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Fatalistic and Religiosity Beliefs among Mexican-American Adults with Type 2 Diabetes Attending a Chronic Care Management Program

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Abstract

Objective: To determine the relationship between diabetes fatalistic beliefs and lifetime religiosity with type 2 diabetes management as measured by hemoglobin A1c (HbA1c) and blood glucose monitoring behavior.

Methods: Study sample was comprised of adult Mexican Americans (n = 475) enrolled in a chronic care management program, "Salud y Vida," for individuals with uncontrolled type 2 diabetes. At baseline, participants were administered the Diabetes Fatalism Scale and a subscale of the National Comorbidity Study Replication (NCS-R) relating to lifetime religiosity. The Diabetes Fatalism Scale is comprised of three subscales measuring emotional distress, religious and spiritual coping, and perceived self-efficacy. At baseline, HbA1c and blood glucose monitoring behavior were also measured. Unadjusted and adjusted linear and logistic regression models were computed, controlling for gender, age, education, blood pressure, and body mass index.

Results: Unadjusted and adjusted linear regression results showed that overall diabetes fatalism and emotional distress were significantly associated with HbA1c. Logistic regression models did not find a significant association between diabetes fatalism, religiosity, and blood glucose monitoring behaviors.

Conclusions: Findings suggested that higher levels of both diabetes fatalism and emotional distress were significantly associated with poorer management of blood glucose among newly enrolled Mexican-American participants of a chronic care management program. Further research is needed to examine these relationships longitudinally to observe the effect of such a program on these belief systems and subsequent health outcomes.

Keywords: fatalism; fatalistic; Mexican American; religiosity; type 2 diabetes

Introduction

The United States' Hispanic population comprises approximately 17% of the total population, making it the nation's largest ethnic minority.[1] Unfortunately, the US Hispanic population is laden with health disparities in part because of economic-, educational-, and language-related disadvantages.[2–6] Hispanics have the highest rate of uninsured adults, with nearly one-third lacking health insurance, as compared to non-Hispanic Whites and other racial/ethnic minorities.[2] In addition, Hispanics have a higher prevalence of certain diseases and illnesses as compared to national averages.[3] One such disease is type 2 diabetes mellitus, with a prevalence of 12.5% among Hispanics, coming second only to that of American-Indian/Alaska natives (14.7%).[4] Among adults of Hispanic descent, Mexicans in particular have the highest prevalence of type 2 diabetes (14.4%) followed by Puerto Ricans (12.4%).[4]

Socioecological factors affecting management of type 2 diabetes in the general population include patient-provider communication, education, personal factors, and social support to facilitate management behaviors.[7,8] Among Hispanics, some of the largest barriers include language, cost of medication, and access to health care.[9] Results of the National Health and Nutrition Examination Survey (2007–2010) showed that only 47.3% of Hispanics with type 2 diabetes achieved hemoglobin A1c (HbA1c) values below the recommended cut point of 7.0%, compared to 52.9% of non-Hispanic Whites. The proportion achieving controlled HbA1c values was even lower among Mexican Americans (43.5%).[10]

Religiosity, a central part of Hispanic culture, plays a key role in the management of diabetes.[11] Religiosity is a multifaceted construct measured and defined in different ways by various disciplines. In the field of psychology, measurement focuses on devotion or piousness,

while sociologists focus on features such as church attendance, doctrinal knowledge, or adhering to religious rites.[12] Estimates of Hispanic religiosity are consistently over 80%, with Catholicism being the most prevalent religious preference.[13,14] Data from the Mexican Health and Aging Study conducted in 2003[15]revealed that although a direct relationship between health and religiosity was not established, religiosity was associated with positive self-care as well as glycemic control behaviors among older Mexicans with diabetes.[15] Similarly, church attendance among Latinas has been noted to be associated with positive nutritional and physical activity behaviors.[16]

Similar to religiosity, fatalism – the belief that every event and circumstance is predetermined, and an individual is powerless in altering the progression of these events or circumstances – has been associated with behaviors both directly and indirectly related to diabetes.[18–22] Among Mexican women, fatalistic beliefs have been determined to be connected with overall cardiometabolic dysfunction.[19] Moreover, findings from the Hispanic Community Health Study/Study of Latinos Sociocultural Ancillary Study (2008–2011)[20] revealed higher fatalism to be associated with an increased odds of hypertension, largely because of its association with socioeconomic status (SES), acculturation, and related health conditions.[20] Although fatalism and type 2 diabetes among Hispanics have not been studied extensively, diabetes fatalism was associated with poorer adherence to medication, self-care, diabetes knowledge, exercise habits, diet, and blood sugar testing among African Americans.[21] Diabetes fatalism, as measured by the Diabetes Fatalism Scale,[22] explores feelings of emotional distress, religious and spirituality coping beliefs, and self-efficacy beliefs in relation to management of diabetes. Egede and Ellis[22] define diabetes fatalism similarly to the general definition of fatalism in that it explores feelings of hopelessness, despair, powerlessness, and meaninglessness; however, the term "diabetes fatalism" refers exclusively to an individual's feelings and beliefs in regard to their personal management of diabetes.[22]

Prior research investigating a relationship between the constructs of diabetes fatalism and religiosity and management of diabetes is limited among Hispanic populations.[16–22] In consideration of these findings, the present study aims to further assess diabetes fatalism and religiosity among a Hispanic population with uncontrolled diabetes in South Texas. This assessment evaluated the relationship between diabetes fatalistic beliefs and religiosity across the lifespan with management of type 2 diabetes as measured by HbA1c status and blood glucose monitoring behaviors. These relationships were determined both independently and while controlling for covariates such as gender, age, education, comorbidities, blood pressure, and body mass index (BMI).

Subjects

The study population was a convenience sample of newly enrolled participants (n = 475) of the "Salud y Vida" chronic care management program. "Salud y Vida" utilizes a culturally appropriate approach to reach primarily low-income, uninsured, and Spanish-language participants with an adaptation of the Wagner Chronic Care Model.[23] The purpose of the program is to provide type 2 diabetes patients with the education and support needed to improve diabetes management behaviors. The present study examined participants' baseline program enrollment data collected in the preferred language of the participant (Spanish or English) by trained interviewers. Following were the inclusion criteria for participants: over 18 years of age, have uncontrolled diabetes (HbA1c > 8.0%), and residing within Regional Healthcare Partnership Region 5. Exclusion criteria included the following: history of violent behavior, history of substance abuse, dialysis patient, cancer patient, have open chronic wounds, untreated bipolar or personality disorders, or pregnant. The study was approved by the School of Public Health Institutional Review Board, University of Texas Health Science Center at Houston.

Materials and Methods

Study measures

Religiosity

Lifetime religiosity[24] was assessed using a subscale from the National Comorbidity Survey Replication (NCS-R). The NCS-R is a nationally representative survey of US adults done between 2001 and 2003 that collected data on a range of psychiatric and substance abuse disorders using the World Health Organization Composite International Diagnostic Interview (WHO-CIDI) instrument. The NCS-R subscale comprised four items. Two items assessed religious salience during adulthood and childhood on a 4-point scale ranging from 1 ("Not at all important") to 4 ("Very important"). For the present study, religious salience during childhood and adulthood were coded as dichotomous variables comparing those who expressed religion was "not at all important" or "unimportant" with those who expressed religion was "somewhat important" or "very important" at each respective life stage. A change in score was calculated to determine what change, if any, was there in religious salience between childhood and adulthood. The change score was calculated by subtracting the total childhood religiosity score from the adulthood religiosity score, and was categorized as an ordinal variable (e.g., positive, no, and negative change).[24]

Religious engagement was assessed by a single item, which was measured through the frequency of church attendance categorized as "More than once per week," "About once per week," "One to three times a month," "Less than once a month," and "Never."[24] Within the current analysis, religious engagement was coded as a dichotomous variable categorizing those who attended church at least once per week and those who attended less than once per week. Lastly, religious preference was assessed and categorized as a dichotomous variable comparing "Protestant/Catholic" with "No preference" (including agnostic, atheist, and those reporting no religious preference/no religion).

Reliability and validity measures were not available for the NCS-R subscale. Thus, for the purposes of this study, the scale was re-administered to 30 participants within 3 months of enrollment to determine the tool's reliability. The time interval was chosen to allow sufficient time to elapse between assessments to avoid memory recall, but not too long after so that there was limited potential for change in the assessed construct.[25] Percentage agreement per subscale item ranged from 60% to 93.3%, demonstrating acceptable agreement; Spearman's *rank*-order correlation coefficients range from 0.6307–0.850, demonstrating moderate to high correlation.

Diabetes fatalism

The 12-item Diabetes Fatalism Scale, developed by Egede and Ellis,[22] was utilized to assess emotional distress (five items), religious and spiritual coping (four items), and perceived self-efficacy (three items) (scale score range: 12–72). Scale items are measured on a unipolar, 6-point scale. Items relating to the religious and spiritual coping as well as the perceived self-efficacy subscales are reverse-scored. Overall diabetes fatalism and diabetes fatalism subscale scores were treated as continuous variables in the present analysis, with higher scores denoting a higher level of fatalism. Among the current sample, the Diabetes Fatalism Scale was determined to have a Cronbach's alpha of 0.79. The emotional distress subscale demonstrated a Cronbach's alpha of 0.84, while the perceived self-efficacy and the religious and spiritual coping subscales demonstrated Cronbach's alpha value of 0.80 and 0.81, respectively.

HbA1c and blood glucose monitoring behaviors

Glycemic control was assessed via HbA1c measured at enrollment utilizing the TRUE Result™ home test kit and was analyzed as a continuous variable. Home-test HbA1c kits are accurate and valid as 93.2% of both health care professionals and patients themselves obtain results within the acceptable range of the laboratory reference value.[26] Blood glucose monitoring behavior was measured with a single item assessing the frequency in which participants measured their blood glucose. Blood glucose monitoring behavior was categorized as a dichotomous variable comparing those who tested their blood glucose levels at least once per day versus those who tested their blood glucose levels at a lesser frequency.

Statistical methods

Descriptive statistics were computed to describe participant characteristics as well as religiosity and fatalistic beliefs. Specifically, mean values and standard deviations were computed to describe continuous variables, while counts and percentages were computed for categorical variables. Spearman's correlations between diabetes fatalism and religiosity with HbA1c and blood glucose monitoring behaviors were reviewed prior to completing the multivariable models. Linear regression was used to model the unadjusted and adjusted relationships between overall diabetes fatalism, each of the diabetes fatalism subscales, and religiosity across the lifespan and HbA1c. Logistic regression was used to examine the unadjusted and adjusted associations between overall diabetes fatalism, each of the diabetes fatalism subscales religiosity across the lifespan and blood sugar monitoring behavior. As age, gender, education, BMI, and high blood pressure are associated with management of type 2 diabetes, these variables were included as potential confounders in adjusted models.[27–30] All analyses were performed using Stata v15.[31]

Results

Sample characteristics

Among a sample of 475 participants, all newly enrolled in a chronic care management program, 68.1% of the participants had not completed high school or a General Educational Development program (GED), and 80.6% did not have health insurance. Nearly three-fourths (72.0%) of the sample were Spanish speakers, and 99.2% were Mexican American. As stated previously, all participants had poor glycemic control (HbA1c = 8.0–17.9), and 92.6% of the participants were either overweight or obese. The most common comorbidities included high cholesterol (56.4%), high blood pressure (56.1%), neuropathy (25.0%), and retinopathy (24.5%). Participants demonstrated poor blood glucose monitoring behaviors with over three-fourths (76.1%) not checking their blood glucose daily. Detailed participant characteristics are given in Table 1.

Table 1. Sample characteristics (n = 475).

Characteristics	% or Mean (SD)
Age (years), mean (SD)	52.2 (10.93)
Ethnicity: Hispanic	99.2
Gender: female	66.7
Language: Spanish	72
Education*	
8th grade or Less	50.1
Some high school	18
High school graduate/GED	16.7
Some college	11.9
College degree (BA/BS)	2.9
Insurance status†	
Private	4.1
Government (Medicaid/Medicare)	12.3
Uninsured	80.6
DSME class total, mean (SD)	4.6 (4.1)
Hemoglobin A1c, mean (SD)	10.2 (1.7)
BMI‡	
Normal	7.4
Overweight	26.6
Obese	66
Blood pressure: normal§	29.4
Comorbidity	
0/1	32.1
2	23.3
3+	44.5
Blood glucose monitoring: Yes‖	23.9
Religious preference: Catholic or Protestant	90
Church attendance: ≥1x/week	39.9
Diabetes fatalism (overall) , mean (SD)	36.7 (6.3)
Subscale 1: emotional distress, mean (SD)	18.4 (4.3)
Subscale 2: religious & spiritual coping, mean (SD)	10.9 (3.4)
Subscale 3: perceived self-efficacy, mean (SD)	7.4 (2.5)

*Data missing on 20 participants.
†Data missing on 11 participants.
‡Data missing on 49 participants.
§Data missing on 75 participants.
‖Data missing on 7 participants.
GED: General Educational Development program; DSME: Diabetes Self-Management Education; BMI: body mass index.

Lifetime religiosity

Most of the participants (90%) reported a religious affiliation; 67.7% identified as Catholic and 22.3% identified as Protestant. Nearly two-fifths (39.9%) reported attending church at least once weekly. The participants did not report large changes in religiosity between childhood and adulthood; over three-fifths (65.6%) showed no change, 27.3% showed an increase, and only 7.1% reported a decrease in religiosity.

Diabetes fatalistic beliefs

The average Diabetes Fatalism Scale score was 36.7 (SD: 6.3); 88% reported a score between 27 and 45. The average emotional distress subscale score (range: 5–30) was 18.4 (SD: 4.3) with 25.8% of the participants expressing some level of agreement to all items on the subscale. Conversely, 17.9% did not express agreement with any of the items. The average spiritual coping subscale score (range: 4–24) was 10.9 (SD: 3.4) with 62.2% of the participants expressing some level of agreement with all subscale items. The average perceived self-efficacy subscale score (range: 3–18) was 7.4 (SD: 2.5) with almost all of the participants (91.2%) expressing some level of agreement with all of the items of the subscale, denoting a high level of self-efficacy.

Tests of correlation

Spearman's correlations are given in Tables 2 and 3. Overall diabetes fatalism ($r = 0.14$; $P < 0.010$) and emotional distress ($r = 0.16$, $P < 0.01$) were significantly associated with HbA1c. Neither diabetes fatalism nor any of the subscales was significantly associated with blood glucose monitoring behaviors.

Linear regression models for HbA1c

Results from the linear regression models are provided in Table 4. The unadjusted linear regression models revealed that overall diabetes fatalism (β = 0.03, 95% confidence interval [CI] = 0.01–0.06, P ≤ 0.004) and emotional distress (β = 0.12, 95% CI = 0.04–0.21, p ≤ 0.001) were associated with higher levels of HbA1c at the 0.05 significance level. Every 1-point increase in diabetes fatalism was associated with a 0.03-point increase in HbA1c. Every 1-point increase in emotional distress was associated with a 0.12-point increase in HbA1c. Religiosity across the lifespan measures was not significantly associated with HbA1c in the unadjusted regression models. However, HbA1c levels were lower among individuals who mentioned that religion was not important during their childhood compared to those who indicated religion was very important (P = 0.08).

Sociodemographic information, potential confounders (i.e., age, gender, education, blood pressure, and BMI), fatalism, and religiosity were controlled for in adjusted models (Table 4). Each adjusted model controlled for diabetes fatalism by including either the overall Diabetes Fatalism Scale score or one of fatalism subscales. The overall Diabetes Fatalism Scale score (adjusted model 1) demonstrated a statistically significant association with HbA1c levels (β = 0.04, 95% CI = 0.02, 0.07, P = 0.001). The emotional distress subscale (adjusted model 2) also demonstrated a statistically significant association with HbA1c levels (β = 0.08, 95% CI = 0.04, 0.12, P ≤ 0.001). In the adjusted analyses, we did not observe statistically significant association between either the religious and spiritual coping or the perceived self-efficacy subscales and HbA1c (β = 0.02, 95% CI= –0.07, 0.03, P = 0.46 and β = –0.01, 95% CI= –0.08, 0.05, p = 0.67, respectively, data not shown). The religiosity measures did not have a significant association with HbA1c in any of the four adjusted models.

Logistic regression models for blood glucose monitoring behaviors

Results from the unadjusted logistic regressions are provided in Table 5. The unadjusted models did not show a statistically significant association between blood glucose monitoring behavior and the overall Diabetes Fatalism Scale, the three subscales, or the measures of religiosity. Results from the adjusted model examining the

Table 2. Correlations between diabetes fatalism and HbA1c, and blood sugar monitoring behaviors.

Measure	*r*	P-value
Diabetes fatalism (overall)		
HbA1c	0.14	<0.01
Blood glucose monitoring	–0.00	0.92
Subscale 1: emotional distress		
HbA1c	0.16	<0.0001
Blood glucose monitoring	0.01	0.8
Subscale 2: religious and spiritual coping		
HbA1c	0.05	0.29
Blood glucose monitoring	–0.00	0.94
Subscale 3: perceived self-efficacy		
HbA1c	–0.00	0.97
Blood glucose monitoring	–0.02	0.72

r: Correlation coefficient

Table 3. Correlations among lifetime religiosity, HbA1c, and blood sugar monitoring behaviors.

Measure	*r*	P-value
Church attendance		
HbA1c	–0.07	0.13
Blood glucose monitoring	0.02	0.74
Religious Salience–Adult		
HbA1c	–0.03	0.56
Blood glucose monitoring	–0.08	0.09
Religious Salience–Child		
HbA1c	–0.07	0.12
Blood glucose monitoring	–0.01	0.80
Change in religiosity		
HbA1c	0.04	0.41
Blood glucose monitoring	0.00	0.93

r: Correlation coefficient

Table 4. Linear regression models: adjusted and unadjusted associations between diabetes fatalism and religiosity with HbA1c.

	Unadjusted n = 475			Adjusted Model #1[1] n = 396			Adjusted Model #2[2] n = 396		
	β	95% CI	P-value	β	95% CI	P-value	β	95% CI	P-value
Fatalism									
Diabetes Fatalism	0.03	0.01, 0.06	<0.05	0.04	0.02, 0.07	0.001	-	-	-
Emotional Distress	0.12	0.04, 0.21	<0.05	-	-	-	0.08	0.04, 0.12	<0.001
Spiritual & religious coping	0.02	–0.02, 0.07	0.29	-	-	-	-	-	-
Perceived self-efficacy	–0.00	–0.06, 0.06	0.97	-	-	-	-	-	-
Lifetime religiosity									
Religious preference									
None/atheist/agnostic	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Catholic/Protestant	–0.22	–0.72, 0.28	0.38	–0.02	–0.56, 0.52	0.94	–0.08	–0.62, 0.46	0.77
Church attendance									
Less than 1x/week	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
1x/week or more	–0.13	–0.44, 0.18	0.41	0.12	–0.23, 0.47	0.50	0.09	–0.25, 0.44	0.59
Religious salience–Adult									
Not important	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Important	–0.25	–1.14, 0.65	0.59	–0.10	–1.19, 0.98	0.85	–0.26	–1.33, 0.82	0.64
Religious salience–Child									
Not important	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Important	–0.35	–0.76, 0.05	0.08	–0.12	–0.73, 0.49	0.70	–0.12	–0.72, 0.49	0.71
Change in religiosity									
Decrease	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
No change	0.05	–0.56, 0.66	0.88	0.26	–0.50, 1.01	0.50	0.31	–0.44, 1.06	0.42
Increase	0.27	–0.38, 0.92	0.42	0.46	–0.45, 1.37	0.33	0.53	–0.37, 1.43	0.25

[1]Model adjusted for diabetes fatalism scale results, lifetime religiosity measures, age, gender, education, blood pressure, and BMI.
[2]Model adjusted for emotional distress subscale results, lifetime religiosity measures, age, gender, education, blood pressure, and BMI.
β: Beta coefficient

overall fatalism scale and glucose blood monitoring did not reveal a significant association (OR = 1.04, 95% CI = 0.99, 1.09, P = 0.10; data not shown). Similarly, results from the adjusted models examining the three subscales revealed no significant associations with blood glucose monitoring.

Discussion

We found a significant association between diabetes fatalism and HbA1c values in this unique sample of Mexican-American adults. Specifically, higher levels of diabetes fatalism were significantly associated with poorer management of blood glucose as measured by HbA1c. Similarly, higher levels of emotional distress were associated with poorer management of glucose (i.e., higher HbA1c levels). In contrast, we did not observe a significant association between the measures of religiosity and HbA1c levels.

We found that religiosity was not significantly associated with blood glucose monitoring behaviors. Although most participants reported a religious affiliation, and nearly two-fifths reported attending church at least once a week, these beliefs were not significantly associated with either HbA1c or blood glucose monitoring behaviors. While other studies reported significant relationships between religiosity, health behaviors, and subsequent health outcomes,[13–16] the nonsignificant associations between religiosity and both blood glucose monitoring and management behaviors observed in the present study may reflect limited variance, as the entire sample had uncontrolled diabetes and 90% identified as being religious.

The high prevalence of diabetes fatalistic beliefs established among the present sample is not unique to this population; the sample was comparable in their scores on the Diabetes Fatalism Scale to African-American populations for which the scale was first developed.[22] However, a distinctive feature of this current Hispanic study sample are the responses to the perceived self-efficacy subscale. The subscale consisted of three questions and less than 10% of the participants expressed any negative feelings of perceived self-efficacy on any of the subscale items, which has not been observed among other racial/ethnic minorities.[22] Further research must examine the elements of Hispanic culture that may facilitate or promote feelings of self-efficacy such as familial connections, and social support provided by friends and/or community resources.

While prior research shows a link between religiosity and diabetes self-care behaviors, the results from this study contribute to the literature surrounding diabetes fatalism specifically among Mexican-American populations, which has not been studied

Table 5. Logistic regression models: unadjusted and adjusted associations between diabetes fatalism, and religiosity with blood glucose monitoring.

	Unadjusted n = 476			Adjusted* n = 398		
	OR	**95% CI**	**P-value**	**OR**	**95% CI**	**P-value**
Fatalism						
Diabetes Fatalism	0.98	0.95, 1.01	0.21	1.04	0.99, 1.09	0.1
Subscale 1: emotional distress	0.98	.89, 1.09	0.75	-	-	-
Subscale 2: spiritual and religious coping	-0.00	–0.06, 0.06	0.94	-	-	-
Subscale 3: perceived self-efficacy	–0.01	–0.10, 0.07	0.72	-	-	-
Lifetime religiosity						
Religious preference						
None/atheist/agnostic	Ref	Ref	Ref	Ref	Ref	Ref
Catholic/Protestant	1.41	0.66, 3.00	0.38	1.32	0.53, 3.27	0.55
Church attendance						
Less than 1x/week	Ref	Ref	Ref	Ref	Ref	Ref
1x/week or more	1.07	0.70, 1.65	0.74	0.99	0.55, 1.78	0.97
Religious salience–Adult						
Not important	Ref	Ref	Ref	Ref	Ref	Ref
Important	0.41	0.14, 1.20	0.1	0.73	0.12, 4.48	0.73
Religious Salience–Child						
Not important	Ref	Ref	Ref	Ref	Ref	Ref
Important	0.93	0.54, 1.61	0.804	1.93	0.72, 5.20	0.19
Change in religiosity						
Decrease	Ref	Ref	Ref	Ref	Ref	Ref
No change	0.71	0.32, 1.55	0.39	0.56	0.13, 2.36	0.43
Increase	0.82	0.35, 1.89	0.64	0.78	0.16, 3.86	0.76

*Model adjusted for diabetes fatalism scale results, lifetime religiosity measures, age, gender, education, blood pressure, and BMI.
95% CI: 95% confidence interval; OR: odds ratio.

extensively to date. Consistent with previous research, we found that Mexican-American adults who experience high levels of emotional distress had higher levels of HbA1c than peers with lower levels of emotional distress.[32, 33] Thus, designing intervention materials to address barriers among these high-risk individuals may serve to improve monitoring and management of blood glucose. Similarly, the current study has established a significant association between diabetes fatalism and HbA1c, suggesting a potential benefit to addressing the construct of diabetes fatalism within discussions of type 2 diabetes care among this population. The present findings also underscored the need of further research exploring emotional distress among Mexican-American patients to understand better the barriers to their management of diabetes. Furthermore, although previous studies have explored relationships between diabetes fatalism and self-care behaviors such as nutrition, physical activity, and foot care, they have not examined the relationship with blood glucose monitoring behaviors as has accomplished by this study.[21,34]

This study had several limitations. First, the sample was a convenience sample, which limits the generalizability of the results beyond the present study sample. Second, we used a cross-sectional study design, which limited our ability to evaluate changes in blood glucose management or self-care behaviors in relation to religiosity and fatalism over time. As a result, our study does not provide information on causality or temporality. Third, the sample was homogenous with limited variance in terms of ethnicity, religious attendance, and all participants had poor glycemic control and self-care behaviors. Nevertheless, the sample allowed for the evaluation of the relationships between diabetes fatalism, religiosity, and diabetes management among a Mexican-American underserved population with uncontrolled Type 2 diabetes. Fourth, the average age of the study participants was 52.2 years; as such, the measure of religiosity across the lifespan may include recall bias. Fifth, barriers to religious engagement were not assessed, such as transportation or familial opposition, which may have been potential confounders, since religiosity was only measured via religious salience, denomination, and church attendance. Finally, while the NCS-R lifetime religiosity subscale demonstrated moderate to high correlation among participants in this sample, the subscale did not probe religiosity in the context of diabetes management directly as did the Diabetes Fatalism Scale in relation to fatalistic beliefs. Potentially, if an instrument exploring religiosity in this manner were to be utilized with this population, similar associations might be observed.

Strengths of the current study include the contemporaneous assessment of both religiosity and diabetes fatalistic beliefs. These constructs have been assessed previously in relation to health outcomes among Hispanic and other racial/ethnic minority populations;

however, no other study to our knowledge has measured both simultaneously to examine their association with diabetes management behaviors and outcomes among a Hispanic population.[13–22,34-35] Furthermore, the present is the first study to utilize the Diabetes Fatalism Scale among a primarily Mexican-American population. Moreover, both religious salience over time and religious engagement were measured. The final strength of the study is that the relationship between religiosity and fatalism was evaluated in relation to both blood glucose management and blood glucose monitoring behavior.

This research suggests the need to further evaluate the relationship between diabetes fatalism and management of diabetes among this population with the implementation of more rigorous study designs. Findings also suggest the need for the development of instruments that include diabetes-specific measures of religiosity. The limitations of our sample suggest the need to explore the effects of diabetes fatalism and religiosity longitudinally in order to observe whether changes in fatalistic beliefs and religious engagement over time are associated with long-term management of diabetes. Further research should qualitatively explore diabetes fatalism in relation to management of blood glucose among Hispanic populations to better understand the cultural nuances of the construct of fatalism in the context of type 2 diabetes among this population, since this relationship has not been studied among Mexican Americans previously. Lastly, the future research should assess the benefits of including discussions regarding fatalism and emotional stress within diabetes management intervention tailored for Hispanic populations.

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