

Health-related quality of life in a binational population with diabetes at the Texas-Mexico border

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ABSTRACT

Objectives. To examine physical and mental health domains of health-related quality of life (HRQL) in a binational adult population with type 2 diabetes at the Texas-Mexico border, and to explore individual and social correlates to physical and mental health status.

Methods. Adults 18 years and older with type 2 diabetes residing in the South Texas Lower Rio Grande Valley and in Reynosa, Tamaulipas, Mexico, were recruited using a convenience sampling technique and interviewed face-to-face with a structured survey. HRQL was measured using physical and mental health summary components of the Medical Outcomes Study Short Form. HRQL correlates included demographic characteristics, health factors, access to healthcare, and family support. Samples characteristics were compared using the Student's t-test or Mann-Whitney U test. Associations between dependent and independent variables were examined using unadjusted and adjusted (multiple variable) logistic regression models.

Results. There were no significant differences between Valley and Reynosa respondents in physical or mental health status scores. Valley participants with lower socioeconomic status and those perceiving their supportive relative's level of diabetes-related knowledge as "low" were more likely to report worse physical health than those lacking those characteristics. In the Reynosa group, lower physical health status was associated with duration of diabetes and insulin use. Both sample populations with clinical depressive symptoms were more likely to have worse physical and mental health than those without such symptoms.

Conclusions. HRQL is an important outcome in monitoring health status. Understanding the levels and influences of HRQL in U.S.-Mexico border residents with diabetes may help improve diabetes management programs.

Key words

Quality of life; diabetes mellitus, type 2; risk factors; border health; Mexican Americans; Texas; Mexico; United States.

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Diabetes is a major public health issue on the U.S.-Mexico border. The

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diabetes death rate for Hispanics living in U.S. counties along the border (46.7 age-adjusted per 100,000 population) is almost three times the rate for non-Hispanic whites along the border (16.3 age-adjusted per 100,000 population) (1), while the overall prevalence

rate among U.S.-Mexico border residents from all ethnic groups is almost twice the level of the general U.S. population (15.7% vs. 9.6%, respectively) (2–4). One study found that diabetes hospital discharge rates are higher among Hispanics living in border counties than among non-Hispanic whites along the border and Hispanics in non-border U.S. counties (5). On the Mexican side of the border, diabetes is the third leading cause of death, and the prevalence rate (15.1%) is higher than other regions in Mexico (4, 6).

Diabetes is a chronic disease with high economic costs for both the U.S. and Mexico healthcare systems and communities (6, 7) and affects patients' health-related quality of life (HRQL). HRQL has emerged as an important outcome in monitoring the health status of a population as well as in assessing disease burden and effectiveness of health interventions (8). HRQL is related to an individual's capacity to function to the highest degree possible physically, psychologically, emotionally, and socially (9), and represents the effect of a disease subjectively on an individual (10). According to the conceptual framework developed by Wilson and Cleary (1995) (11), HRQL is influenced by biological, social, and environmental factors. Research with non-Hispanic whites shows that type 2 diabetes is associated with a reduced HRQL (2, 12, 13). Studies also indicate that factors correlating with HRQL include diabetes-related complications (12, 14) and diabetes-related risk factors such as heart failure, depression, high medication intake (12), low socioeconomic status, older age, female gender, and lack of health insurance (14).

Although the U.S.-Mexico border population suffers a disproportionate burden of diabetes compared to the general population in the United States and Mexico, there is a paucity of studies examining HRQL in border residents with type 2 diabetes. Healthy Border 2010, an agenda adopted by the U.S.-Mexico Border Health Commission for improving the health of border residents, identifies diabetes as one of 11 priority areas on the bilateral

health agenda aiming at reducing both the diabetes mortality and hospitalization rate (15). Understanding the levels and influences of HRQL in persons with diabetes may be helpful in increasing the success of diabetes management programs. Therefore, this study aimed to: (1) examine the differences in the physical and mental domains of HRQL in a binational adult population with type 2 diabetes at the Texas-Mexico border; and (2) explore individual and social correlates to physical and mental health status for each population. Correlates of HRQL in this study included demographic characteristics, health factors, access to healthcare, and family support.

MATERIALS AND METHODS

Subjects and sampling

This was a cross-sectional study based on a survey conducted in 2004–2005 in the South Texas Lower Rio Grande Valley ("Valley") and in Reynosa, Tamaulipas, Mexico. Using a convenience sampling technique, the study recruited participants on both sides of the border from clinical settings (hospitals and physician offices). Eligibility criteria included: being 18 years of age and older; having been diagnosed with type 2 diabetes for at least one year; and willingness to give informed consent. Physicians and nurses at the recruitment sites identified patients with type 2 diabetes and referred them to the researchers. Graduate students from health-related programs on both sides of the border were trained to conduct the interviews. Participants were interviewed in either English or Spanish. On the U.S. side, the interviewers were bilingual. A total of 199 individuals in the Valley and 200 in Reynosa agreed to participate in the study. The final sample size was 399 respondents. Participants signed informed consent forms and received a box of dietetic sugar for participating in the study. This study was approved by the Texas A&M University Institutional Review Board.

Measures

The dependent variable, HRQL, was assessed using the Medical Outcomes Study Short Form (SF-8™) instrument. The SF-8™ health survey is an 8-item survey that provides a health profile consisting of two summary components: physical component summary (PCS) and mental component summary (MCS) (16). Although both summary components are continuous variables (as measured by the SF-8™), a different calculation was used under two global categories. To examine variables in a logistic fashion, PCS and MCS were divided by the median, creating the categories: "PCS Lower vs. Higher score" and "MCS Lower vs. Higher score." The median was used to create these global categories because the PCS and MCS scales were not normally distributed. In studies with skewed distributions, use of the median rather than the mean has been found to be more accurate in representing the majority of cases (17, 18). The medians for the PCS and MCS were 42.36 and 46.65, respectively. The median was calculated for all participants because there were no significant median differences between the two groups included in the study.

Independent variables examined in the study included demographic and health factors, access to healthcare, and family support. Demographic variables included gender, age (mean and standard deviation; various age groups), marital status ("not married" vs. "married"), education level ("less than high school" vs. "high school or more"), and socioeconomic status ("low" vs. "high"). Socioeconomic level was assessed by asking participants about their employment status, an indicator of socioeconomic position (19, 20). Household income was not included due to missing values.

Health factors were based on self-reported information and included: Body Mass Index (BMI); age when diagnosed with diabetes (mean and standard deviation); duration with diabetes ("less than 10 years" vs. "10 years or more"); high blood pressure ("yes" vs. "no"); heart disease ("yes" vs. "no"); high cho-

lesterol ("yes" vs. "no"); insulin use ("yes" vs. "no"); amputations ("yes" vs. "no"); smoking ("yes" vs. "no"); and depressive symptoms ("clinical" vs. "non-clinical"). BMI was calculated from study participants' self-reported heights and weights. BMI was expressed as weight (in kilograms) divided by the square of height (in meters) and categorized according to the parameters of the Centers for Disease Control and Prevention (CDC) (21): "normal" (18.5–24.9 kg/m²), "overweight" (25–29.9 kg/m²), "obesity" (30–34.9 kg/m²), and "severe obesity" (35 kg/m² and higher). Depressive symptoms were measured using the English and Spanish versions of the 20-item Center for Epidemiological Studies Depression Scale (CES-D). The reliability and validity of the scale have been tested in general and clinical populations, yielding very good internal consistency, with an alpha of 0.85 for the general population and 0.90 for a psychiatric (clinical) population. Scores of 16 and above indicate clinical depressive symptoms (22, 23).

Access-to-healthcare variables included number of doctor visits, emergency room (ER) visits, and hospital stays, as well as diet counseling and diabetes education sessions over the past 12 months ("never" vs. "one or more times"). "Glucose level check" was measured using the question, "How many times, on average, do you check your blood sugar per week"? As a majority of Reynosa respondents did not check their glucose level daily or weekly, the following categories were created for the purpose of analysis: "never," "monthly," "weekly," and "daily."

Family support was measured using the Diabetes Family Behavior Checklist (DFBC), which assesses the actions of the relative identified by participants as the person most supportive of their efforts to manage their diabetes. DFBC items include the supportive relative's behaviors related to medication, glucose testing, exercise, diet, and "in general." A positive summary score ("high" vs. "low" family support) was obtained by averaging the frequency ratings over all five supportive behaviors. The reliability and predictive validity of this scale is

between 0.64 and 0.84. The DFBC also asks the participant to rate the diabetes-related knowledge level of the supportive relative ("low" vs. "moderate" vs. "high") (24).

Statistical analyses

Summary statistics were calculated to describe the population in terms of sociodemographic status, HRQL, and other variables. These statistics included means, standard deviations, and/or percentages, as appropriate. Study participant demographic, health, healthcare access, and family support characteristics were compared using the Student's *t*-test or Mann-Whitney U test. Associations between dependent and independent variables were examined using unadjusted and adjusted

(multiple variable) logistic regression models. The cross-tabulation method and Pearson chi-square test were used to analyze associations in univariate analysis to derive the percentage of each independent variable significant to PCS and MCS. Multivariate analyses were reported using odds ratios (OR), 95% confidence intervals (CI), and *p* values. A *p* value of <0.05 was considered significant for all statistical tests conducted. The analyses were performed using the Statistical Package for the Social Sciences (SPSS version 13.0 for Windows; SPSS Inc., Chicago, IL, USA) (25).

RESULTS

Table 1 shows the descriptive characteristics of the two samples, Valley respondents and Reynosa respon-

TABLE 1. Descriptive characteristics and differences between the two sample populations, South Texas Lower Rio Grande Valley and Reynosa, Tamaulipas, Mexico, 2004–2005

Variable	Valley		Reynosa		P value ^c
	(n = 199) ^a	(%) ^b	(n = 200) ^a	(%) ^b	
Gender					0.004
Female	126	63.3	153	76.5	
Male	73	36.7	47	23.5	
Age [mean (SD) ^d]	58.89 (14.05)		55.76 (12.24)		0.006
18–34	12	6.0	3	1.5	
35–44	17	8.5	39	19.7	
45–54	48	24.1	54	27.3	
55–64	42	21.1	53	26.8	
65+	80	40.2	49	24.7	
Marital status					0.384
Not married	69	34.7	77	38.9	
Married	130	65.3	121	61.1	
Education					0.000
< High school	102	51.3	140	70.4	
≥ High school	97	48.7	59	29.6	
Socioeconomic status					0.220
Low	147	74.6	158	79.8	
High	50	25.4	40	20.2	
Ethnicity					NA ^e
Mexican American	172	91.0	–	–	
Non-Hispanic white	15	7.9	–	–	
Non-Hispanic black	1	0.5	–	–	
Native American	1	0.5	–	–	
Country of birth					0.000
Mexico	82	41.2	200	100	
United States	114	57.3	0	0	

^a Due to missing data, the total number of individuals for each variable may be less than 199 for the Valley sample and less than 200 for the Reynosa sample.

^b Valid percentage.

^c Significant difference (*P* < 0.05) between the two groups according to the independent-samples Student's *t*-test or the two-independent-samples Mann-Whitney U test.

^d Standard deviation.

^e Not applicable.

TABLE 2. Differences in PCS, MCS, and other health indicators between the two sample populations, South Texas Lower Rio Grande Valley and Reynosa, Tamaulipas, Mexico, 2004–2005

Variable	Valley		Reynosa		P value ^c
	(n = 199) ^a	(%) ^b	(n = 200) ^a	(%) ^b	
Health-related quality of life					
PCS [mean (SD) ^d]	41.65 (11.73)		41.40 (10.21)		0.826
MCS [mean (SD)]	45.35 (10.84)		44.75 (10.11)		0.571
Body Mass Index					0.002
Normal	22	12.4	39	25.3	0.991
Overweight	54	30.3	45	29.2	
Obesity	43	24.2	38	24.7	
Severe obesity	59	33.1	32	20.8	
Smoking	15	7.5	23	11.5	0.183
Age when diagnosed with diabetes [mean (SD)]	48.58 (15.00)		45.05 (13.18)		0.013
Duration of diabetes (years)					0.991
<10	109	55.6	110	55.6	
≥10	87	44.4	88	44.4	
High blood pressure (yes)	132	66.3	120	60.0	0.190
Heart disease (yes)	68	34.2	46	23.0	0.014
High cholesterol (yes)	125	62.8	79	39.5	0.000
Insulin use (yes)	107	53.8	40	20.0	0.000
Amputations (yes)	10	5.0	8	4.0	0.630
Depressive symptoms					0.376
Non-clinical	127	63.8	119	59.5	
Clinical	72	36.2	81	40.5	

^a Due to missing data, the total number of individuals for each variable may be less than 199 for the Valley group and less than 200 for the Reynosa group.

^b Valid percentage.

^c Significant difference ($P < 0.05$) between the two groups according to the independent-samples Student's *t*-test or the two-independent-samples Mann-Whitney U test.

^d Standard deviation.

dents. Significant differences between samples were found for gender, age, and education.

Tables 2 and 3 show the differences between the samples in relation to the PCS and MCS mean, personal health, and healthcare variables. Compared to respondents in Reynosa, significantly more Valley participants visited the doctor more than once in the past 12 months and were using insulin. Reynosa respondents received statistically significantly more diet counseling sessions than Valley participants. More than half of the participants in both samples reported a high level of family support, with no significant differences between samples.

Table 4 shows the univariate (unadjusted) logistic regression analyses. Only variables that were statistically significant for PCS or MCS in either sample population, according to the Pearson chi-square test, are listed in the table. Analyzed individually, education, socioeconomic status, BMI, glu-

cose level checks, years with diabetes, ER visits, hospital stays, diet counseling, depressive symptoms, and relative's level of diabetes-related knowledge (as perceived by the respondent) had a statistically significant association with PCS among Valley participants. In addition, in this group, ER visits, hospital stays, and depressive symptoms were significantly associated with MCS.

Among Reynosa participants, duration of diabetes, hypertension (high blood pressure), insulin use, glucose level checks, ER visits, and clinical depressive symptoms were statistically significant to PCS. In this group, those who had low socioeconomic status and reported clinical depressive symptoms were more likely to have lower MCS.

Table 5 presents the results from the multivariate (adjusted) logistic regression analyses. Among Valley respondents, low socioeconomic status and having a supportive relative with a

low level of diabetes-related knowledge (as perceived by the study participant) were predictors of worse physical health status than those without those characteristics. In addition, respondents from this group with clinical depressive symptoms were more likely to report worse physical health as well as worse mental health than those without such symptoms. In the Reynosa group, the strongest multivariate relationships with lower PCS were duration of diabetes, insulin use, and clinical depressive symptoms. Reynosa participants with clinical depressive symptoms were more likely to be in worse physical and mental health status than those with non-clinical symptoms.

DISCUSSION

To the best of the authors' knowledge, this is the first study to assess HRQL and its correlates in a binational

TABLE 3. Differences in healthcare factors and family support between the two sample populations, South Texas Lower Rio Grande Valley and Reynosa, Tamaulipas, Mexico, 2004–2005

Variable	Valley		Reynosa		P value ^c
	(n = 199) ^a	(%) ^b	(n = 200) ^a	(%) ^b	
Glucose level check					0.000
Never	13	6.5	22	11.2	
Monthly	2	1.0	137	69.5	
Weekly	28	14.1	30	15.2	
Daily	156	78.4	8	4.1	
ER visits in past 12 months					0.211
Never	141	70.9	130	65	
≥1	58	29.1	70	35	
Doctor visits in past 12 months					0.000
Never	1	0.5	56	28	
≥1	198	99.5	144	72	
Hospital stays in past 12 months					0.856
Never	137	68.8	136	68	
≥1	62	31.2	64	32	
Diet counseling in past 12 months					0.000
Never	118	59.3	78	39	
Once	34	17.1	42	21	
≥1	47	23.6	80	40	
Diabetes education in past 12 months					0.074
Never	135	67.8	155	77.5	
Once	32	16.1	16	8	
≥1	32	16.1	29	14.5	
Family support					0.452
High	107	53.8	100	50	
Low	92	46.2	100	50	
Supportive relative's diabetes-related knowledge level ^d					0.000
Low	42	21.6	92	46	
Moderate	85	43.8	71	35.5	
High	67	34.5	37	18.5	

^a Due to missing data, the total number of individuals for each variable may be less than 199 for the Valley group and less than 200 for the Reynosa group.

^b Valid percentage.

^c Significant difference ($P < 0.05$) between the two groups according to the independent-samples Student's *t*-test or the two-independent-samples Mann-Whitney *U* test.

^d Based on study participant's perception.

border population with type 2 diabetes. HRQL levels and personal and social correlates were examined in adults with type 2 diabetes residing in the Valley and in Reynosa at the Texas-Mexico border.

There were no statistically significant differences in physical and mental health status scores between Valley and Reynosa [border] study participants. This is not surprising, considering that the U.S.-Mexico border is a melting pot of cultures and behaviors. Despite major differences between the United States and Mexico in terms of the organization of their health care systems, U.S.-Mexico border residents share many health prob-

lems and are economically and culturally interdependent (15).

In terms of physical health, on a scale of 0–100 (with “0” representing “worst possible health” and “100” representing “best possible health”), study participants on both sides of the border with diabetes reported slightly higher mean scores compared to those with diabetes in the general U.S. population (U.S. border, 41.65; Mexico border, 41.40; general U.S. population, 39.30) (26). One explanation for this discrepancy is that this study's binational sample may have included patients with less severe disease and comorbid conditions than those included in the general U.S. sample.

The results for Valley respondents indicate lower physical health status was correlated with low socioeconomic status—a finding consistent with previous studies (14, 27–29). However, this association was not found among Reynosa respondents.

Perhaps the most important finding of this study is that clinical depressive symptoms had a statistically significant association with decreased physical and mental health status in both Valley and Reynosa participants. Previous studies show that depression is a predictive factor of reduced HRQL (10, 12, 28, 30–34). In this study about 40% of participants in both samples reported clinical depressive symptoms. As opposed to the results for physical health status, based on the same scale (0–100), study statistics indicated U.S.-Mexico border residents with diabetes had a slightly worse mental health status than those among the general U.S. population suffering from the disease (26) (U.S. border respondents, 45.45; Mexico border respondents, 44.75; general U.S. population, 47.90). This finding has important public health implications for the binational border agenda, underscoring the need for healthcare professionals and policymakers to pay more attention to the mental well-being of border residents with diabetes. Depression has been associated with diabetes complications (35), poor glycemic control (36), and low treatment adherence (37, 38). Moreover, Healthy People 2010 identifies diabetes and mental health issues as border health priorities and recognizes that access to mental health services along the U.S.-Mexico border is problematic due to a shortage of specialty mental health providers and services (15). Thus, culturally sensitive interventions and services as well as comprehensive health policies are needed to address any deficits in both the U.S. and Mexican mental health-care systems.

As shown in Table 5, insulin use correlated significantly with lower physical health status in the multivariate analyses among respondents in Reynosa. A statistically significant association was not found in the Valley

TABLE 4. Univariate (unadjusted) correlates to HRQL physical and mental health status scores, South Texas Lower Rio Grande Valley and Reynosa, Tamaulipas, Mexico, 2004–2005

Independent variables ^a	Valley				Reynosa			
	Dependent variable		Dependent variable		Dependent variable		Dependent variable	
	Lower ^d	Higher	P value	MCS ^c	Lower ^d	Higher	P value	MCS ^c
Education level			0.000	0.621			0.070	0.006
< High school	65.6%	38.4%		53.5%	84.7%	74.2%		87.5%
≥ High school	34.4%	61.6%		46.5%	15.3%	25.8%		12.5%
Socioeconomic status			0.001	0.300			0.007	0.290
Low	85.4%	63.9%		77.8%	45.5%	64.6%		51.0%
High	14.6%	36.1%		22.2%	54.5%	35.4%		49.0%
Body Mass Index			0.019	0.152			0.012	0.682
Normal	14.1%	10.1%		9.2%	69.0%	51.5%		61.9%
Overweight	21.2%	38.2%		25.3%	31.0%	9.3%		29.6%
Obesity	21.2%	27.0%		24.1%	7.1%	15.8%		10.4%
Severe obesity	43.5%	24.7%		41.4%	66.7%	72.6%		65.6%
Glucose level check			0.005	0.174			0.017	0.399
Never	3.1%	10.1%		6.1%	7.1%	1.1%		5.2%
Monthly	1.0%	1.0%		2.0%	55.0%	74.2%		59.8%
Weekly	7.3%	21.2%		10.1%	45.0%	25.8%		40.2%
Daily	88.5%	67.7%		81.8%	41.0%	79.4%		37.1%
ER visits in past 12 months			0.003	0.000			0.000	0.000
Never	60.4%	79.8%		58.6%	59.0%	74.2%		59.8%
≥1	39.6%	20.2%		41.4%	45.0%	25.8%		40.2%
Hospital stays in past 12 months			0.001	0.001			0.005	0.000
Never	58.3%	79.8%		58.6%	41.0%	79.4%		37.1%
≥1	41.7%	20.2%		41.4%	59.0%	20.6%		62.9%
Diet counseling in past 12 months			0.034	0.332			0.000	0.000
Never	68.8%	50.5%		42.0%	41.0%	79.4%		37.1%
Once	13.5%	20.2%		23.0%	59.0%	20.6%		62.9%
>1	17.7%	29.3%		35.0%	41.0%	79.4%		37.1%
Depressive symptoms			0.000	0.000			0.000	0.000
Non-clinical	45.8%	79.8%		35.4%	41.0%	79.4%		37.1%
Clinical	54.2%	20.2%		64.6%	59.0%	20.6%		62.9%
Years with diabetes			0.043	0.327			0.000	0.000
<10 years	49.5%	63.9%		60.2%	41.0%	79.4%		37.1%
≥10 years	50.5%	36.1%		39.8%	59.0%	20.6%		62.9%
Supportive relative's diabetes-related knowledge ^e			0.007	0.186			0.000	0.000
Low	31.6%	12.6%		26.5%	41.0%	79.4%		37.1%
Moderate	37.9%	48.4%		43.9%	59.0%	20.6%		62.9%
High	30.5%	38.9%		29.6%	41.0%	79.4%		37.1%

^a The table only includes variables that tested significant for PCS or MCS ($P < 0.05$) in either sample population according to the Pearson chi-square test. The cross-tabulation method was used to derive the percentage of each independent variable significant to PCS and MCS.
^b Physical health status summary component of HRQL.
^c Mental health status summary component of HRQL.
^d Higher and lower scores are divided by median (42.36 for PCS and 46.65 for MCS).
^e Based on study participant's perception.

TABLE 5. Multivariate (adjusted) correlates to HRQL physical and mental health status scores, South Texas Lower Rio Grande Valley and Reynosa, Tamaulipas, Mexico, 2004–2005

Dependent variable	Valley				Reynosa				
	OR ^c	Lower ^d	Higher	P value	OR	Lower ^d	Higher	P value	
PCS ^e (Lower ^d vs. Higher)	Independent variables ^b								
	Education	0.49	0.20	1.20	0.117				
	< High school	1.00				0.52	0.26	1.03	0.062
	≥ High school					1.00			
	Socioeconomic status								
	Low	0.34	0.13	0.90	0.030	2.02	1.01	4.03	0.047
	High (reference)	1.00				1.00			
	BMI								
	Normal (reference)	1.00				10.04	0.76	132.98	0.080
	Overweight	1.86	0.42	8.28	0.416	3.90	0.36	42.33	0.264
	Obesity	1.02	0.21	4.85	0.981	1.71	0.14	21.01	0.676
	Severe obesity	0.41	0.09	1.85	0.248	1.00			
	Years with diabetes								
	<10 years	1.65	0.70	3.90	0.255	0.81	0.38	1.71	0.583
	≥10 years	1.00				1.00			
	Glucose level check								
Never	4.18	0.65	27.07	0.133					
Monthly	2.20	0.06	76.99	0.664	0.29	0.11	0.77	0.014	
Weekly	2.92	0.91	9.36	0.071	1.00				
Daily (reference)	1.00								
ER visits in past 12 months									
≥1	0.56	0.19	1.67	0.301	0.15	0.07	0.32	0.000	
Never (reference)	1.00				1.00				
Hospital stays in past 12 months									
≥1	0.56	0.19	1.65	0.292					
Never (reference)	1.00								
Diet counseling in past 12 months									
Never	0.54	0.20	1.45	0.222					
Once	1.72	0.47	6.32	0.413					
More than once (reference)	1.00								
Depressive symptoms									
Clinical	0.22	0.09	0.53	0.001					
Non-clinical (reference)	1.00								
Supportive relative's diabetes-related knowledge ^f									
Low	0.19	0.05	0.65	0.008					
Moderate	1.25	0.51	3.02	0.628					
High (reference)	1.00								
Hosmer and Lemeshow Goodness-of-Fit Test ^g				0.446				0.077	
ER visits in past 12 months									
≥1	0.55	0.20	1.52	0.253	0.44	0.20	1.01	0.053	
Never (reference)	1.00				1.00				
Hospital stays in past 12 months									
≥1	0.46	0.17	1.24	0.125	0.14	0.07	0.28	0.000	
Never (reference)	1.00				1.00				
Depressive symptoms									
Clinical	0.05	0.02	0.12	0.000					
Non-clinical (reference)	1.00								
Hosmer and Lemeshow Goodness-of-Fit Test				0.164				0.538	

^a CI, confidence interval.
^b The table only includes variables that tested significant for PCS or MCS ($P < 0.05$) in either sample population according to the Pearson chi-square test. The cross-tabulation method was used to derive the percentage of each independent variable significant to PCS and MCS.
^c OR, odds ratio.
^d Higher and lower scores are divided by the median (42.36 for PCS and 46.65 for MCS).
^e Physical health status summary component of HRQL.
^f Based on study participant's perception.
^g For the Lemeshow-Hosmer goodness-of-fit statistic, a P value > 0.05 indicates acceptable calibration of the model.
^h Mental health status summary component of HRQL.

sample. This finding resonates with previous research showing that insulin use is a predictor of decreased HRQL (10, 27, 39–42). Twenty percent of Reynosa participants reported use of insulin compared to 53.8% of their counterparts in the Valley (see Table 3), a finding that is also consistent with previous research (42). However, it should be noted that the percentage of Reynosa insulin users in this study (20%) was higher than that reported in Mexican national surveys with Mexican cohorts from non-border regions (4.6% to 5.8%) (6, 43). To better understand the impact of insulin use within a public health perspective, further research should focus on examining factors influencing insulin-related behaviors among border (U.S. and Mexican) patients with diabetes, including attitudes and beliefs toward insulin use, insulin-related knowledge deficits among health providers, and issues of affordability.

Another study finding was that Mexican respondents with less than 10 years with diabetes were more likely to have worse physical health status than those with long-term experience with the disease (10 years or more). Other studies have found this association (14, 39, 41, 44). Diabetes self-management education, at diagnosis, may thus be beneficial to patients.

Valley respondents perceiving that their supportive relative had poor diabetes-related knowledge were more likely to have worse physical health than those with supportive relatives with good knowledge of the dis-

ease (as perceived by the study participant). Research indicates that family encouragement of healthy behaviors related to diabetes management may be a key factor in providing appropriate support to individuals with diabetes (45, 46). For instance, Wilson et al. (47) found that meal planning and medication reminders from relatives are critical for treatment adherence among individuals with diabetes. Health interventions on both sides of the border targeting residents of Mexican origin with diabetes should consider the inclusion of patients' relatives, as family is a very important construct in Mexican culture (48).

Although some studies found a significant correlation between obesity and HRQL (33, 39, 40), this study did not—consistent with the results of a 2006 study by Wexler et al. (41). Further investigation is warranted to better understand the perception that border patients have toward obesity and obesity-related behaviors as well as its influence on diabetes burden and complications.

This study had several limitations. First, the use of a convenience sample of patients diagnosed with type 2 diabetes limits generalizations, so causal inferences cannot be made. Furthermore, due to the heterogeneity of the samples in terms of ethnicity and use of language (English and Spanish), study findings may not be generalized to all border residents with type 2 diabetes. In addition, the use of both English and Spanish in the interviews may have introduced measurement errors. Finally,

both dependent and independent variables were measured using a self-reporting instrument, which carries intrinsic respondent biases.

Despite its limitations, this may be the first binational study documenting the impact of personal and social factors on HRQL among adults with type 2 diabetes from both sides of the Texas-Mexico border. Assessing the HRQL of adults with type 2 diabetes in these populations may advance public health research and border policy efforts to increase the quality and years of healthy life of those affected by this debilitating disease.

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RESUMEN**La calidad de vida relacionada con la salud en una población diabética binacional de la frontera Texas-México**

Objetivos. Analizar los dominios de salud física y mental de la calidad de vida relacionada con la salud (CVRS) en una población binacional de adultos con diabetes tipo 2 en la frontera Texas-México y explorar los factores individuales y sociales relacionados con el estado de la salud física y mental.

Métodos. Se realizó un muestreo de conveniencia de personas de 18 años de edad o más con diabetes tipo 2 que vivían en Lower Rio Grande Valley, al sur de Texas, y en Reynosa, Tamaulipas, México, y se les realizó una entrevista estructurada presencial. La CVRS se midió mediante los componentes abreviados de salud física y mental del MOS-SF8 (Medical Outcomes Study Short Form 8). Entre los factores relacionados con la CVRS estaban las características demográficas, los factores de salud, el acceso a la atención sanitaria y el apoyo familiar. Se compararon las características de las muestras mediante la prueba de la *t* de Student o la prueba de la U de Mann-Whitney. Las asociaciones entre las variables independientes y la dependiente se analizaron mediante modelos de regresión logística múltiple, ajustados y sin ajustar.

Resultados. No se encontraron diferencias significativas entre los entrevistados de Valley y de Reynosa en cuanto a la puntuación del estado de salud física y mental. Los participantes de Valley con menor estatus socioeconómico y los que consideraban que los parientes que los apoyaban tenían un "bajo" nivel de conocimiento sobre la diabetes presentaron una mayor probabilidad de informar un peor estado de salud física que los que no tenían esas características. En el grupo de Reynosa, el peor estado de salud física se asoció con la duración de la diabetes y el uso de insulina. En ambos grupos, las personas con síntomas clínicos de depresión tuvieron una mayor probabilidad de informar una peor salud física y mental que los que no presentaban esos síntomas.

Conclusiones. La CVRS es un importante criterio en el análisis del estado de salud. La comprensión de los niveles de CVRS de los diabéticos que viven en la frontera entre los EE.UU. y México y de los factores que influyen en su CVRS puede contribuir a mejorar los programas de control de la diabetes.

Palabras clave

Calidad de vida, diabetes mellitus tipo 2, factores de riesgo, salud fronteriza, americanos mexicanos, Texas, México, Estados Unidos.