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Pushing the envelope for cultural appropriateness: Does evidence support cultural tailoring in type 2 diabetes interventions for Mexican American adults?

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Abstract

Purpose—This study explores the potential utility of a culturally tailored diabetes management intervention approach by testing associations between acculturation and diabetes-related beliefs among Mexican American adults with type 2 diabetes.

Methods—Data from 288 Mexican American adults with type 2 diabetes were obtained via a bilingual, telephone-administered survey. Participants were drawn from a stratified, random sample designed to obtain maximum variability in acculturation. The survey assessed diabetes-related beliefs, intervention preferences, and three acculturation constructs from the Hazuda acculturation and assimilation scales: Spanish use, value for preserving Mexican culture, and interaction with Mexican Americans.

Results—Only one outcome, preference for a program for Mexican Americans, was associated with all three acculturation variables. Spanish use was positively associated with belief in *susto* as a cause of diabetes, preference for expert-driven health guidance, and involvement of others in taking care of diabetes. Value for preserving Mexican culture was related to a more holistic view of health, as evidenced by an increased likelihood of consulting a *curandero*, use of prayer, and interest in a diabetes program with religious content. Value for cultural preservation was also related to higher suspicion of free diabetes programs. Interaction with Mexican Americans was associated with a belief that insulin causes blindness.

Conclusions—Findings from this study suggest distinct relationships between acculturation constructs and diabetes-related beliefs and preferences, this arguing against use of a single acculturation construct to determine diabetes intervention design. Cultural tailoring may enhance the cultural appropriateness and ultimate effectiveness of diabetes interventions for Mexican American adults.

The prevalence of type 2 diabetes in the U.S. is almost twice as high among Mexican Americans than among non-Latino Whites.¹ Mexican Americans also tend to have more severe diabetes² and to experience disease onset at earlier ages.³ Since Mexican Americans comprise the largest and fastest growing U.S. Latino subgroup,⁴ the need for effective, culturally appropriate interventions to support diabetes management among Mexican Americans is increasing.^{5, 6}

A number of effective diabetes management interventions have been developed for Mexican Americans and other Latino populations.^{e.g., 7-15} Many of these interventions have included elements to enhance cultural appropriateness, such as the use of Spanish, discussions of ethnic Latino foods, inclusion of Latino music, and use of exclusively Latino staff.¹⁶ However, diabetes management programs for Latinos have primarily consisted of educational classes designed for groups of participants¹⁶ and have thus, by necessity, tended to incorporate cultural elements deemed relevant to the majority of program participants. While this “one size fits all” approach may be culturally appropriate for some program participants, Latinos are culturally heterogeneous, and the broad application of selected cultural features may reduce the appeal and salience of diabetes interventions for many Latino individuals.

Cultural tailoring presents a potential solution to the one size fits all dilemma. Due to relatively recent technological advances, diabetes educators now have the opportunity to create interventions that accommodate within-group cultural heterogeneity at the individual level through cultural tailoring. Tailoring is the utilization of individual-level data to create personalized health programming¹⁷. As such, tailoring could be used to help type 2 diabetes patients improve glycemic control by creating intervention materials that specifically address individual behavior change needs. Examples of potential behavior change targets include building self-efficacy for physical activity, improving blood glucose monitoring, assisting patients in communicating with their doctors, increasing diabetes knowledge, and addressing barriers to compliance with dietary recommendations. Tailoring generally appears to be more effective than group-targeted interventions across diverse populations.¹⁸ However, only two published studies have tested tailoring with a Latino population,^{19, 20} and no study has tested the effectiveness of cultural tailoring, which is defined as tailoring on cultural variables, for a Mexican American population. This paper posits that cultural tailoring represents an underutilized approach for maximizing cultural appropriateness in diabetes management interventions for Mexican Americans by ensuring that participants only receive personally salient cultural elements in their intervention materials. Before culturally tailored diabetes interventions for Mexican Americans can be tested, however, it is necessary to develop a deeper understanding of how diabetes-related beliefs that have been associated with Mexican Americans vary among this population, and how. To this end, this paper uses data from a telephone survey to explore relationships between acculturation and diabetes-related beliefs and intervention preferences among Mexican American adults with type 2 diabetes. Implications for study findings for the design of tailored diabetes management interventions are discussed.

Research Design and Methods

Sample

Data were obtained via a 2008 telephone survey of U.S. adults of Mexican descent with type 2 diabetes residing in Texas or California. The study sample was designed to recruit respondents who varied in acculturation and cultural beliefs. To achieve this cultural heterogeneity, the sampling design targeted three groups of respondents using lists of phone numbers purchased from a commercial sampling vendor. The lists for Group 1 and Group 2 were created by overlaying information from the vendor's database with Hispanic ethnic

density data from the 2000 U.S. Census. Hispanic ethnic density refers to the proportion of persons of self-reported Hispanic ethnicity living in a specified geographic area. For this study, three levels of Hispanic density were created: 0-33% density, where no more than one-third of residents were Hispanic; greater than 33% and up to 66% density, where between one-third and two-thirds of residents were Hispanic; and greater than 66% density, where more than two-thirds of residents were Hispanic. Group 1 was recruited from phone numbers associated with individuals who had Hispanic surnames, had previously reported having type 2 diabetes, and who lived in telephone area code exchange combinations with a 0-33% density of Hispanic ethnicity. Group 2 was recruited using phone numbers associated with individuals who had Hispanic surnames, had previously reported having type 2 diabetes, and who lived in telephone area code exchange combinations with greater than 33% and no more than 66% density of Hispanic ethnicity. Group 3 was recruited using a list of randomly generated telephone numbers in area code exchange combinations with an over 66% density of Hispanic ethnicity. This random number generation included both landlines and cell phones. Since the incidence of eligible participants in the three sampling groups was expected to be low, a small subset was also recruited via non-probability methods by soliciting referrals from participants in Groups 1-3. Throughout, efforts were made to ensure that each of the three main sampling groups comprised approximately one-third of the final sample. Eligible participants reported being diagnosed by a doctor with type 2 diabetes, between 18 and 75 years of age, not pregnant, and of Mexican descent. To qualify as being of Mexican descent, participants had either: (1) two sets of parents born in Mexico; (2) two sets of grandparents born in Mexico; or (3) one parent and an opposing set of grandparents born in Mexico.

Data Collection

Interviewers first ascertained whether anyone in the household had type 2 diabetes. No participants were requested by name, as the accuracy of the listed samples was unknown. If the initial respondent reported more than one person in the household with type 2 diabetes, the interviewer requested the resident with the most recent birthday. All interviewers were bilingual in Spanish and English, and calls were initiated using the language in which the respondent answered the phone. A thank-you letter containing a \$20 gift card to a retail store was subsequently mailed to participants providing valid mailing addresses. A total of 3,167 phone numbers were called between June and August 2008, resulting in 292 completed surveys from eligible participants. Since it is unknown how many phone numbers were associated with eligible respondents, these figures yield a conservative response rate of 9.2%. Four participants had incomplete data and were excluded from analyses. Thus, the final analytical dataset contained 288 participants. This study was approved by a human subjects review committee at [institute name blinded].

Measures

Acculturation—Three acculturation variables were computed: Spanish use, value for preserving Mexican culture, and interaction with Mexican Americans. These variables were assessed using subsets of items from the Hazuda acculturation and structural assimilation scales,^{21, 22} which were specifically developed for use with Mexican Americans.

Spanish Use: Spanish use was measured using nine items drawn from two subscales with high correlations: English comprehension (3 items ranging from one to four) and adult Spanish use (6 items ranging from one to five). The combined scale had high internal consistency reliability ($\alpha = 0.95$). Higher scores indicated higher use of Spanish and lower use and comprehension of English.

Value for Preserving Mexican Culture: Value for preserving Mexican culture was measured with three items querying the importance of passing Mexican traditions on to children. Response options ranged from one to four, and higher scores indicated higher importance placed on preserving Mexican culture ($\alpha = 0.82$).

Interaction with Mexican Americans: Interaction with Anglos versus Mexican Americans in adulthood was measured using two items ranging from one to three. Higher scores indicated more interaction with Mexican Americans ($\alpha = 0.82$). Details on the content of the items in these subscales are available elsewhere.²³

Beliefs and Intervention Preferences—Relationships were assessed between the three acculturation variables and 16 diabetes-related beliefs and intervention preferences representing seven domains: personal illness models; barriers to insulin use; use of alternative therapies; likelihood to consult a folk healer (*curandero*); preference for expert direction in health care; self vs. shared disease management; and intervention preferences. These beliefs and preferences were selected because they were hypothesized to covary with acculturation among Mexican American adults, based on the existing literature on Latinos with type 2 diabetes. However, many of these beliefs and preferences have only been documented in the literature in qualitative research; thus, survey items to assess many of these beliefs and preferences were created by the study team.

Personal Illness Models: Four items were designed to explore personal illness models. Participants were asked whether “Diabetes can be caused by an intense fright or trauma (*susto*)” (“Yes”/“No”). Prior research indicates that some Mexican Americans believe in *susto* as a catalyst of diabetes onset,²⁴⁻²⁶ and endorsement of this belief appears to vary by acculturation.^{27, 28} Participants also rated their agreement with the statement that “Sadness, fear, or unhappiness can make diabetes get worse” (5-point Likert scale). The intention of this item was to explore a finding from qualitative research that some Mexican Americans worry that negative emotions will increase their blood glucose levels.²⁵ The item “In terms of managing diabetes, how a person feels in his heart is as important as how he feels in his body” (5-point Likert scale) sought to assess a relationship between acculturation and a holistic view of health. The fourth item asked participants whether or not they agreed that “Diabetes can be cured”. This item was drawn from a previously published measure of diabetes knowledge among Mexican Americans with type 2 diabetes.²⁹ Qualitative data indicate that some Mexican Americans view diabetes as a temporary, curable disease,^{30, 31} which may be related to a lack of understanding of the chronicity of type 2 diabetes and a perception that diabetes care behaviors are unassociated with glycemic control.³⁰

Barriers to Insulin Use: Two items were created by the study team to assess beliefs previously identified as barriers to insulin use among Mexican Americans:^{25, 28, 32} “Insulin can cause blindness” (“Yes”/“No”) and “Insulin is only prescribed to people who have failed to take care of themselves” (5-point Likert scale).

Use of Alternative Therapies: A single item explored use of alternative remedies: “How many of the last seven days did you take any vitamins, herbal teas, or drinks to help your diabetes?” Prior research indicates that acculturation may be inversely associated with use of folk remedies among Mexican Americans with diabetes.^{25, 28} Feedback from medical providers suggests that financial barriers may motivate use of alternative remedies.^{33, 34}

Likelihood to Consult a Folk Healer: Research also indicates that lower-income and lower-acculturated Mexican Americans may be more likely to have positive attitudes about seeing *curanderos*, or folk healers.³⁵ Thus, participants in this study were asked to rate their

likelihood of consulting a *curandero* using a previously published item: “On a scale of one to ten with one being “not at all likely” and ten being “very likely”, how likely do you think you would be to seek help for your diabetes from an herbalist or folk healer (*curandero*)?”³⁵

Preference for Expert Direction: One item was adapted from a prior study by two of the co-authors: “When it comes to managing my diabetes, I would prefer for an expert to just tell me what to do” (10-point Likert scale).³⁶ This item, which was intended to tap into preference for autonomous versus expert-driven health care, was predicted to be negatively associated with acculturation due to the Mexican American cultural value for *simpatía*, or agreeableness, in interpersonal communications.³⁷

Self vs. Shared Disease Management: Three items explored how Mexican American adults manage or co-manage their diabetes care. Due to traditional Mexican gender roles and a strong Mexican cultural value for familism,³⁸ it was predicted that acculturation would be negatively associated with the following items: “For the most part, the people that I live with take care of my diabetes” and “(Administered only to participants with a spouse/partner:) My (spouse/partner) and I are equal partners in caring for my diabetes.” In contrast, acculturation was expected to be positively associated with “My diabetes care is my own responsibility”. All three items were rated on a 10-point Likert scale.

Intervention Preferences: Participants were asked about their preferences regarding several aspects of intervention design. Based on previous recommendations to consider religiosity in health program planning for Latino populations,^{e.g., 6, 39} participants were asked to rate their agreement with “Prayer is an important part of managing diabetes” (5-point Likert scale) and to say whether or not they would be interested in a free diabetes care program that “talked about how religiosity and/or spirituality can play a role in diabetes care”. Participants were also asked whether or not they would be interested in a diabetes program that “was specifically designed for Mexican Americans”. Based on concerns raised by medical providers that low-income Mexican Americans and other Latinos may refuse free medical services and diabetes care supplies,³³ participants were further queried about whether or not they would be “suspicious of a diabetes care program that was offered free of charge from (their) health care provider”.

Control Variables—Gender, age, education, having health insurance (“Yes”/“No”), and income were also assessed.

Statistical Analysis

All analyses were conducted using SAS 9.2 for Windows.⁴⁰ Means and frequencies were computed to describe the study sample, and t-tests and chi-square tests were utilized to explore differences by state of residence across the demographic and acculturation variables. Frequencies were generated to illustrate the distributions of the dependent variables.

With the exception of the “My diabetes care is my own responsibility” item, all of the dependent variables were hypothesized to be positively related to Spanish use, value for preserving Mexican culture, and interaction with Mexican Americans. The “My diabetes care is my own responsibility” item was predicted to be inversely associated with Spanish use, value for preserving Mexican culture, and interaction with Mexican Americans. The dependent variables were run as separate models for conceptual reasons, since they were believed *a priori* to measure conceptually distinct concepts. Calculations of internal consistency coefficients among conceptually related variables were conducted and yielded low alphas (below .60), providing support for considering the dependent variables as separate models.

In order to test the study hypotheses, two sets of regression models were computed. The first set of models tested linear associations between the three acculturation variables and the 11 dependent variables consisting of beliefs and preferences measured by Likert scales. These models were run as generalized linear regression models using the SAS proc reg procedure. The second set of models tested relationships between the three acculturation variables and the five remaining dependent variables, which were assessed as binary variables. These logistic regression models were tested using the SAS proc logistic procedure. All models controlled for gender, age, education, income, and health insurance. Due to concerns for response style bias in these data,²³ all models additionally controlled for acquiescent (reflexive agreement) and extreme response (selecting response scale endpoints) styles by creating a variable to represent participants' use of each of these response styles. *A priori*, the three acculturation variables were expected to be highly intercorrelated; however, multicollinearity was not found to be a problem for any of the models tested. In addition to the models reported, separate models were run to explore interactions with gender. Since these analyses yielded only a few interactions and did not substantially alter the overall results found in the main analyses, only models using a combined sample of men and women are reported.

Results

Sample Characteristics

Women represented 58% of the study sample (Table 1). Almost one-fifth of the sample reported an 11th grade education or less. Over a quarter of the sample reported an annual household income of \$20,000 or less, while 11.4% reported an income of over \$80,000 a year. Most participants (77%) had health insurance. More participants lived in Texas (54%) than California (46%); however, no differences in demographics were observed between participants from the two states. The unstandardized English comprehension mean was 1.64, which was just under the midpoint. The mean score for adult Spanish use was very close to the midpoint, at 2.69. The mean value for preserving Mexican culture (3.19) indicates a relatively strong value for passing on Mexican traditions. The higher mean for interaction with Mexican Americans (2.29) suggests that participants had more interaction with Mexican Americans than Anglos.

Distributions of Variables Representing Diabetes-Related Beliefs and Intervention Preferences

Almost half of the sample reported using alternative remedies daily (Table 2), but only 11% of participants said they would be very likely to consult a *curandero*. Approximately half of participants strongly agreed that negative emotions can worsen diabetes (53%), that prayer was an important part of managing diabetes (55%), and that others took care of their diabetes (48%). A majority reported that how a person feels in his heart was as important as the body (64%), a preference for an expert to tell them what to do (59%), being equal partners with their spouse/partner in managing their diabetes (60%), and that their diabetes care was their own responsibility (86%). Only 29% of participants strongly agreed that insulin can cause blindness, and 33% agreed that insulin use signifies a failure to care for one's diabetes. Most respondents disagreed that diabetes can be caused by *susto* (57%) or that diabetes can be cured (69%). Participants were divided on whether or not they would be interested in a diabetes program that talked about religion or spirituality, whereas 68% of respondents were interested in a program for Mexican Americans. Thirty-nine percent of participants would be suspicious of a free diabetes program.

Associations Between Acculturation and Diabetes-Related Beliefs and Intervention Preferences

Results for linear regression models testing associations between the three acculturation variables and specific diabetes-related beliefs and intervention preferences are shown in Table 3. The more that participants reported using Spanish in their daily lives, the more likely they were to agree that insulin was prescribed to people who have failed to care for themselves ($p=.002$), to prefer for an expert to tell them what to do for their diabetes ($p=.002$), and to report that the people they lived with took care of their diabetes ($p=.003$). Participants who reported a stronger value for preserving Mexican culture were more likely to seek help for diabetes from a *curandero* ($p=.01$), to agree that how a person feels in his heart was as important as how he feels in his body ($p=.03$), and to believe that prayer was an important part of diabetes management ($p=.02$). Only one significant association was found for interaction with Mexican Americans versus Anglos: participants reporting more interaction with Mexican Americans than Anglos were more likely to agree that insulin causes blindness ($p=.02$).

Several of the control variables were also significant. Older participants were more likely to prefer for an expert to tell them what to do for their diabetes than younger participants ($p=.02$). Male and lower income respondents were more likely to say that their spouse/partner was an equal partner in caring for their diabetes than female and higher income participants ($p=.02$). Participants with more years of education were more likely to use alternative remedies ($p=.003$) and to believe that insulin is prescribed for people who have failed to take care of themselves ($p=.05$).

Results for logistic regression models testing associations between the three acculturation variables and specific diabetes-related beliefs and intervention preferences are shown in Table 4. Participants who used Spanish more in their daily lives were more likely to believe that diabetes can be caused by *susto* ($p=.0004$) and less likely to believe that diabetes can be cured ($p=.004$). Participants who valued preserving Mexican culture more were more likely to express interest in a diabetes care program involving religion or spirituality ($p=.01$). Using Spanish more ($p=.04$), having a stronger value for preserving Mexican culture ($p=.05$), and more interaction with Mexican Americans ($p=.02$) were all associated with stronger interest in a diabetes care program that was specifically designed for Mexican Americans. Female participants ($p=.03$) and participants with a stronger value for preserving Mexican culture ($p=.03$) were also less likely to be suspicious of a free diabetes program.

Implications for Diabetes Educators—Of the 16 dependent variables assessed in this study, only one, interest in a program designed specifically for Mexican Americans, yielded significant findings for all three of the acculturation variables tested. This pattern of findings suggests that the three domains of acculturation studied are not interchangeable, which cautions against making assumptions about diabetes-related beliefs and intervention preferences based on a single acculturation construct.

Higher Spanish use, stronger value for preserving Mexican culture, and more interaction with Mexican than Anglo Americans were all associated with stronger preference for a diabetes program specifically designed for Mexican Americans. This finding suggests that not only may lower-acculturated individuals be more likely to prefer a program for Mexican Americans, but also that more highly-acculturated individuals may be less likely to participate or be engaged in a program targeting Mexican Americans, despite their Mexican heritage.

Results from this study imply that Mexican Americans with type 2 diabetes who are monolingual or primarily Spanish speakers may sustain personal illness models supporting a

strong role for negative emotions (*susto*) in the etiology of diabetes. However, although Spanish speakers may be more likely to believe in *susto* as a causative agent, acculturation does not appear to be associated with a belief that negative emotions can worsen diabetes post-diagnosis. Most participants in this study believed that negative emotions can be a deleterious effect on diabetes, regardless of acculturation. Since previous research indicates that Mexican Americans endorsing non-behavioral etiological factors may be less active diabetes self-managers,²⁶ educators may consider using tailoring to assist individuals in tracking diabetes behaviors and their proximal and distal effects on diabetes control in order to improve adherence to diabetes regimens. However, the hypothesis that individuals who endorse *susto* are less likely to see connections between diabetes care behaviors and glycemic control should be confirmed.

Since Mexican culture has been described as collectivist, it was anticipated that lower-acculturated Mexican Americans would report more shared responsibility and less personal responsibility in their diabetes care. A more complex pattern emerged. Spanish speakers were more likely to report that the people they live with took care of their diabetes, suggesting a more external locus of control over diabetes care. Evidence of an external locus of control may be further suggested by the findings that Spanish speakers were less likely to say that diabetes can be cured and that Spanish speakers and older program participants were more likely to prefer expert-driven, directive health care guidance. Men and lower income respondents were more likely to say that their spouse/partner was an equal partner in caring for their diabetes. This finding is consistent with prior research on Mexican gender roles, in which women are the traditional caretakers of the health of their families. These data indicate a more collectivist, external approach to diabetes management, particularly among men and older patients, and lend evidence to the assertion that interventions focused on self-efficacy may be culturally inappropriate for populations with more collectivist cultural orientations.^{5, 41} However, this study also found that most participants reported that diabetes care was their own responsibility, and agreement with this sentiment was not associated with acculturation. Thus, sharing diabetes care does not appear to exclude a person with diabetes from feeling some responsibility for disease management. Together, these findings indicate that diabetes interventions for Mexican Americans may need to be tailored on gender roles, self- versus collective disease regulation, locus of control, and preference for expert-directed vs. autonomous health care guidance. In at least one intervention study with African Americans,³⁶ tailoring on preference for expert versus autonomous direction has been shown to be effective in achieving health behavior change.

Findings from this study also suggest associations between value for preserving Mexican culture and endorsement of a more holistic approach to diabetes management, indicating more use of spiritually oriented strategies that may provide individuals with additional resources for coping with type 2 diabetes. Among this sample of Mexican American adults, value for preserving Mexican culture was associated with the belief that how one feels in one's heart is as important as the body, higher likelihood of consulting a *curandero*, use of prayer in managing diabetes, and interest in a diabetes program that incorporates religion and/or spirituality. Mexican American program participants who value Mexican cultural traditions may therefore respond better to intervention content with a holistic framework than Mexican Americans expressing less regard for cultural preservation. It is important to note, however, that only half of the participants in this study endorsed the use of prayer in managing diabetes or a desire for a diabetes program that talked about religion or spirituality. This finding may be contrary to stereotypes about Mexican American adults and suggests that religiosity may be an effective variable for cultural tailoring. Cultural tailoring may also be warranted in messages concerning use of *curanderos*. Individuals who consult *curanderos* may be reluctant to reveal such use, while those who eschew this practice may be offended by being asked about such use.⁴² To avoid offense, educators may use tailored

approaches to address this topic only with participants who strongly value preserving Mexican culture.

Participants who valued preserving Mexican culture and men were both more likely to report suspicion of a free diabetes program. Medical providers have attributed refusal of free diabetes services and supplies among Latinos to pride, fears of losing residency, and beliefs that free services and goods would be billed at a future time.³³ This study supports some of these observations, as the desire to preserve Mexican culture may tap into cultural pride, which, in turn, may encourage the rejection of free services as a means of projecting a positive image for one's cultural group. Men may be particularly unwilling to participate in free programs, as the receipt of such services may undermine their roles as primary providers of material goods for their families.⁴³ Nonetheless, many participants in this study reported financial barriers to purchasing sufficient blood glucose monitoring supplies (not reported); thus, it is unclear whether educators should seek alternative fee structures for diabetes programs. Resolving this dilemma is a goal of current research by the authors.

In contrast to epidemiological studies,^{22, 44} the degree of interaction with Anglo versus Mexican Americans was a weak influence on diabetes-related beliefs and intervention preferences. Aside from a stronger preference for a program designed for Mexican Americans, which was already discussed, the only association found for structural assimilation was a positive relationship between interaction with Mexican Americans and a belief that insulin causes blindness. This finding may be an artifact of the higher prevalence of diabetes among Mexican than Anglo Americans. Interaction with Mexican Americans may increase individuals' exposure to diabetes-related complications in others without improving the accuracy of observers' diabetes knowledge. Communications for Mexican Americans may benefit from tailoring on content about the biological progression of diabetes, as well as the role of insulin and other therapies.

This study found no association between acculturation and use of alternative remedies. However, use of alternative remedies was relatively high, with 45% of participants reporting daily use of vitamins, herbal teas, or drinks to help their diabetes. Use was associated with higher education, which suggests that use of alternative remedies may be less of a culturally associated behavior than an indicator of a more proactive, less fatalistic approach to health maintenance. Higher education was similarly associated with disagreement that insulin is a sign that someone has failed to take care of his diabetes. Participants with higher education may feel more empowered to take an active role in their health care and may therefore be more inclined to support the use of both alternative and clinically supported diabetes treatments. The prevalence of alternative remedy use in these data suggests that alternative remedies should be addressed in diabetes intervention content, regardless of whether this behavior is culturally patterned.

This research has several limitations. First, there is a lack of proven measures for many of the dependent variables under study. All of these constructs were based on single items, and more robust measures may have yielded more robust findings. Developing such measures is a goal of ongoing research by the authors. These data were obtained by self-report, which may be subject to social desirability bias. Another limitation is the testing of 16 separate regression models, which may have increased the chance of type 1 error. Findings from this study are limited to participants in this research. Mexican Americans are extremely diverse, and research with Mexican Americans living in other locations with different cultural orientations and family structures may yield different findings. Finally, this study used a linear operationalization of acculturation. Future work should include independent measurement of both Anglo and Mexican cultural constructs⁴⁵ in order to better explore

interactions between diabetes beliefs and preferences and a bicultural Mexican-Anglo identity, in which both cultural orientations are salient.

Despite these limitations, these data provide evidence that Mexican Americans vary in acculturation and in their endorsement of specific diabetes-related beliefs and intervention preferences. These data therefore suggest a potential role for cultural tailoring to enhance the cultural appropriateness and, ultimately, program outcomes, of diabetes interventions. By pursuing deeper and more personalized cultural customization, diabetes educators may set a new bar for the achievement of cultural appropriateness in health education.

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Table 1
Study Sample Descriptive Statistics (n = 288)

Female	58.0%
Mean age in years (SD)	55.1 (12.7)
Married/living with partner	68.8%
Educational status	
Less than 8th grade	17.1%
8th-11th grade	8.9%
Completed high school or GED	30.4%
Post-high school training other than college/some college/2-year college graduate	26.1%
4-year college graduate/graduate school degree	17.5%
Employment status	
Works part- or full-time	34.7%
Student	1.4%
Homemaker	10.1%
Retired	35.4%
Unable to work/out of work	18.4%
Income	
\$20 000 or less	29.1%
\$20 001-\$40 000	24.9%
\$40 001-\$60 000	18.1%
\$60 001-\$80 000	16.5%
More than \$80 000	11.4%
Percent with health insurance	77.3%
State of residence	
California	46.2%
Texas	53.8%
Primary language of interview	
English	65.3%
Spanish	34.7%
Acculturation subscale means (unstandardized)	
English comprehension (SD)	1.64 (0.99)
Adult Spanish use (SD)	2.69 (1.30)
Value for preserving Mexican culture (SD)	3.19 (0.78)
Interaction with Mexican Americans (SD)	2.29 (0.61)

Table 2

Distributions of Dependent Variables

	% Selecting "None"	% Selecting "7 Days"
Use of alternative remedies	39.3	44.6
	% Selecting "Not at All Likely"	% Selecting "Very Likely"
Likelihood of seeing herbalist or folk healer (<i>curandero</i>)	64.6	10.5
	% Selecting "Strongly Disagree"	% Selecting "Strongly Agree"
Negative emotions can worsen diabetes	24.1	53.4
How feels in heart as important as body	14.6	63.6
Insulin can cause blindness	55.4	28.9
Insulin for people who have failed	51.3	32.8
Preference for expert to tell what to do	5.6	58.7
People lives with take care of diabetes	25.5	48.0
Diabetes care is my own responsibility	2.8	85.7
Spouse/partner and I are equal partners	11.7	59.7
Prayer important part of managing diabetes	25.2	54.9
	% Selecting "No"	% Selecting "Yes"
Diabetes caused by <i>susto</i>	56.8	43.2
Diabetes can be cured	69.3	30.7
Program that talked about religion and/or spirituality	49.6	50.4
Program for Mexican Americans	32.3	67.7
Suspicious of free program	61.2	38.8

Table 3
Multiple Linear Regression Models Testing Associations Between Acculturation and Diabetes-Related Beliefs and Intervention Preferences Among Mexican Americans with Type 2 Diabetes—Estimates and Standard Errors (n = 288)^a

	Negative Emotions Can Worsen Diabetes	How Feels in Heart as Important as Body	Insulin Can Cause Blindness	Insulin for People Who Have Failed	Use of Alternative Remedies	Likelihood of Seeing Herbalist or Folk Healer (<i>Curandero</i>)	Preference for Expert to Tell What to Do	People They Live with Take Care of Diabetes	Diabetes Care is My Own Responsibility	Spouse/ Partner and I are Equal Partners	Prayer an Important Part of Managing Diabetes
Spanish use	0.27 (0.18)	0.19 (0.15)	0.33 (0.19)	0.59 (0.18) ^b	0.07 (0.34)	0.003 (0.32)	0.82 (0.27) ^b	1.18 (0.39) ^b	-0.18 (0.20)	0.14 (0.39)	0.13 (0.19)
Value for preserving Mexican culture	-0.08 (0.14)	0.25 (0.11) ^b	0.15 (0.14)	-0.17 (0.13)	0.20 (0.24)	0.61 (0.22) ^b	0.04 (0.19)	-0.08 (0.28)	-0.06 (0.14)	0.45 (0.27)	0.31 (0.13) ^b
Interaction With Mexican Americans	0.18 (0.13)	0.12 (0.11)	0.33 (0.14) ^b	-0.15 (0.13)	0.03 (0.24)	-0.22 (0.23)	-0.07 (0.19)	-0.29 (0.28)	0.13 (0.14)	0.27 (0.28)	0.11 (0.13)
Age	0.16 (0.10)	0.11 (0.08)	-0.08 (0.10)	-0.07 (0.10)	0.31 (0.18)	-0.33 (0.17)	0.33 (0.14) ^b	0.12 (0.22)	0.08 (0.11)	0.19 (0.23)	0.15 (0.10)
Gender (female)	0.17 (0.24)	0.28 (0.20)	0.08 (0.25)	-0.11 (0.24)	0.51 (0.45)	-0.05 (0.41)	-0.03 (0.35)	-0.76 (0.51)	0.20 (0.25)	-1.16 (0.49) ^b	-0.05 (0.24)
Education	0.09 (0.19)	0.14 (0.16)	-0.18 (0.19)	-0.36 (0.18) ^b	1.05 (0.35) ^b	-0.20 (0.32)	0.38 (0.27)	-0.11 (0.40)	-0.15 (0.20)	-0.03 (0.39)	0.04 (0.19)
Income	0.03 (0.10)	0.05 (0.08)	-0.10 (0.10)	-0.12 (0.10)	0.02 (0.18)	-0.23 (0.17)	-0.19 (0.14)	-0.27 (0.21)	0.01 (0.10)	-0.52 (0.21) ^b	0.13 (0.10)
Health insurance (yes)	0.04 (0.29)	0.06 (0.24)	0.47 (0.31)	0.08 (0.29)	0.70 (0.55)	0.14 (0.51)	0.09 (0.43)	0.76 (0.63)	0.14 (0.32)	0.55 (0.65)	-0.02 (0.30)
R ²	.05	.11	.19	.23	.09	.11	0.12	.14	.02	.18	.09

^a All models also controlled for acculturation and extreme response style (not shown).

^b Significant at $P \leq .05$

Table 4
Multiple Logistic Regression Models Testing Associations Between Acculturation and Diabetes-Related Beliefs and Intervention Preferences Among Mexican Americans with Type 2 Diabetes—Odds Ratios and 95% Confidence Intervals (n = 288)^a

	Diabetes Caused by <i>Susto</i>	Diabetes Can be Cured	Program That Talked About Religion and/or Spirituality	Program for Mexican Americans	Suspicious of Free Program
Spanish use	2.53 (1.51-4.23) ^b	0.42 (0.24-0.76) ^b	1.55 (0.96-2.49)	1.81 (1.02-3.20) ^b	1.43 (0.90-2.28)
Value for preserving Mexican culture	1.03 (0.72-1.46)	1.23 (0.87-1.73)	1.54 (1.10-2.17) ^b	1.41 (1.00-2.00) ^b	1.49 (1.03-2.14) ^b
Interaction with Mexican Americans	1.14 (0.79-1.64)	1.08 (0.77-1.53)	1.06 (0.76-1.48)	1.55 (1.09-2.22) ^b	1.07 (0.75-1.52)
Age	0.86 (0.66-1.11)	0.96 (0.73-1.26)	1.07 (0.83-1.38)	1.19 (0.91-1.55)	1.03 (0.79-1.34)
Gender (female)	1.18 (0.62-2.26)	0.88 (0.47-1.67)	0.63 (0.34-1.17)	0.62 (0.32-1.20)	0.49 (0.26-0.92) ^b
Education	0.90 (0.55-1.47)	1.21 (0.73-2.00)	0.70 (0.43-1.13)	0.81 (0.48-1.37)	0.88 (0.55-1.43)
Income	1.01 (0.78-1.31)	0.93 (0.72-1.20)	1.20 (0.94-1.54)	1.13 (0.87-1.46)	0.79 (0.60-1.04)
Health insurance (yes)	0.73 (0.34-1.58)	1.06 (0.46-2.44)	0.92 (0.42-2.00)	1.10 (0.46-2.64)	1.37 (0.63-2.99)
Max-rescaled R ²	0.25	0.12	0.23	0.21	0.19

^a All models also controlled for acculturation and extreme response style (not shown).

^b Significant at $P \leq .05$.