



Social support and chronic disease management among older adults of Mexican heritage: A U.S.-Mexico perspective



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ARTICLE INFO

Keywords:

Social support
Self-management for chronic disease
Diabetes mellitus
Hypertension
Mexican-American
Older adults

ABSTRACT

This study explores the association between social support and chronic disease self-management among older adults of Mexican heritage who live in the U.S. and Mexico. We hypothesize that social support increases the ability to manage hypertension and Type 2 (T2) diabetes, regardless of place of residence. We also investigate if differences in country of residence and health system factors influence the ability to manage chronic conditions. Older adults 65 years or older from Los Angeles (LA) and Mexico City (CDMX), with diagnosed hypertension or T2 diabetes (self-reported), attending government agencies, participated in the study. The statistical analyses investigate differences between older adults in LA and CDMX; identify the association between social support and chronic disease self-management; and examine the role of T2 diabetes treatment, testing and complications on self-management. Our study findings show that social support was a statistically significant predictor of improved T2 diabetes self-management (37%–51%, $p < 0.05$). The association between social support and hypertension self-management was only significant (90% confidence level) for adherence to weight management and increased alcohol consumption. Our study did not identify statistically significant differences in social support between LA and CDMX. However, almost 40% of sampled older adults were at risk of social isolation, signaling a vulnerable population that needs to be targeted by health and social systems in the U.S. and Mexico. Our study also shows that social support is a strong predictor of improved T2 diabetes management in the U.S. and Mexico. While older adults in the U.S. and Mexico reported similar access to care and health insurance coverage, higher adherence to low salt diets in LA and reduced coverage of glucose testing in CDMX could signal areas of opportunity for policymakers. Health care providers in both countries need to identify ways of improving adherence to physical activity and weight management.

1. Introduction

Chronic conditions, such as hypertension and Type 2 (T2) diabetes mellitus have increased rapidly in the United States (U.S.) and Mexico (World Health Organization, 2017). In 2017, the incidence of T2 diabetes in Mexico was of 13.1 percent and of 10.8 percent in the U.S., while the incidence of hypertension in Mexico was of 26.1 percent and of 32 percent in the U.S. in the same year (World Bank, 2018). These chronic conditions are expected to become more widespread in both countries as their populations age (Centers for Disease Control and Prevention, 2016). In the U.S., 19.5 percent of the population is projected to be 65 years of age or older by 2050. This demographic change will lead to a higher share of Latino older adults, of whom Mexican Americans are the largest heritage group (Bustamante et al., 2018).

According to the U.S. Census, Latinos currently account for 7 percent of the older adult population, but are projected to represent 20 percent by 2050 (US Census, 2018). Similarly, the proportion of the Mexican population aged 65 and over is expected to increase from 6.3 to 22.5 percent by 2050 (Chande, 2011; CONAPO, 2011).

Previous research shows that social capital and related social determinants of health influence health outcomes, along with individual lifestyles, genetic factors and access to care (The Henry Kaiser Family Foundation, 2015). Studies conclude that social isolation impairs immune function and boosts inflammation, contributing to increased mortality, adverse health outcomes, and the onset of chronic diseases (Steptoe et al., 2013). Studies have also found that socially isolated individuals, particularly vulnerable older adults, face more challenges self-managing their chronic conditions (Chodosh et al., 2005; Clark

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<https://doi.org/10.1016/j.socscimed.2018.09.025>

Received 6 April 2018; Received in revised form 2 September 2018; Accepted 14 September 2018

Available online 15 September 2018

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et al., 1991). According to this research, family members and a network of social support play a crucial role in keeping chronic conditions under control (Daviglius et al., 2012).

Self-management of chronic illness refers to the daily activities that individuals undertake to control one or more chronic conditions, and minimize the negative impacts in their health status and psychosocial functioning (Clark et al., 1991; Gallant, 2003). Effective chronic disease self-management requires multiple components (Bayliss et al., 2003). Individuals need to engage in activities that promote their health. They also have to interact adequately with providers and adhere to treatments. At home, they should be able to monitor their chronic conditions and act upon them. Social support facilitates interactions with health care providers and it contributes to treatment adherence and the adequate monitoring of self-management behaviors at home (Gallant, 2003).

Considering that chronic disease self-management occurs in a physical and social environment within a framework of effective self-management, this study uses the Chronic Care Model (CCM) as a conceptual framework. This model was derived by reviewing and synthesizing successful interventions in many different settings across multiple chronic diseases, and thus intended it to be generic, applicable across diseases and types of health care organizations (Wagner et al., 1996). The CCM defines broad areas that must be considered, such as self-management support. This factor along with other improvement strategies can be tailored to different locations.

Our study uses this framework to guide model specification and variable selection. In the analyses we are particularly interested in exploring the role of social support in complementing effective self-management in two different locations (U.S. and Mexico). According to the CCM, effective self-management will facilitate coping with challenges of living with and managing chronic conditions in ways that reduce emotional impact and disability (Wagner et al., 1996). The specific factors that we investigate in this study correspond to health system factors (i.e. access to care and health insurance coverage) in two different countries, the U.S. and Mexico.

The Mexican heritage population in the U.S. is approximately 34 million individuals, 35 percent of whom are foreign-born (Gonzalez-Barrera and Hugo, 2013). Previous research concludes that compared to their white counterparts, the Mexican heritage population in the U.S. is more likely to be unaware of chronic conditions, and has lower adherence to self-management behaviors (Chesney et al., 1982; Sorlie et al., 2014). Recent research has shown that an increasing share of older adults of Mexican heritage in the U.S. is at risk of social isolation and chronic disease (Vargas Bustamante, 2018). Studies have also shown that social isolation is widespread in Mexico, particularly in urban environments, constituting one of the main deterrents of health care utilization (Vilar-Compte et al., 2018). Despite these findings, few recent studies have explored the association between social support, hypertension, and T2 diabetes self-management.

The interaction between social support and chronic disease self-management can differ across countries, even among similar populations. Environmental factors such as social networks, community relations and the availability of health care and social services can influence how individuals, with different degrees of social support, manage their chronic conditions (Castrejon-Perez et al., 2017; Figueroa-Lara et al., 2016). A cross-country comparison of the relationship between social support and chronic disease self-management can be useful to examine the role of social determinants of health and health system factors on effective chronic disease self-management.

To investigate the role of social support on chronic disease self-management, this study compares hypertension and T2 diabetes self-management among Mexican older adults who live in the U.S. and Mexico. We use a cross-national approach to compare differences in adherence and its association with social support, and health system factors such as access to care and health insurance coverage. Since socially isolated older adults are less likely to benefit from different

forms of social support to screen and manage chronic conditions, this study hypothesizes that social support increases the ability of older adults to manage hypertension and T2 diabetes, regardless of place of residence (Bayliss et al., 2007; Cuffee et al., 2014; House, 2001). To accomplish our study objectives, in this study we assess differences between older adults in the U.S. and Mexico; identify the association between social support and chronic disease self-management; and examine the role of T2 diabetes treatment, testing and complications on self-management.

2. Methods

2.1. Data

Data were collected during a six-month period in Los Angeles (LA) and Mexico City (CDMX-Ciudad de México), during the spring and summer of 2016. Older adults 65 years or older from LA and CDMX, with diagnosed hypertension or T2 diabetes (self-reported), and no cognitive impairments (i.e. Pfeifer test) were the inclusion criteria. In both settings, a convenience sample of older adults attending government agencies was consented to participate in the survey. The survey instrument included questions from previously validated hypertension (H-Scale) and T2 diabetes (SDSCA) self-management scales, in addition to health and socio demographic information from survey participants (D. J. Toobert et al., 2000b; Warren-Findlow and Seymour, 2011). This questionnaire was available in English or Spanish. Survey participants were not compensated for participating in the study. Our total sample size was 259 in LA and 207 in CDMX.

For the LA sample, data were collected at the Mexican Consulate in LA, where older adults of Mexican heritage submit paperwork, for example, to renew a Mexican passport or receive a “Consular ID”. Bilingual and bicultural survey interviewers completed the study questionnaire face-to-face. For the sample in Mexico City, data were collected in the offices of the Institute for Older Adults (INAPAM-Instituto Nacional para los Adultos Mayores), where older adults submit paperwork to receive an “Old Age ID”. Trained survey interviewers completed the survey in person, following the same procedure as in LA. The University of California Los Angeles (UCLA) and *Universidad Iberoamericana's* Institutional Review Boards approved the study protocol, respectively.

2.2. Hypertension and type 2 diabetes self-management measures

The survey used the Summary of Diabetes Self-Care Activities (SDSCA) to assess T2 diabetes self-management, a scale that has been culturally adapted and validated in English and Spanish. The SDSCA scale includes 11-items that measure frequency of self-management activities in the last 7 days for six aspects of the diabetes regime, such as general diet, specific diet, exercise, blood-glucose testing, foot care, and smoking (Toobert et al., 2000a). Higher global scores indicate better self-management.

To assess hypertension self-management skills, the survey used the English and Spanish versions of the Hypertension Self-Care Activity Level Effects (H-Scale). This scale contains 31-items to assess six dimension of hypertension self-management activities. Survey respondents were classified as compliant or not compliant based on the criteria developed by the Joint National Committee on Prevention Detection Evaluation (JNC7), as described in previous studies (Han et al., 2014). The H-SCALE identifies six criteria defined by the JNC7, including adherence to medication, weight loss or maintenance, adoption of a low-salt diet, limited alcohol use and no tobacco use. In addition to these measures, survey respondents were also asked about the age when they were first diagnosed with hypertension or T2 diabetes, T2 diabetes behaviors and complications, diet and alcohol consumption patterns.

2.3. Social support measure

The abbreviated Lubben Social Network Scale (LSNS-6) was used to measure social support. The LSNS-6 Spanish language face validity identified that listing family, friends and neighbors provided more accurate values of social support (Vilar-Compte et al., 2018). This listing procedure was replicated in the present study. The LSNS-6 has been used extensively in the literature to capture the risk of social isolation in older adults by measuring perceived social support from family, friends, and neighbors (Lubben et al., 2006b). Specifically, this instrument includes six items evaluating three different aspects of social networks (i.e. size of network, perceived support, and perceived confidant network) attributed to family ties and friendship. Each item is scored on a 0 to 5 scale, which are subsequently summed to obtain a global score. Higher global scores indicate more social support. Using previously established cut-off points, an individual with a global score less than 12 is identified as socially isolated (Lubben et al., 2006a). For the analyses of our survey results we created a dichotomous measure to identify survey respondents with social support.

2.4. Explanatory variables

In addition to T2 diabetes and hypertension self-management measures, our survey collected additional information about health status, health care utilization and socioeconomic and demographic factors that were included in the analyzes, following our conceptual framework. Survey respondents were asked to rate their self-reported health status (i.e. very good, good, normal, bad, very bad). They were also asked, if a physician or other medical professional had told them that they had one of the following health conditions: T2 diabetes or high glucose levels, high cholesterol, hypertension or high blood pressure, heart disease, cancer, asthma or bronchitis, depression, arthritis, osteoporosis, renal failure, gastritis or ulcers, or another condition.

Subsequently, survey respondents were asked if they had health insurance (yes/no) and what type of coverage they had (e.g. Medicare, Medicaid, among others in the U.S., *Seguro Popular* or Social Security in Mexico). To assess access to care, respondents were asked if they had a usual source of care. Socio demographic characteristics collected during the survey included age, gender, place of birth and residence. These measures were included as explanatory variables in the statistical analyses following the previous literature (D. J. Toobert et al., 2000b; Warren-Findlow and Seymour, 2011).

2.5. Statistical analyses

An initial analysis describes the socio demographic and health characteristics of the surveyed population, distinguishing between the samples collected in LA and CDMX. A subsequent bivariate analysis compares the mean values from the social support scale (LSNS-6), hypertension and T2 diabetes self-management behaviors in both study settings. A step-wise multivariable ordinary least squares (OLS) regression using four different specifications was implemented to identify the association between social support and T2 diabetes self-management skills (SDSCA) in LA and CDMX. This step-wise regression specification is also useful to test the robustness of the main results. For this analysis, data were pooled between the LA and CDMX samples, with an indicator where CDMX residence equals one (i.e. LA is the reference population).

The specific combination of confounders included in the step-wise OLS regressions was the following: i) Model 1 included controls for social support, place of residence, comorbidities, health insurance coverage and access to care, age and gender, ii) Model 2 appended to the Model 1 specification a control for T2 diabetes treatment to evaluate if the inclusion of this control variable changed the relationship between social support and T2 diabetes self-management skills, iii) Model 3 appended to the Model 2 specification two common T2

Table 1
Hypertension, T2 diabetes and socio demographic characteristics by city of residence.

	Hypertension		T2 diabetes	
	Mexico City (n = 161)	Los Angeles (n = 213)	Mexico City (n = 98)	Los Angeles (n = 156)
Total	43.05%	56.95%	38.58%	61.42%
Female - Male	63.16% - 36.84%	53.23% - 46.77%	55.68% - 44.32%	50.00% - 50.00%
Age (mean,(sd))	67.37 (7.6)	69.34 (6.79)	65.70	68.97
Self-reported health status				
Very good/ Good	50.93%	33.33%	56.12%	30.72%
Fair/Poor/ Very Poor	49.07%	66.67%	43.88%	69.28%
Age first diagnosed w/chronic disease				
< 40	5.59%	4.69%	8.16%	8.33%
40-50	22.36%	13.62%	17.53%	14.10%
50-60	42.86%	30.52%	45.92%	37.82%
60-70	21.74%	31.46%	15.31%	25.64%
> 70	7.45%	19.72%	13.27%	14.10%
Risk of social isolation				
No	60.78%	61.47%	59.18%	57.03%
Yes	39.22%	38.53%	40.82%	42.97%
Access to health care				
Yes	97.50%	97.10%	95.92%	98.68%
No	2.50%	2.90%	4.08%	1.32%
Health Insurance				
Yes	87.42%	87.75%	85.71%	91.33%
No	12.58%	12.25%	14.29%	8.67%
Type of insurance				
Medicare	-	30.18%	-	30.47%
Medicaid	-	17.75%	-	21.09%
Medicare & Medicaid	-	21.89%	-	19.53%
Other	-	30.18%	-	28.91%
IMSS	44.06%	-	46.59%	-
ISSSTE	20.28%	-	21.59%	-
Seguro Popular	16.78%	-	17.05%	-
More than one health plan	11.89%	-	5.68%	-
Other	6.99%	-	9.09%	-

diabetes testing procedures (e.g. Eye, Urine tests) to investigate these factors in the relationship between social support and T2 diabetes self-management, iv) Model 4 appended to the Model 2 specification the existence of complications to take this important factor into account in the relationship between social support and the outcome measures.

Logistic regression models were used to examine the association between social support and differences in hypertension self-management skills (H-scale) in LA and CDMX. Each row represents a specific behavior assessed by the H-scale (i.e. medication adherence, low salt diet, physical activity, weight management, smoking and alcohol consumption), classifying survey respondents as compliant or non-compliant based on the guidelines from the JNC7. Each regression model includes controls for place of residence (CDMX or LA), insurance status, access to care, age and gender. We used Stata 14 to perform the data analyses.

3. Results

Table 1 shows descriptive statistics about survey respondents with reported hypertension and T2 diabetes in LA and CDMX. Overall, a total of 43.05 percent of respondents in CDMX (N = 161) and 56.95 percent of respondents in LA (N = 213) had hypertension (self-reported). Similarly, a total of 38.58 percent of respondents in CDMX (N = 98) and 61.42 percent of respondents in LA (N = 156) had T2 diabetes (self-reported). According to these results, a higher share of older adults in LA reported being diagnosed with hypertension, compared to respondents in CDMX. The corresponding figures for T2 diabetes were

more widespread between LA and CDMX.

Females were approximately 63.16 percent of older adults with hypertension and 55.68 percent of older adults with T2 diabetes in CDMX. By contrast, females were approximately 53.23 percent of older adults with hypertension, and 50 percent of older adults with T2 diabetes in LA. Females were less likely to report a chronic condition in LA compared to CDMX. In the case of diagnosed hypertension or T2 diabetes, rates among females were lower in LA compared to those reported in CDMX. In contrast, in both cities, males were less likely to report a chronic condition. However, LA had a higher share of male respondents with hypertension (46.77 percent) and T2 diabetes (50 percent), compared to CDMX, where males reported lower rates of hypertension (36.84 percent) and T2 diabetes (44.32 percent).

The mean age of respondents in CDMX was 67.37 for survey respondents with hypertension and 65.70 for survey respondents with T2 diabetes. In LA the mean age was 69.34 for survey respondents with hypertension and 65.7 for survey respondents with T2 diabetes. Table 1 also shows that older adults in CDMX were more likely to report their health as very good/good (50.93 percent for respondents with hypertension and 56.12 percent for those with T2 diabetes), compared to older adults in LA (33.33 percent for respondents with hypertension and 30.12 percent for those with T2 diabetes). The age when older adults were first diagnosed was more homogeneous across the two cities in the case of T2 diabetes. In the case of hypertension, approximately 52 percent of first diagnoses in LA occurred after age 60, while the corresponding figure for CDMX was approximately 30 percent.

The distribution of older-adults with social support in LA was 61.47 percent for respondents with hypertension, and 57.03 percent for those with T2 diabetes. In CDMX, the corresponding figures were 60.78 percent for respondents with hypertension and 59.12 percent for those with T2 diabetes. Access to care (ranging from 95.92 percent to 98.68 percent) and health insurance rates (ranging from 85.42 percent to 91.33 percent) were relatively homogenous across cities. The majority of LA respondents were enrolled in Medicare, Medicaid or both programs. In CDMX, Social Security institutions (IMSS, ISSSTE) provided health services in addition to a public health plan called *Seguro Popular*.

Table 2 examines differences in means between older adults in LA and CDMX for social support, hypertension and T2 diabetes. Based on these results, social support among older adults in both cities was not statistically different, either for respondents diagnosed with hypertension or for survey participants diagnosed with T2 diabetes. Similarly, no statistically significant differences were identified across the LA or CDMX samples in five of the six dimensions of the H-Scale: medical adherence (LA: 73.6 percent, CDMX: 69.93 percent), physical activity (LA: 54.26 percent, CDMX: 43.67 percent), smoking status (LA: 25.53 percent, CDMX: 28.30 percent), weight management (LA: 32.37

percent, CDMX: 26.71 percent), and alcohol consumption (LA: 23.47 percent, CDMX: 22.98 percent). Adherence to low-salt diets, however, was higher in LA (LA: 73.6 percent vs CDMX: 69.93 percent, $p < 0.05$), and this difference was statistically significant. The alpha coefficient of internal consistency for the H-scale was 0.70.

By contrast, in the case of the Summary of Diabetes Self-Care Activities (SDSCA) scale, five of the seven dimensions of T2 diabetes self-management were non-statistically significant across the two cities: general diet (LA: 4.80 +- 2.42, CDMX: 4.34 +- 2.76), specific diet (LA: 4.74 +- 1.65, CDMX: 4.41 +- 1.79), exercise (LA: 3.2 +- 1.98, CDMX: 2.79 +- 2.26), medication compliance (LA: 6.13 +- 2.24, CDMX: 6.03 +- 2.43), and smoking status (LA: 18.59 percent, CDMX: 21.43 percent). The two dimensions of T2 diabetes that were statistically significant corresponded to glucose testing (LA: 3.46 +- 2.98, CDMX: 0.85 +- 1.67, $p < 0.00$) and foot care (LA: 4.93 +- 2.86, CDMX: 4 +- 3.34, $p < 0.03$). The alpha coefficient of internal consistency for the SDSCA scale was 0.64.

Table 3 shows the results from linear regressions used to estimate the association between social support and T2 diabetes self-management using the pooled data from LA and CDMX. Model 1 includes controls for socio demographic, health and health care characteristics. Results from this model shows that respondents with social support, compared to respondents with no social support in LA and CDMX were 37 percent more likely to have better T2 diabetes self-management. This association, however, was only statistically significant at the 90 percent confidence level ($p < 0.1$). Model 2 appended a control for T2 diabetes treatment. Once this variable was introduced, results showed that respondents with social support, compared to respondents with no social support in both cities were 45.3 percent more likely to have better T2 diabetes self-management, and this association was statistically significant ($p < 0.05$).

Model 3 includes controls for diabetes examination and aspirin intake. When these measures were included, results showed that respondents with social support, compared to respondents with no social support in LA and CDMX were 37.3 percent ($p < 0.05$) more likely to have better T2 diabetes self-management. Model 4 appended controls for T2 diabetes complications, showing that respondents with social support, compared to respondents with no social support in both cities were 51.3 percent ($p < 0.05$) more likely to have better T2 diabetes self-management. Respondents who reported an ophthalmologic examination (65.9 percent) or aspirin intake (52.6 percent) compared to those who did not have an ophthalmologic examination or aspirin intake, respectively, were more likely to have better T2 diabetes self-management, and these differences were statistically significant ($p < 0.05$). In all models, respondents from CDMX were less likely (Model1: 95.1 percent, Model 2: 87.9 percent, Model 3: 61.8 percent,

Table 2
Place of residences, chronic condition and social support by chronic disease self-management scales.

	Hypertension (%)			T2 diabetes (mean +- SD)			
	CDMX	LA	p value	CDMX	LA	p value	
With Social Support	60.78%	61.47%	0.56	With Social Support	59.18%	57.03%	0.75
Medical adherence	69.93%	73.60%	0.46	General diet	4.34 +- 2.76	4.80 +- 2.42	0.19
Low salt diet	43.67%	54.26%	0.05	Specific diet	4.41 +- 1.79	4.74 +- 1.65	0.15
Physical activity	28.30%	25.53%	0.56	Exercise	2.79 +- 2.26	3.2 +- 1.98	0.15
Smoking status	15.53%	18.31%	0.48	Glucose testing	.85 +- 1.67	3.46 +- 2.98	0.00
Weight management	26.71%	32.37%	0.27	Foot care	4 +- 3.34	4.93 +- 2.86	0.03
Alcohol consumption	22.98%	23.47%	0.91	Medication	6.03 +- 2.43	6.13 +- 2.24	0.74
				Smoking status	21.43%	18.59%	0.58
Cronbach alpha	.70			Cronbach alpha	.64		

Notes: The SDSCA was constructed as a continuous scale that ranges from 1 to 7, representing the different dimensions of T2 diabetes self-management (i.e. general diet, specific diet, exercise, glucose testing, foot care, medication and smoking status), as described by previous studies (D. J. Toobert et al., 2000b). To estimate values for the H-Scale, we estimated rates of compliance for six self-management activities (i.e. medical adherence, low salt diet, physical activity, smoking status, weight management and alcohol consumption) as defined by the JNC7 described in detail by previous studies (Warren-Findlow and Seymour, 2011).

Table 3
OLS regression model: Summary of Diabetes Self-Care Activities (SDSCA).

	1	2	3	4
	SDSCA	SDSCA	SDSCA	SDSCA
Social Support	0.370* (0.209)	0.453** (0.197)	0.373** (0.188)	0.513** (0.200)
CDMX residence	-0.951*** (0.219)	-0.879*** (0.209)	-0.618*** (0.208)	-0.878*** (0.212)
Comorbidities	-0.00854 (0.0633)	-0.00348 (0.0612)	-0.0439 (0.0587)	-0.0434 (0.0654)
With insurance	0.0602 (0.328)	0.123 (0.311)	-0.182 (0.302)	0.100 (0.311)
With access to health care	-0.286 (0.740)	-0.132 (0.693)	0.108 (0.662)	-0.0886 (0.691)
Age	0.00191 (0.0171)	0.00224 (0.0161)	0.00820 (0.0153)	0.00546 (0.0162)
Men	-0.0635 (0.211)	-0.230 (0.199)	-0.229 (0.189)	-0.257 (0.200)
Diabetes treatment		0.112 (0.132)	0.113 (0.125)	0.119 (0.133)
Ophthalmologic Examination			0.659*** (0.227)	
Aspirin intake			0.526** (0.203)	
Urine test			0.269 (0.281)	
Diabetes complications				0.136 (0.0855)
Constant	4.427*** (1.359)	4.223*** (1.289)	2.973** (1.244)	3.893*** (1.294)
Observations	198	190	190	187
R-squared	0.114	0.133	0.239	0.143

Std errors in parentheses. SDSCA values were indexed to a zero to one scale, where values closer to one indicate better T2 diabetes self-management. Comorbidities include the number of comorbid conditions reported by survey respondents (12 conditions). Results for place of residence correspond to those from CDMX, with LA as reference population. T2 diabetes treatment, testing and complications controlled for in Models 2,3,4, respectively. ***p < 0.01, **p < 0.05, *p < 0.1.

Model 4: 87.8 percent) to have adequate T2 diabetes self-management, compared to the survey respondents in LA (p < 0.01), which is the reference population.

Table 4 shows the results from the logistic regressions used to estimate the association between social support and hypertension self-management using pooled data from LA and CDMX. The association between the risk of social isolation and the six dimensions of hypertension self-management was statistically significant (p < 0.10) in two of these dimensions. Older adults with social support reported higher odds of complying with weight management (OR: 1.668) and reporting alcohol consumption (OR: 1.761) compared to older adults

with no social support. In addition, older adults with health insurance coverage reported higher odds (OR: 2.152, p < 0.05) of medication adherence compared with older adults without health insurance coverage. In the case of compliance with physical activity guidelines, males reported higher odds of adherence (OR: 1.633, p < 0.10) compared to females, while older adults with more comorbidities reported lower odds of adherence (OR: 0.826, p < 0.05) to these guidelines compared to older adults with fewer comorbidities. Males, however, reported higher odds of smoking (OR: 1.926, p < 0.10) and consuming alcohol (OR: 4.647, p < 0.01) compared to females. In the case of hypertension self-management, no statistically significant differences were

Table 4
Logistic Regression (odds ratios): Hypertension self-management scale (H-Scale).

	medication adherence	low salt diet adherence	physical activity adherence	smoker	weight management adherence	alcohol consumption
Social support	1.436 (0.391)	0.979 (0.241)	1.577 (0.464)	1.245 (0.459)	1.668* (0.468)	1.761* (0.584)
Residence = CDMX	0.891 (0.249)	0.665 (0.166)	0.906 (0.265)	1.655 (0.617)	0.680 (0.191)	1.367 (0.445)
Comorbidities	0.950 (0.0766)	0.991 (0.0728)	0.826** (0.0771)	0.937 (0.108)	0.965 (0.0802)	0.955 (0.0964)
With Insurance	2.152** (0.829)	1.258 (0.457)	1.441 (0.665)	1.615 (1.038)	1.639 (0.727)	0.700 (0.329)
With access to health care	1.145 (0.941)	1.209 (0.854)	1.864 (2.054)		0.485 (0.390)	1.554 (1.745)
Age	0.990 (0.0185)	1.021 (0.0173)	0.988 (0.0199)	0.998 (0.0250)	0.975 (0.0195)	0.988 (0.0229)
Male	1.111 (0.307)	1.137 (0.275)	1.633* (0.451)	1.926* (0.674)	0.974 (0.264)	4.647*** (1.491)
Observations	287	299	300	297	280	306

Standard errors in parentheses. Comorbidities include the number of comorbid conditions reported by survey respondents (12 conditions). Results for place of residence correspond to those from CDMX, with LA as reference population.

***p < 0.01, **p < 0.05, *p < 0.1.

identified between LA and CDMX.

4. Discussion

This study uses a cross-national sample of older adults to investigate the association between social support, hypertension and T2 diabetes self-management in LA and CDMX. Our cross-country study compares socioeconomic and demographic characteristics of older adults of Mexican heritage in the U.S. and Mexico and explores the association between social support and chronic disease self-management. Overall our findings show that the majority of older adults in our sample report a chronic condition. Reported health status, access to care and health insurance coverage, however, are similar in LA and CDMX. Importantly, our study did not identify statistically significant differences in social support between LA and CDMX. However, almost 40 percent of sampled older adults were at risk of social isolation, signaling a vulnerable population that needs to be targeted by health and social systems in the U.S. and Mexico.

We first hypothesized that social support would be positively associated with better chronic disease self-management. Our study findings show that social support is a statistically significant predictor of improved T2 diabetes self-management, particularly after T2 diabetes treatment, testing and complications were taken into consideration, along with access to care, insurance coverage, age and gender. These findings support previous research that concludes that social support among older adults represents an important barrier to chronic disease self-management (Daviglius et al., 2012).

By contrast, the association between social support and hypertension self-management was only significant at the 90 percent confidence level in the cases of adherence to weight management and increased alcohol consumption, which is consistent with previous research that has also found that increased social interaction is associated with drinking alcohol among older adults (Simoni-Wastila and Yang, 2006). In our study, we also observed that insurance coverage was a statistically significant predictor of medication adherence.

According to our conceptual framework, the Chronic Care Model, differences in community factors and health system factors would influence the ability of older adults to manage chronic conditions. Our findings showed three important differences between LA and CDMX. Previous research has found that hypertension is more likely to be undiagnosed among Mexican immigrants and Mexican-Americans in the U.S. (Sorlie et al., 2014). In our study, more than half of older adults with hypertension in LA were diagnosed after age 60, while in CDMX more than half of cases were first diagnosed between 40 and 60 years of age. This difference in the age of first diagnoses could be due to Medicare eligibility until age 65 in the U.S., which might delay the age of first hypertension diagnoses for some older adults in LA (Vargas Bustamante, 2018). In Mexico, public health insurance programs do not have age restrictions for adults. Thus, hypertension could be diagnosed at an earlier age. Future research should investigate whether eligibility cut-offs for health insurance programs are related to hypertension diagnoses rates.

Gender differences in diagnosed hypertension and T2 diabetes were also identified in both cities. Lower rates of chronic disease among males of Mexican heritage could be explained by higher chronic disease unawareness (Simoni-Wastila and Yang, 2006). However, gender differences were much more pronounced in CDMX than in LA, particularly in the case of hypertension. Future research should investigate whether patient or health system factors explain these gender differences. Another relevant difference among older adults from both cities was on self-perceived health status. The sample in CDMX was more likely to report Very good/Good health status. This difference could be due to sampling differences, or to environmental factors that influence perceived health status in the U.S. and Mexico.

Validated scales used to evaluate chronic disease self-management have been used among different minority populations, but very few

studies have used them to compare chronic disease self-management among Mexican older adults who reside in the U.S. and Mexico (D. J. Toobert et al., 2000b; Warren-Findlow and Seymour, 2011). In our study we found that adherence rates to hypertension and T2 diabetes self-management guidelines were similar between LA and CDMX. Older adults of Mexican heritage in both cities reported higher medical adherence, but lower physical activity and weight management compliance rates. An important statistically significant difference, however, was increased adherence to low salt diets in LA. This difference might signal an area of opportunity for Mexican health care providers to improve hypertension self-management.

Similarities in the case of T2 diabetes were also common across cities. Medication adherence was higher, compared to diet and exercise. Two key differences in T2 diabetes self-management were glucose testing and foot care. Older adults in LA were considerably more likely to report these two measures of diabetes self-management, compared to respondents in CDMX. Differences across cities could be related to the lack of financial coverage for individualized glucose testing equipment from health insurers in Mexico (Arredondo and Zuniga, 2004; Rull et al., 2005). Even though T2 diabetes rates have increased rapidly in Mexico, this type of equipment still needs to be purchased out-of-pocket by patients. This signals a second area where Mexican health care providers might want to focus efforts to improve T2 diabetes self-management.

After the samples of both cities were pooled and analyzed in a linear regression framework, our study found that respondents in CDMX were consistently less likely to report adequate T2 diabetes self-management. These differences were robust to the inclusion of different control variables. Investigating the association between social support and chronic disease self-management can inform policymakers, health care providers and system administrators on how to design interventions to improve chronic disease self-management among older adults in the U.S. and Mexico.

4.1. Study limitations

Data from this study was gathered among older adults of Mexican heritage from urban areas. Since we used a convenience sample, some differences in diagnosed hypertension and T2 diabetes could be attributed to sample characteristics. The cross-sectional nature of our data limits the ability to draw causal inferences from the study results. Data gathered by this survey might be subject to recollection bias since it relied on self-reports from survey respondents. Self reported data is dependent on a respondent's perspective, which in some cases could differ from objective assessments of health status. The study setting and targeted population limits the external validity of the study findings.

5. Conclusions

The historical migration process between the U.S. and Mexico suggests that the increasing incidence of chronic conditions could have intertwined implications for the delivery of health care and social services in both countries. In the upcoming decades, an increasing number of older adults in the U.S. and Mexico would need to develop effective self-management skills to keep their chronic conditions under control. Effective interventions to improve chronic disease self-management can potentially improve health outcomes and health-related quality of life.

Our study shows that social support is a strong predictor of improved T2 diabetes management among older adults of Mexican heritage in the U.S. and Mexico. Health care providers catering to this population need to identify ways of improving adherence rates for physical activity and weight management. While older adults in the U.S. and Mexico reported similar access to care and health insurance coverage, higher adherence to low salt diets in LA and reduced coverage of glucose testing in Mexico could signal areas of opportunity for policymakers. Procuring social support among older adults can

potentially reduce the demand for costly health care related to chronic disease management and would help reconnect individuals with their communities in the U.S. and Mexico.

Funding/acknowledgements

Program of Immigration and Health (PIMSA) and UC-Mexus. We acknowledged the valuable contribution of Rosa E. García who co-ordinated the administration of the study survey in Los Angeles.

We want to acknowledge the following:

- None of the authors has any conflicts of interest to report.
- The corresponding author (AVB) confirms that he had full access to all aspects of the research and writing process, and take final responsibility for the paper.
- The co-authors contributed with the following tasks:
 - AVB – study design, development and implementation of methods, data analysis, manuscript preparation
 - MVC – study design, development and implementation of methods, data analysis, manuscript editing
 - AO – data analysis

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