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Trajectories of Depressive Symptoms in Elderly Mexican Americans

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Abstract

Objectives—To identify depressive symptom trajectories and factors associated with trajectory group membership in the very old segment of the rapidly growing and long-living Mexican-American population.

Design—Latent growth curve modeling was used to identify depressive symptom trajectories and multinomial logistic regression to identify factors associated with trajectory group membership.

Setting—Data spanning three waves and 7 years (2004–05, 2007–08, 2010–11) drawn from the Hispanic Established Populations for Epidemiologic Studies of the Elderly; homes of Mexican-origin elderly adults.

Participants—Community-dwelling Mexican Americans aged 75 and older living in the southwestern United States (N = 1,487).

Measurements—The 20-item version of the Center for Epidemiologic Studies Depression Scale.

Results—Three trajectory groups were identified: low throughout, increasing, and high but decreasing. Activity of daily living disability was the strongest predictor of depressive symptoms, followed by social support. Foreign-born individuals were at greater risk than those who are U.S. born for high but decreasing depressive symptoms than for low depressive symptoms.

Conclusion—Early detection and treatment of chronic disabling conditions, especially heart disease, cancer, visual impairment, and cognitive impairment, and increasing access to social participation should be the focus of treatment and intervention strategies for depression in very old Mexican Americans.

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Keywords

depressive symptoms; mental health; Mexican Americans

The older population in the United States is expected to grow more diverse in the coming years. Older Latinos, in particular, accounted for 7% of the population aged 65 and older in 2010 and are projected to increase to 20% by 2050.¹ The Mexican-origin population is the largest subgroup of Latinos in the United States, representing approximately half of the Latino population aged 65 and older according to the 2012 Census.² Research on mortality risk indicates that Latinos, on average, tend to live longer than non-Latino whites but do so with higher rates of comorbidities, disability, and frailty in middle age and late life.^{3–7} Disability and comorbidities are accompanied by risk of depression. Elderly Latinos, especially Mexican Americans, tend to report more depressive symptoms in the past week⁸ and past year⁹ than non-Latino whites.

The current study contributes to the Latino health and aging literature in three important ways. First, it goes beyond static analyses to understand diverse levels and changes in depressive symptoms to better describe variations in psychological distress over time. Understanding these patterns, as well as risk factors for increasing depressive symptoms, will indicate target subpopulations for intervention efforts. Second, a recent study found that Latinos in mid- and late life were at greater risk of depressive symptoms over a 10-year period than non-Latinos.¹⁰ Investigating trajectories in Latino subgroups is important given differences in cultural and economic needs. The Mexican-origin population has especially high rates of comorbidities and represents a disproportionate share of the poor¹¹ and therefore was expected to be at risk for high depressive symptoms across the study waves. Third, the current study focused on the role of nativity status. The healthy immigrant hypothesis suggests that immigrants have a health advantage over native-born adults,⁷ although at older age, because of acculturative strain processes, there is a convergence or crossover. Recent research demonstrates that major depression is more prevalent in foreign-born Latinos than native-born Latinos but only in late life.¹⁰ Given the advanced age of the current study sample, it was expected that foreign-born Latinos would be at greater risk of high depressive symptoms than those who were native born.

The current study used data from the Hispanic Established Population for the Epidemiologic Study of the Elderly (Hispanic EPESE, 2004–05, 2007–08, 2010–11) (N = 1,487) on adults aged 75 and older. The current study identifies the latent structure of depressive symptoms over a 7-year study period, and factors associated with trajectory group membership. Identifying risk factors is especially important given depression's ability to limit the care and maintenance of chronic conditions such as diabetes mellitus and heart disease, which are highly prevalent in this population and increase the risk of mortality.^{12–15} In accordance with previous research on depression, it was expected low levels of social support, being foreign born, living alone, being female, low socioeconomic standing, and high levels of cognitive and functional limitations would put individuals at risk of high depressive symptoms.^{15–21}

Methods

Study Sample

The Hispanic EPESE is a longitudinal study of Mexican-American adults aged 65 and older living in the southwestern United States.²² Data were first collected in 1993–94, and follow-up interviews were conducted every 2 to 3 years through 2010–11. A new sample of 902 respondents, also aged 75 and older and from the same region, was added to the original sample in Wave 5 (2004–05). Data from Waves 5 (2004–05), 6 (2007–08), and 7 (2010–11) were used, and only respondents with partial or complete information on depressive symptoms at baseline (Wave 5) who were reinterviewed at Wave 6 or 7 (N = 1,487) were included.

Measures

Depressive symptoms are based on the Center for Epidemiologic Studies Depression Scale (CES-D),²³ which is a summation of 20 items experienced during the past week. Scores for each item range from 0 (rarely or none of the time) to 3 (most or all of the time). Positively worded items were reverse coded. The potential scores range from 0 to 60, with higher scores indicating more psychological distress. In most studies, a score of 16 or greater indicates high depressive symptoms.²⁴ The reliability and validity of the CES-D has been substantiated in older Mexican Americans.^{12,25} For the current study, Cronbach alphas were 0.88, 0.89, and 0.89 for the three waves, indicating high internal consistency.

Sociodemographic indicators were also included: nativity status, age, sex, years of formal education, marital status, and living arrangements. Social support is a categorical variable assessed according to the degree to which respondents can count on some of their family and friends in times of trouble: most of the time (reference), some of the time, or hardly ever. Activity of daily living (ADL) disability is defined as difficulty with or needing help performing any of seven self-care activities: walking across a room, bathing, personal grooming, dressing, eating, getting from a bed to a chair, and using a toilet. Cognitive function is assessed using the Mini-Mental State Examination (MMSE); lower scores indicate greater cognitive impairment.²⁶ English and Spanish versions of the MMSE were adopted from the Diagnostic Interview Schedules and have been used in previous studies.²⁷ Chronic conditions (diabetes mellitus, heart attack, stroke, hypertension, kidney disease, cancer, visual impairment, hearing impairment) were based on self-reported diagnoses.

Statistical Analysis

A conventional unconditional growth-curve model was fit to investigate the average overall trajectory of depressive symptoms for the entire sample. Then latent class growth curve analysis, a type of growth mixture model, was used to identify distinctive trajectories of depressive symptoms. This model was also used to estimate the mean trajectories of CES-D scores based on growth parameter estimates, intercept, and slope at each study wave. The Bayesian Information Criterion (BIC) value²⁸ and the BIC log Bayes factor approximation^{29,30} were used to select appropriate and distinguishable number of trajectories. In addition, means of the estimated posterior probabilities assigned to specific trajectories were used to evaluate the precision of the identification of the selected number of

trajectories. Finally, multinomial logistic regression analyses were performed to determine which predictors discriminated between unique trajectories.

In general, older respondents are more likely to have incomplete data on the CES-D.³¹ In the current study cohort, 9.0%, 9.5%, and 6.1% of respondents had partial item responses at each wave, respectively. To prevent the bias resulting from single imputation,³² discarding respondents with incomplete items,^{32,33} or forming a scale score based on partial data,³⁴ a sensitivity analysis was conducted that indicated the robustness of the single-person mean imputation at each wave. Under the above-described modeling structure, missing data on covariates or outcome due to mortality or attrition were assumed to be missing at random, permitting valid inference.^{35,36}

Results

Respondent Characteristics at Baseline

Of the 1,487 respondents, 44% were born in Mexico, 63% were female, 44% were married, and 29% lived alone (Table 1). The mean age of the sample was 81 ± 5 , and the mean educational level was 5 ± 4 years of formal education. Close to 80% reported being able to count on some of their family and friends most of the time. For physical and cognitive functioning, approximately 29% of respondents needed help with ADLs, and the average MMSE score was 22 ± 6 , indicating mild cognitive impairment. The most frequent chronic diseases reported were hypertension (63%) and visual impairment (61%). Approximately 32% reported diabetes mellitus, and 24% reported hearing impairment.

Assessment of Overall Trajectory

The overall trajectory of the estimated mean CES-D score for all respondents was assessed using the unconditional linear growth model. A fitted trajectory indicated an increase of 1 point on the CES-D score at each wave (results not shown). Then, a trajectory model was fit using two stratified groups at baseline: respondents with low depressive symptoms (CES-D score < 16) and respondents with high depressive symptoms (CES-D score ≥ 16). Respondents with low depressive symptoms at baseline had persistently low depressive symptoms across the three waves. In contrast, respondents with high depressive symptoms declined between the first and last waves, although the estimated mean was still within the range of high depressive symptoms (≥ 16) throughout the waves.

Identification of Latent Trajectory Classes

In the next step, a linear conditional latent class growth curve analysis model adjusted for covariates at baseline, including sociodemographic indicators, physical and cognitive function, and chronic conditions, was used to determine the number of trajectory classes and to describe the linear pattern of each latent trajectory over time in depressive symptoms. Model fit assessments comparing the two- (BIC = $-11,718.27$), three- (BIC = $-11,705.16$, BIC log Bayes factor approximation ≈ 26.22), and four- (BIC = $-11,744.48$, BIC log Bayes factor approximation ≈ -78.64) class models indicated that a three-class linear model was the optimal model (entropy estimate of 0.72).

Figure 1 shows the distribution of CES-D scores in the three trajectory classes over three waves. Approximately 61% of respondents were allocated to the first trajectory class, which had the lowest intercept (4.05, $P < .001$) at baseline and only a slight increase in depressive symptoms (0.23, $P = .003$) over time and therefore was characterized as persistently low depressive symptoms. The second trajectory class, increasing depressive symptoms (33% of respondents), had a higher intercept (11.71, $P < .001$) at baseline and an increase in depressive symptoms (1.16, $P < .001$) over time. The third trajectory class, high but decreasing depressive symptoms, had the highest intercept (31.24, $P < .001$) at baseline and a decrease over time (-2.06 , $P < .001$) (7% of respondents). The mean posterior probabilities for the three trajectory classes were 0.90, 0.81, and 0.88, respectively, suggesting good model fit. Figure 2 shows estimated growth curves of mean CES-D scores for the three classes.

Characteristics of Respondents According to Trajectory Class

Table 2 illustrates characteristics of respondents at baseline according to trajectory group membership. A larger percentage of the low (60%) and increasing (55%) depressive symptom groups were U.S. born, whereas more of the high but decreasing depressive symptom group (69%) were immigrants. The persistently low depressive symptoms trajectory class had a larger proportion of men, married respondents, and respondents living with someone than the high depressive symptom trajectory groups (increasing and decreasing). The low depressive symptoms group, on average, was younger and had more years of formal education, less disability, and better cognitive functionality than the high depressive symptom groups. In addition, a further exploration showed that, of the 892 respondents with CES-D scores at Wave 7, 65% ($n = 168$) of the increasing depressive symptoms ($n = 257$) and 53% ($n = 27$) of the high but decreasing depressive symptoms ($n = 51$) trajectory classes had clinically significant depressive symptoms (CES-D score ≥ 16) 6 years later.

Association Between Respondent Characteristics and Trajectory Class Membership

Table 3 presents results from multinomial logistic regression analyses. Respondents born in Mexico were approximately 2.5 times as likely as those born in the United States to have high and decreasing depressive symptoms. Sex, educational attainment, and living arrangements were significantly associated with depressive symptom trajectory group membership, whereas baseline age and marital status were not. For example, respondents who lived alone were 1.5 times as likely to have increasing depressive symptoms (odds ratio (OR) = 1.55, 95% confidence interval (CI) = 0.96–2.59) as those who lived with someone and more than twice as likely to have high and decreasing depressive symptoms (OR = 2.27, 95% CI = 1.06–4.88). Social support was significantly associated with trajectory group membership, in that those who were unable to count on family and friends were at the greatest risk of high depressive symptoms. Those who were unable to perform or needed help performing any ADL were almost five times as likely (OR = 4.54, 95% CI = 2.93–7.02) to have increasing depressive symptoms and more than six times as likely (OR = 6.36; 95% CI = 3.30–12.26) to have high but decreasing depressive symptoms as those with persistently low depressive symptoms.

For every 1-point increase in MMSE score, the estimated odds were almost 10% lower for the increasing depressive symptom group (OR = 0.90, 95% CI = 0.87–0.94) and high but decreasing depressive symptom group (OR = 0.87, 95% CI = 0.82–0.92). Finally, there is strong evidence of 2 to 5 times greater odds of membership in the trajectory class of high and decreasing than low depressive symptoms for those who report having had a heart attack, having hypertension, having cancer, and having visual impairment. Of these, visual impairment and heart attack were also significantly and independently associated with membership in the trajectory of increasing depressive symptoms. Overall, these results support that baseline covariates, such as nativity status, sex, education, living arrangement, physical and cognitive function, and certain chronic diseases, have a strong effect on characterizing depressive symptom trajectory membership in very old Mexican Americans.

Discussion

The purpose of this study was twofold: to identify trajectories of depressive symptoms and predictors of trajectory group membership in very old Mexican Americans. Trajectory modeling is an improvement over more-static analyses because it identifies heterogeneity in changes in depressive symptoms over time. Based on three waves of panel data spanning 7 years, results from this investigation revealed three distinct trajectory classes of depressive symptoms: persistently low (61%), increasing (33%), and high but decreasing (7%). The increasing depressive symptom group's predicted trajectory crossed the cutoff CES-D score (16) indicating risk of clinical depression. The high but declining group's score, although demonstrating some decline, remained within the range of risk of clinical depression.

The forms of stability and change observed in depressive symptoms in very old Mexican Americans support previous research on late-life depressive symptom trajectories, with one notable exception. Results from samples with more-diverse age ranges identify small groups of respondents with consistently high depressive symptoms or high and increasing depressive symptoms.^{17–19} It is likely that the lack of these groups in the current study reflect the advanced age of the sample, with mortality selecting out those with consistently high depressive symptoms before the beginning of the study. One finding that is consistent across studies is the relationship between physical health or disability and high depressive symptom. It is likely that the especially high and increasing rates of disability and cognitive impairment observed in this population^{37,38} reflect greater disease burden and a lifetime of physical labor and substandard medical care. Targeting these distal factors (e.g., working conditions, access to adequate care) is important in reducing psychological distress of Mexican Americans in late life.

One question that remains unanswered is how some elderly adults with ADL disability are able to achieve slight recovery in depressive symptoms over time. This group may have improvements in functional status after baseline data collection or may be able to effectively mobilize support to aid with these day-to-day activities and offset depressive symptoms. Research on Latino families, particularly Mexican Americans, demonstrates that strong family and neighborhood support systems benefit health and functioning, especially in late life.^{39–41} Uncovering the financial and social circumstances that limit family social support in very old Mexican Americans is an important area for future research. The current findings

also demonstrate that, regardless of physical health, supportive relationships benefit well-being. Lacking beneficial social relationships and living alone, especially for a population that relies heavily on neighborhood and family support structures for emotional and material support, is especially detrimental to well-being. Interventions that reduce social isolation through improving community resources and safety so that individuals can socialize⁴² are especially needed for populations with high rates of disability.

Finally, this study contributes to the literature on depressive symptom trajectories by investigating the role of nativity status. The crossover in health to levels worse than that of individuals who were native born for immigrants at older ages has been attributed to the adoption of health-compromising behaviors, experiences with acculturative stress, and lack of financial resources.^{9,43–46} The results of the current study show that those born in Mexico are at risk of high but slowly decreasing depressive symptoms. This raises the question of whether there is an additional crossover at the end of the life span at which levels of distress of foreign-born individuals fall below the levels of those who are native born. Future research incorporating older adults from multiple racial and ethnic groups can determine whether there are significant differences in these trajectories in late life. Still, the current study is one of the first to identify patterns of change and the risk factors for high depressive symptoms, including nativity status, in the elderly Mexican-origin population.

Certain limitations are worth mentioning. First, because data were collected every 2 to 3 years for these respondents, depressive symptoms were observed only every 2 to 3 years. Additional data points would better describe the course of and highlight possible nonlinear changes in depressive symptoms over time. Second, taking into consideration acculturation and life course stage at migration would better elucidate the role of immigration-related factors. Pinpointing which aspects of acculturation processes induce psychological distress would allow areas of intervention for foreign born Mexican Americans to be uncovered. Third, certain symptom clusters of depressive symptoms is an important area for future research. Especially high correlations with somatic symptoms or unique associations with positively or negatively worded items may determine the relationship between morbidity and depressive symptoms.

Overall, the current study builds on more-static analyses to show the course of stability and change in depressive symptoms in very old Mexican Americans and demonstrates that intervention efforts should focus on culturally sensitive models that take into account nativity status and mobilize supportive structures. The study is one of the first to identify patterns of change and the risk factors for high depressive symptoms in the very old segment of this quickly growing population.

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Figure 1.
Distribution of Center for Epidemiologic Studies Depression Scale scores within each trajectory group.

Figure 2.
Predicted mean Center for Epidemiologic Studies Depression Scale score for each trajectory group.

Table 1
Descriptive Characteristics at Baseline (Wave 5, 2004–05) (N = 1,487)

Characteristic	Value
Age, mean $\pm$ SD	81 $\pm$ 5
Born in Mexico, n (%)	653 (44)
Female, n (%)	938 (63)
Married, n (%)	649 (44)
Education, years, mean $\pm$ SD	5 $\pm$ 4
Living alone, n (%)	436 (29)
Can count on someone	
Most of the time	1,161 (80)
Some of the time	218 (15)
Hardly ever	79 (5)
Need help with activities of daily living, n (%)	434 (29)
Diabetes mellitus, n (%)	479 (32)
Heart attack, n (%)	221 (15)
Stroke, n (%)	172 (12)
Hypertension, n (%)	926 (63)
Kidney disease, n (%)	117 (8)
Cancer, n (%)	100 (7)
Visual impairment, n (%)	895 (61)
Hearing impairment, n (%)	349 (24)
Mini-Mental State Examination score, mean $\pm$ SD	22 $\pm$ 6

SD = standard deviation.

Table 2
Baseline Characteristics According to Trajectory Group

Characteristic	Low, n = 862 (61%)	Increasing, n = 462 (33%)	Decreasing, n = 93 (7%)	P-Value
Nativity, %				
Mexico	40	45	69	<.001
United States	60	55	31	
Age, mean $\pm$ SD ^a	81 $\pm$ 4	82 $\pm$ 5	82 $\pm$ 6	.001
Education, years, mean $\pm$ SD ^a	6 $\pm$ 4	4 $\pm$ 4	2 $\pm$ 3	<.001
Sex, %				
Male	47	21	18	<.001
Female	53	79	82	
Marital status, %				
Married	52	31	34	<.001
Not married	48	69	66	
Living status, %				
With someone	76	63	63	<.001
Alone	24	37	37	
Can count on someone, %				
Most of the time	83	76	61	<.001
Some of the time	13	18	23	
Hardly ever	4	6	16	
Activities of daily living, %				
No help	88	48	38	<.001
Needs help	12	52	62	
Mini-Mental State Examination score, mean $\pm$ SD ^a	24 $\pm$ 5	20 $\pm$ 6	17 $\pm$ 7	<.001
Body mass index $\geq$ 30.0 kg/m ² , %	25	34	43	<.001
Diabetes mellitus, %	30	34	42	.03
Heart attack, %	11	18	29	<.001
Stroke, %	10	12	22	.002
Hypertension, %	58	68	80	<.001
Kidney disease, %	6	10	10	.02
Cancer, %	5	8	13	.01
Visual impairment, %	54	69	87	<.001
Hearing impairment, %	22	23	39	.002

SD = standard deviation.

Table presents respondents who were not missing any covariates.

^aP-values based on the Kruskal-Wallis test.

Table 3
Baseline Covariates Associated with Trajectory Group Membership

Baseline Covariate	Increasing Depressive Symptoms Versus Low Depressive Symptoms			High but Decreasing Depressive Symptoms Versus Low Depressive Symptoms		
	Estimate (SE)	OR	P-Value	Estimate (SE)	OR	P-Value
Born in Mexico	0.12 (0.21)	1.13	.55	0.90 (0.32)	2.45	.01
Age	-0.01 (0.02)	0.99	.65	-0.04 (0.03)	0.96	.20
Male	-1.00 (0.25)	0.37	<.001	-1.87 (0.44)	0.15	<.001
Education, years	-0.02 (0.03)	0.98	.39	-0.15 (0.06)	0.86	.01
Not married	0.09 (0.25)	1.10	.70	-0.38 (0.41)	0.69	.36
Living alone	0.46 (0.25)	1.58	.07	0.82 (0.39)	2.27	.04
Can count on someone						
Some of the time	0.58 (0.28)	1.78	.04	1.09 (0.39)	2.97	.01
Hardly ever	0.81 (0.46)	2.24	.08	2.14 (0.53)	8.51	<.001
Need help with activities of daily living	1.51 (0.22)	4.53	<.001	1.85 (0.33)	6.36	<.001
Mini-Mental State Examination score	-0.10 (0.02)	0.90	<.001	-0.14 (0.03)	0.87	<.001
Diabetes mellitus	0.02 (0.21)	1.02	.92	0.07 (0.32)	1.08	.82
Heart attack	0.61 (0.29)	1.84	.03	1.23 (0.39)	3.42	<.001
Stroke	-0.08 (0.31)	0.92	.80	0.43 (0.43)	1.54	.32
Hypertension	0.39 (0.21)	1.48	.06	0.88 (0.36)	2.41	.02
Kidney disease	0.53 (0.37)	1.71	.10	0.51 (0.54)	1.66	.35
Cancer	0.65 (0.39)	1.91	.10	1.23 (0.52)	3.41	.02
Visual impairment	0.50 (0.21)	1.64	.02	1.57 (0.44)	4.79	<.001

Baseline Covariate	Increasing Depressive Symptoms Versus Low Depressive Symptoms			High but Decreasing Depressive Symptoms Versus Low Depressive Symptoms		
	Estimate (SE)	OR	P-Value	Estimate (SE)	OR	P-Value
Hearing impairment	-0.06 (0.29)	0.95	.82	0.55 (0.34)	1.74	.11

SE = standard error; OR = odds ratio.