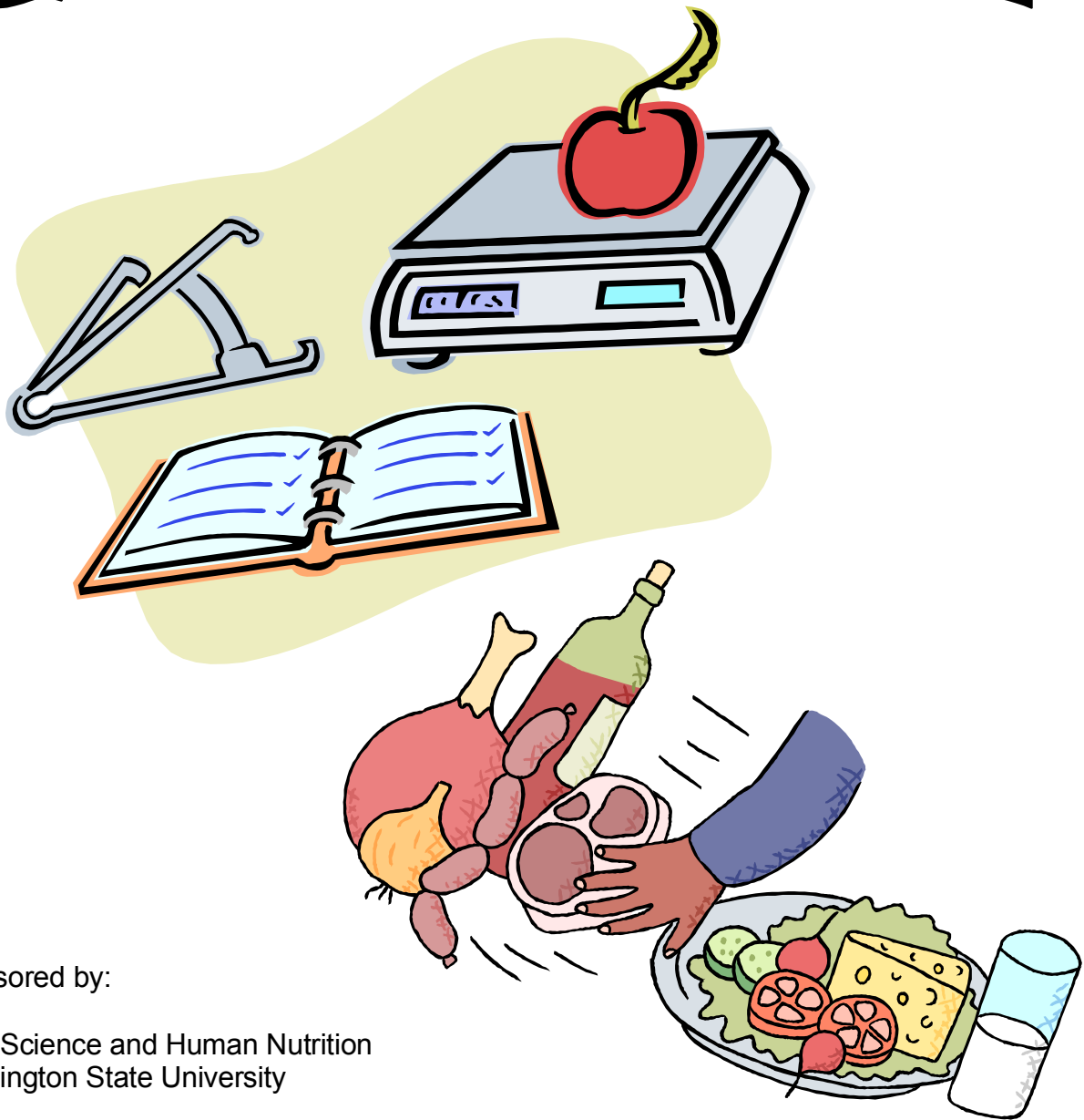
Q-36. What could you tell me that would help me know more about you?

Thank you for your participation!

APPENDIX B

SURVEY QUESTIONNAIRE FOR MANUSCRIPT 2

DIABETES DIET MANAGEMENT QUESTIONNAIRE



Sponsored by:

Food Science and Human Nutrition
Washington State University

DIABETES SELF-MANAGEMENT

Q1. We would like to know about your diabetes education. Please check the box(s) to show what type of diabetes education have you received.

	No ▼	Yes ▼
A Group class.....	<input type="checkbox"/> 1	<input type="checkbox"/> 2
B Individual instruction	<input type="checkbox"/> 1	<input type="checkbox"/> 2
C Follow-up education.....	<input type="checkbox"/> 1	<input type="checkbox"/> 2

Q2. Think about when you had your diabetes education. During diabetes education, did you choose any of the following areas to try and improve?

	No ▼	Yes ▼
Food planning	<input type="checkbox"/> 1	<input type="checkbox"/> 2
Exercise	<input type="checkbox"/> 1	<input type="checkbox"/> 2
Medications.....	<input type="checkbox"/> 1	<input type="checkbox"/> 2
Self-monitoring of blood glucose	<input type="checkbox"/> 1	<input type="checkbox"/> 2
Foot care.....	<input type="checkbox"/> 1	<input type="checkbox"/> 2
Eye care.....	<input type="checkbox"/> 1	<input type="checkbox"/> 2
Stress management.....	<input type="checkbox"/> 1	<input type="checkbox"/> 2

Q3. Did your diabetes educator (dietitian, nurse, or doctor) ask you what goal(s) you wanted to achieve by coming to diabetes education?

- 1 No
- 2 Yes

Q4. Did you feel that you had an influence on choosing the final goals for your diabetes care during diabetes education?

- 1 Yes, I had a lot of influence
- 2 Yes, I had some influence
- 3 No, I had no influence

Q5. How confident are you that you would be able to achieve the goal(s)?

- 1 Not at all confident
- 2 Somewhat confident
- 3 Very confident

Q6. Thinking about how much you agreed to do for your diabetes, would you say you are doing . . .

- ₁ Much less than you agreed to do
- ₂ Somewhat less
- ₃ About what you agreed to do
- ₄ Somewhat more
- ₅ Much more than you agreed to do

Sometimes people choose to work on improving their eating habits for better blood sugar control.

Q7. Please check the box for the one statement below that best describes how frequently you follow a food plan for your diabetes.

- ₁ I do **not** follow a food plan, and I **do not plan** to start in the near future.
- ₂ I do **not** follow a food plan now, but I have been **thinking** of starting.
- ₃ I am planning to begin following a food plan **in the next month**.
- ₄ I have been following a food plan for the **past 1 to 6 months**.
- ₅ I have been following a food for **over 6 months**.
- ₆ I had been following a food plan, but I **no longer** do this.

Q8. Did you get a diabetes food plan from your doctor, dietitian or nurse?

- ₁ No, → **SKIP TO Q14**
- ₂ Yes, → **GO TO Q9**

Q9. On average, over the last SEVEN days, how many days have you followed a food plan for diabetes?

_____ # of days

Q10. How satisfied are you with your diabetes food plan?

- ₁ Not at all satisfied
- ₂ Somewhat satisfied
- ₃ Very satisfied

Q11. Did your diabetes educator (dietitian, nurse, or doctor) ask you what food plan changes you wanted to accomplish?

- ₁ No
- ₂ Yes

Q12. Did you feel that you had an influence on choosing the final goals for your diabetes food plan during diabetes education?

- ₁ Yes, I had a lot of influence
- ₂ Yes, I had some influence
- ₃ No, I had no influence

Q13. Thinking about how much you agreed to do for your diabetes food plan, would you say you are doing . . .

- ₁ Much less than you agreed to do
- ₂ Somewhat less
- ₃ About what you agreed to do
- ₄ Somewhat more
- ₅ Much more than you agreed to do

DIABETES DIETARY BACKGROUND

Q14. The following is a list of possible changes a person with diabetes can make with what they eat to control blood sugar. For each of those changes, please indicate if you have never tried the change, tried it a little, tried it some of the time, or tried it most of the time, and are doing it now.

	Tried most of the time ▼	Tried some of the time ▼	Tried, but only a little ▼	Never Tried ▼
A Eat smaller meals.....	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
B Cook with or use less fat or oil	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
C Cook with or use a different type of fat or oil.....	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
D Cook with more vegetables and greens.....	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
E Avoid fried foods.....	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
F Grill meats instead of frying.....	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
G Eat more vegetables or greens.....	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
H Eat low fat foods.....	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
I Eat leaner meats	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
J Eat more fresh or frozen fruits.....	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
K Eat low-sugar or sugar-free foods.....	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
L Eat higher fiber foods	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
M Eat less bread, rice, or pasta	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
N Eat less canned fruit.....	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
O Avoid regular fruit juice or soda pop.....	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1

FOLLOWING A FOOD PLAN

Q15. We'd like to know what kinds of things help you to meet your diet and nutrition goal(s). Please indicate how important each of the things listed below is in helping you achieve your diabetes food plan goals.

How important is it that:	Not at all ▼	Somewhat ▼	Very ▼
A You receive encouragement from your dietitian, nurse, or doctor for trying to follow your diet goals?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3
B People close to you support your efforts to follow your diet goals?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3
C Grocery stores have a wide variety of healthy foods?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3
D People close to you eat the same way you do?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3
E Someone helps with food preparation?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3
F You get good blood sugar numbers when you follow your diabetes food plan?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3
G You feel healthier when following your food plan?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3
H You have other people with diabetes around you for support?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3

Q16. Making healthy food choices for diabetes control is easy for me.

- ₁ Strongly disagree
- ₂ Somewhat disagree
- ₃ Somewhat agree
- ₄ Strongly agree
- ₅ Don't Know

Q17. I want to make changes in my diet for better diabetes control.

- ₁ Strongly disagree
- ₂ Somewhat disagree
- ₃ Somewhat agree
- ₄ Strongly agree
- ₅ Don't Know

Q18. This next set of questions asks you about things that may make it harder for you to follow a diabetes food plan. For each item below please check how often it is true for you, if at all.

	Never ▼	Rarely ▼	Sometimes ▼	Always ▼
A It is too expensive to eat healthy for my diabetes.....□ ₁	□ ₂	□ ₃	□ ₄	
B I don't know how to shop for food for my diabetes food plan.....□ ₁	□ ₂	□ ₃	□ ₄	
C Knowing how to cook or prepare food for my diabetes food plan is difficult.....□ ₁	□ ₂	□ ₃	□ ₄	
D I don't have the will power to follow my diet.....□ ₁	□ ₂	□ ₃	□ ₄	
E I forget to eat.....□ ₁	□ ₂	□ ₃	□ ₄	
F Craving sweets is a problem for me.....□ ₁	□ ₂	□ ₃	□ ₄	
G Craving high fat foods is a problem for me.....□ ₁	□ ₂	□ ₃	□ ₄	
H It is difficult for me to give up certain foods that I like.....□ ₁	□ ₂	□ ₃	□ ₄	
I It is difficult for me to follow a schedule for meals and snacks.....□ ₁	□ ₂	□ ₃	□ ₄	
J Reducing portion sizes is too difficult.....□ ₁	□ ₂	□ ₃	□ ₄	
K Reading food labels is too difficult.....□ ₁	□ ₂	□ ₃	□ ₄	
L People close to me don't understand about my diet.....□ ₁	□ ₂	□ ₃	□ ₄	
M When people eat foods I'm not supposed to have, I want to eat them too.....□ ₁	□ ₂	□ ₃	□ ₄	
N It is hard to cook one way for me and a different way for others (such as family or friends).....□ ₁	□ ₂	□ ₃	□ ₄	
O I eat more than I should when I am stressed.....□ ₁	□ ₂	□ ₃	□ ₄	

HERBAL REMEDIES

Q19. Do you use home remedies, or herbal remedies, for treating your blood sugar?

- ₁ Never
- ₂ Rarely
- ₃ Sometimes
- ₄ Always

Q20 If it didn't harm you, would you try any home remedy to help control your diabetes?

- ₁ I don't know
- ₂ Definitely not
- ₃ Probably not
- ₄ Probably yes
- ₅ Definitely yes

OTHER AREAS OF DIABETES MANAGEMENT

Q21. On how many of the last SEVEN days did you participate in at least 30 minutes of physical activity?

_____ # of days



Q22. Do you take prescribed oral medication(s) to control your diabetes?

- ₁ No, → **SKIP TO Q25**
- ₂ Yes

Q23. During the last SEVEN days, how often did you actually take the prescribed medications?

- ₁ All of the time
- ₂ Most of them
- ₃ Some of time
- ₄ None of time

Q24. Do you sometimes not pay bills, or not buy food because of the cost of medications?

- ₁ No
- ₂ Yes

Q25. Do you take insulin injections?

- ₁ No → **SKIP TO Q27**
- ₂ Yes



Q26. During the last SEVEN days, how often did you actually take the prescribed insulin injections?

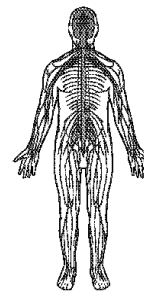
- ₁ All of the time
- ₂ Most of them
- ₃ Some of time
- ₄ None of time

Q27. How would you describe your blood sugar (diabetes) control?

- ₁ excellent
- ₂ very good
- ₃ good
- ₄ fair
- ₅ poor
- ₆ don't know

Q28. How would you describe your overall health?

- ₁ excellent
- ₂ very good
- ₃ good
- ₄ fair
- ₅ poor
- ₆ don't know



DEMOGRAPHIC QUESTIONS

Q29. What is your gender?

- ₁ Male
- ₂ Female

Q30. Which one of the following best describes your CURRENT marital status?

- ₁ Never married
- ₂ Divorced
- ₃ Separated
- ₄ Married
- ₅ Widowed
- ₆ Living with a partner
- ₇ Other (*please specify*): _____

Q31. How many children, under 18 years of age, live in your household?

- ₁ None
- ₂ One
- ₃ Two
- ₄ Three
- ₅ Four
- ₆ Five or more

Q32. Do you have family living in Mexico or Latin America?

- ₁ No → **SKIP to Q34, next page**
- ₂ Yes

Q33. Having my family live far away from me makes it hard to follow my diabetes food plan. (*Please check one answer.*)

- ₁ Strongly disagree
- ₂ Disagree
- ₃ Undecided
- ₄ Agree
- ₅ Strongly agree
- ₆ Not applicable

Q34. Do you have family living in the local area?

- ₁ No
- ₂ Yes

Q35. How often do you shop for the food you eat for yourself?

- ₁ Never
- ₂ Some of the time
- ₃ Most of the time
- ₄ All of the time

Q36. How often do you prepare the food you eat?

- ₁ Never
- ₂ Some of the time
- ₃ Most of the time
- ₄ All of the time

Q37. Do you have some kind of financial assistance, such as Medicare/Medicaid, reduced clinic fees (sliding scale), or insurance, to help pay for your diabetes care?

- ₁ No, I do not have any financial assistance
- ₂ Yes, I have financial assistance
- ₃ I don't know

Q38. How many years ago were you diagnosed with diabetes?

_____ Years

Q39. What is your current age?

_____ Years

Q40. Please tell us how you would describe your ethnic background.
(Please check one box only.)

₁ Latino/Hispanic

₂ Caucasian/White

₃ Other, please specify here _____

Thank you very much! You have finished the questionnaire. We value your opinions!

Do you have any additional comments about Diabetes Diet Management?