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The Role of Education in the Relationship Between Age of Migration to the United States and Risk of Cognitive Impairment Among Older Mexican Americans

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Abstract

Prior research indicates age of migration is associated with cognitive health outcomes among older Mexican Americans; however, factors that explain this relationship are unclear. This study used eight waves from the Hispanic Established Populations for the Epidemiologic Study of the Elderly to examine the role of education in the risk for cognitive impairment (CI) by nativity, age of migration, and gender. Foreign-born women had a higher risk for CI than U.S.-born women, regardless of age of migration. After adjusting for education, this risk remained significant only for late-life migrant women (risk ratio [RR] = 1.28). Foreign-born men who migrated at >50 had significantly higher risk for CI compared to U.S.-born men (RR = 1.33) but not significant after adjusting for education. Findings from a decomposition analysis showed education significantly mediated the association between age of migration and CI. This study highlights the importance of education in explaining the association between age of migration and CI.

Keywords

Mexican American; age of migration; cognition; education

Population aging has made cognitive impairment (CI), Alzheimer's disease (AD), and related dementias significant public health concerns. Over 5 million adults aged 65 and older in the United States are living with AD (Hebert, Weuve, Scherr, & Evans, 2013), and nearly one in six adults aged 71 and older are living with dementia (Plassman et al., 2007). While population aging will contribute to an increase in the number of older adults living with AD (Hebert, Scherr, Bienias, Bennett, & Evans, 2003; Hebert et al., 2013), there is growing evidence that the prevalence and incidence of CI and dementia in Western countries may be declining (Crimmins, Saito, & Kim, 2016; Langa et al., 2016; Langa et al., 2008; Manton, Gu, & Ukraintseva, 2005; Schrijvers et al., 2012; Wu et al., 2016). This trend has been attributed to improved cardiovascular health, better management of cardiovascular diseases, and greater educational attainment among recent cohorts of older adults (Larson, Yaffe, &

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Langa, 2013). However, evidence from the Framingham Heart Study suggests that the decline in dementia may be limited to older adults with more than a high school education (Satizabal et al., 2016). Consequently, Hispanic and other minority populations characterized by low educational attainment may continue to be at an increased risk for CI and dementia.

Disparities in cognitive functioning in old age between Hispanics and non-Hispanic Whites have been studied extensively. However, a substantial proportion of the Hispanic population in the United States is foreign-born, and existing research indicates that the cognitive functioning of older Mexican Americans varies according to nativity and age of migration to the United States. However, research into potential explanations for the association between age of migration and cognition among older Mexican Americans is lacking. This analysis extends previous research by examining whether the risk for CI among Mexican Americans varies by nativity and, for the foreign-born, the age at which they immigrated to the United States. The mediating role of educational attainment in the association between age of migration and risk for CI was also examined.

Literature Review

Age of Migration, Acculturation, and Health

Hispanics aged 65 and older are the fastest growing segment of the United States older adult population (U.S. Census Bureau, 2014). However, Hispanic elderly are not a monolithic group; in 2014, 48.7% of Hispanics living in the United States were foreign-born (Stepler & Brown, 2016). Recent research suggests Hispanic immigrants are positively selected for health characteristics compared to nonmigrants and their U.S.-born counterparts (Bostean, 2013; Markides & Gerst, 2011; Riosmena, Wong, & Palloni, 2013). Moreover, the degree of health selectivity may depend on the age at which they immigrated to the United States, as differences in motivation to migrate vary by age (R. J. Angel, Angel, Diaz Venegas, & Bonazzo, 2010; Markides, Eschbach, Ray, & Peek, 2007; Treas, 2015). For instance, health selection is likely to be the strongest for young adult and mid-life migrants because these individuals often come to the United States seeking employment opportunities and must be healthy enough to migrate and work when they arrive (R. J. Angel et al., 2010; Gubernskaya, Bean, & Van Hook, 2013). Conversely, health selectivity is thought to be relatively weak if the migration occurs during childhood or adolescence because these youth are often accompanying a parent, and any health selection is likely to be a reflection of their parents' characteristics (Gubernskaya, 2015). Similarly, health selection is posited to be weak for older migrants, as the decision to migrate is often based on family reunification and failing health (Treas, 2015). In addition, late-life migrants have fewer opportunities for social and economic incorporation that would benefit cognitive health in later life. Finally, factors that contribute to the decision to migrate to the United States also differ by gender. Men frequently migrate for occupational opportunities, whereas women traditionally migrate for family obligations (R. J. Angel et al., 2010; Treas, 2015).

Previous research indicates that foreign-born Hispanics are more likely to engage in negative health behaviors with longer duration of residence and greater assimilation in American society (Abraido-Lanza, Chao, & Florez, 2005; Ayala, Baquero, & Klinger, 2008). The

acculturation of foreign-born Hispanics contributes to the high prevalence of diabetes (Selvin, Parrinello, Sacks, & Coresh, 2014), hypertension (Flegal, Carroll, Kit, & Ogden, 2012), and overall decline in health (Antecol & Bedard, 2006). Conversely, residing in the United States for a longer period of time can lead to higher socioeconomic status through greater educational attainment, better employment opportunities, and incorporation into mainstream institutions (Gonzalez et al., 2009; Gubernskaya et al., 2013; Treas, 2015), all of which are protective of health in later life. Potentially important gender differences for changes in health and behaviors with greater duration spent in the United States have also been reported, with foreign-born women experiencing greater increases in body mass index (Hao & Kim, 2009) and being less likely to smoke (Riosmena, Kuhn, & Jochem, 2017) compared to foreign-born men. Thus, age of migration should be considered when assessing health differentials among older immigrants (Gubernskaya, 2015; Hummer & Hayward, 2015).

Ethnic Disparities in Cognitive Function

Hispanic older adults have consistently been observed to have lower cognitive functioning than non-Hispanic Whites (Brewster et al., 2014; Diaz-Venegas, Downer, Langa, & Wong, 2016; Early et al., 2013), but the relationship between nativity status and cognitive functioning is less clear. Several studies have reported no significant differences in cognitive function between foreign-born and U.S.-born Hispanics (Collins, Sachs-Ericsson, Preacher, Sheffield, & Markides, 2009; Miranda, González, & Tarraf, 2011; Nguyen, Black, Ray, Espino, & Markides, 2002; Sachs-Ericsson, Corsentino, & Cougle, 2009). However, research using data from the Hispanic Established Populations for the Epidemiologic Study of the Elderly (H-EPESE) suggests that the relationship between nativity and cognitive function varies by age of migration *and* gender among older Mexican Americans (Hill, Angel, & Balistreri, 2012; Hill, Angel, Balistreri, & Herrera, 2012). These studies found that foreign-born Mexican Americans who migrated to the United States in early life (< 19) or late life (>50) had comparable trajectories of cognitive function relative to their U.S.-born counterparts over a 15-year follow-up period (Hill, Angel, & Balistreri, 2012). Also, men who migrated in mid-life (between the ages of 20 and 49), which is the prime age for labor migration, had higher cognitive functioning and exhibited less cognitive decline than their U.S.-born peers (Hill, Angel, & Balistreri, 2012; Hill, Angel, Balistreri, et al., 2012).

Previous research has demonstrated age of migration to be an important factor in determining physical health outcomes among older Hispanics in general and Mexican Americans in particular (R. J. Angel, Angel, & Hill, 2014; Gubernskaya, 2015; Markides & Rote, 2015). Age of migration has been associated with mortality (R. J. Angel et al., 2010), disability, physical functioning, self-rated health trajectories (Garcia & Reyes, forthcoming; Gubernskaya, 2015), and disabled life expectancies (Garcia & Chiu, 2016). However, less research has focused on the association of age of migration and the risk for CI among older Mexican Americans.

Objectives and Hypotheses

The aim of the present study was to examine if the risk for CI varies among older Mexican Americans by nativity and age of migration to the United States. We build upon prior

research on the relationship between nativity, age of migration, and cognition by (1) assessing risk for CI according to nativity and age of migration by gender and (2) formally testing whether differences in years of education mediate the relationship between age of migration and CI among the study population, which is characterized by low levels of educational attainment.

Based on previous research, we hypothesize (1) early-life migrants (<19) will have comparable risk profiles for CI to U.S.-born Mexican Americans as a result of similar behavioral risk patterns and opportunities to incorporate into U.S. mainstream (i.e., educational institutions); (2) lower educational attainment among late-life migrants (>50) will contribute to an increased risk for CI compared to U.S.-born Mexican Americans; this increased risk may also be due to late-life migrants having fewer opportunities to incorporate into U.S. social institutions through education attainment and labor force participation which may lead to social isolation; (3) mid-life migrant men, but not women, will be at significantly lower risk for CI compared to U.S.-born men due to gender differences in the migration selection process; and (4) years of education will explain the observed differences in CI according to age of migration. All analyses in the present study are stratified by gender because of the differences in the migration selection process (Angel et al., 2010; Markides et al., 2007; Treas, 2015), which may contribute to differentials in risk for CI according to age of migration. Women have also been reported to have a higher lifetime risk for CI and dementia compared to men in some (Chene et al., 2015; Ott, Breteler, van Harskamp, Stijnen, & Hofman, 1998) but not all studies (Barnes et al., 2003; Hebert, Scherr, McCann, Beckett, & Evans, 2001).

Methods

Sample Population

The H-EPESE is a longitudinal study of Mexican American adults aged 65 and older living in Texas, Arizona, California, Colorado, and New Mexico (Beard, AlGhatrif, Samper-Ternent, Gerst, & Markides, 2009; Markides, Rudkin, Angel, & Espino, 1997). The study was initiated in 1993–1994 (n = 3,050) and follow-up observations were completed in 1995–1996, 1998–1999, 2000–2001, 2004–2005, 2006–2007, 2010–2011, and 2012–2013. The original cohort was replenished during the fifth observation in 2004–2005 with 902 participants aged 75 and older, which was the minimum age of the surviving members of the original 1993–1994 cohort.

The final sample for the present analysis included 3,434 unique individuals for a total of 13,033 observations across 8 waves of the study. We excluded 518 observations from participants who required a proxy to complete the interview or were missing information on nativity or age of migration. Observations in which a participant required a proxy were excluded because these participants did not receive a cognitive assessment.

Measures

Nativity was dichotomized as being U.S.-born or foreign-born. All participants who reported being foreign-born were asked how old they were when they came to the United States to

stay. These participants were then categorized as having migrated to the United States at <19 years of age (early life), between 20–49 years of age (mid-life), and age >50 (late life).

Cognitive functioning was measured during each observation wave using the Mini-Mental Status Exam (MMSE; Folstein, Folstein, & McHugh, 1975). The MMSE measures orientation to time (5 points), orientation to place (5 points), attention (5 points), registration (3 points), recall (3 points), and language and praxis (9 points) for a maximum score of 30 points. The definition of CI was based on the criteria for dementia proposed by the National Institute on Aging—Alzheimer's Association workgroup (McKhann et al., 2011). Cognitive impairment was defined as having a score below 21 points on the MMSE *and* being unable to independently perform one or more activities of daily living (ADLs: walking, bathing, grooming, dressing, eating, moving from bed to chair, toileting) or instrumental ADLs (IADLs: telephone, drive, shopping, prepare a meal, light housework, take medicine, and manage money). A cutoff of 21 points is consistent with other studies involving the H-EPESE (Alfaro-Acha et al., 2006; Ostir, Raji, Ottenbacher, Markides, & Goodwin, 2003).

Covariates included demographic and health morbidities. Demographic measures were age, years of formal education completed, and gender. Self-reported measures for health morbidities were collected during each observation wave by asking participants if they had ever been told by a doctor that they have had (1) a heart attack, coronary myocardial infarction, or coronary thrombosis; (2) a stroke, blood clot in the brain, or a brain hemorrhage; (3) high blood pressure; (4) diabetes, sugar in your urine, or high blood sugar; (5) arthritis or rheumatism; or (6) cancer or any type of malignant tumor. All health comorbidities were dichotomized as *yes* (1) or *no* (0).

Statistical Analysis

Student's *t* tests and χ^2 tests were used to identify differences in the sociodemographic and health characteristics of the final sample according to CI. Risk ratios for CI were estimated using random effects Poisson regression models (Zou, 2004). These models included normally distributed individual random effects and robust standard errors to account for repeated observations of participants. Our main independent variable of interest was age of migration (reference group was U.S.-born). Three multivariable models were used: Model 1 included age and age at migration, Model 2 added years of education, and Model 3 further added health morbidities. All models were stratified by gender. Finally, the Karlson, Holm, and Breen (KHB) decomposition method (Kohler, Karlson, & Holmd, 2011) was used to formally test the hypothesis that the relationship between age of migration and CI is mediated by education. The KHB analysis was conducted using logistic regression models.

Results

Sample Characteristics

Demographic characteristics of the final sample are presented in Table 1. The majority of the sample was female (60.6%) and U.S.-born (57%). For U.S.-born women, the mean age was 78.1 years, and the mean years of education completed was 6.0. U.S.-born men had a mean age of 77.0 and completed 6.5 years of education on average. In general, the mean age and

years of education were greater with younger age of migration among foreign-born men and women (Table 1). Overall, the percentage of participants classified as cognitively impaired increased at each observational wave and ranged from 9% at Wave 1 to 45% at Wave 8 (see Figure 1). Baseline characteristics associated with CI were older age, female gender, fewer years of education, stroke, and arthritis ($p < .05$).

Table 2 presents the baseline characteristics of the sample according to having been interviewed at three or more observation waves versus two or fewer observations. The percentage of participants with CI, hypertension, and arthritis was higher for women who were observed for ≥3 observations, where as the percentage of participants with self-reported cardiovascular disease, stroke, and cancer was higher for women observed in ≤2 observations. For men, the percentage of participants with CI, hypertension, and arthritis were higher among participants with ≥3 observations. Men with ≤2 observations had a higher percentage of self-reported cardiovascular disease, stroke, cancer, and diabetes compared to men observed at ≥3 observations.

Age of Migration and Risk for Cognitive Impairment

The results for the Poisson regression models estimating the risk for CI by age of migration are summarized in Table 3. Compared to U.S.-born women, the age-adjusted risk for CI (Model 1) was 1.25, 1.24, and 1.71 times higher for foreign-born women who migrated to the United States during early life (<19), mid-life (20–49), and late life (>50), respectively ($p < .05$). After adjusting for years of education (Model 2), the increased risk for CI among foreign-born women was significant for late-life (>50) migrants but not for early life (<19) or mid-life (20–49) migrants (Model 2). The relationship between age of migration and risk of CI for women did not change substantially after adjusting for health morbidities (Model 3).

For men, the age-adjusted risk for CI (Model 1) was 1.33 times greater for foreign-born participants who migrated to the United States in late life (>50) compared to U.S.-born men ($p < .05$). Foreign-born men who migrated in early life and mid-life were not at a significantly greater risk for CI compared to U.S.-born men. The increased risk for CI among late-life migrant men was reduced and no longer statistically significant after adjusting for education (Model 2) and health morbidities (Model 3). Overall, each additional year of education was associated with an approximately 10% decrease in the risk for CI regardless of gender. Subsequently, we further assess the mediating effects of education on CI.

The results of the KHB decomposition analysis are presented in Table 4. The KHB method decomposes the total effect of age of migration on CI into direct and indirect effects. The total effect is the relationship between age of migration and risk for CI when *not* accounting for the effect of education. The direct effect is the coefficient estimate for age of migration after controlling for education. The indirect effect is the proportion of the relationship between age of migration and CI that is mediated by education. The percentage of reduction in the association between age of migration and CI after controlling for education is found by calculating the indirect effect divided by the total effect and multiplying by 100. For women, education had the greatest mediating effect for early-life migrants and reduced the

coefficient estimate for the odds of CI by 177.9% ($p < .05$). Education reduced the coefficient estimate for the odds of CI by 61.1% and 59.4% for foreign-born women who migrated in mid-life (20–49) and late life (>50), respectively ($p < .01$). Overall, the mediating effects of education were greater for foreign-born men than women. Education reduced the coefficient estimate for the odds of CI for foreign-born males who migrated in early-, mid-, and late life by 161.3%, 159.6%, and 175.6%, respectively ($p < .001$). These findings provide evidence that the association between age of migration and CI is significantly mediated by education, particularly for foreign-born men.

Discussion

This study provides evidence that the risk for CI among foreign-born Mexican Americans varies by age of migration to the United States. The results provide support for the first hypothesis that early-life migrants (<19 years of age) do not differ in risk for CI compared to U.S.-born Mexican Americans. We found support for our second hypothesis that educational differences between foreign- and U.S.-born Mexican Americans contributed to the increased risk for CI among late-life migrants. The risk for CI among late-life migrant women was partly attenuated by education, but remained significant. While education appears to explain a considerable portion of the risk for CI associated with age of migration, the results from our decomposition analysis suggest that the mediating effects of education are lower for women who migrate after age 50. Conversely, late-life migrant men did not differ from U.S.-born Mexican Americans in risk for CI after adjusting for education. These findings can be attributed in part to the mediating effects of education being larger for late-life migrant men relative to early and mid-life migrant men. Finally, we did not find support for our hypothesis that mid-life migrant males would be at a significantly lower risk for CI than U.S.-born Mexican Americans. Consistent with prior research that mid-life migrant men exhibit slower rates of cognitive decline (Hill, Angel, Balistreri, et al., 2012), this analysis showed that mid-life migrant men had a lower risk for CI compared to U.S.-born Mexican Americans. However, this finding only approached statistical significance.

The relationship between education and cognitive function has been studied extensively and greater education is consistently associated with higher cognition and lower risk for dementia (Caamano-Isorna, Corral, Montes-Martinez, & Takkouche, 2006). The benefits of education to cognitive function may be due to educational experiences contributing to greater brain volume and other anatomical changes to the brain that promote cognitive function (Foubert-Samier et al., 2012; Liu et al., 2012). Alternatively, highly educated older adults may be able to recruit multiple neural networks and use existing neural networks more efficiently when performing cognitive tasks (Stern, 2002). These anatomical and functional characteristics of the brain can allow for older adults with more education to sustain greater damage to the brain before cognitive symptoms of dementia are observed (Stern, 2002, 2012). Thus, the increased risk for CI among foreign-born Mexican Americans may be due in part to lower cognitive reserve as a result of lower educational attainment. The higher overall socioeconomic status and better health associated with greater educational attainment may also contribute to preserved cognitive functioning later in life (Adams, 2002; Cagney & Lauderdale, 2002).

The differences in the risk for CI among foreign-born Mexican Americans according to age of migration observed in the present study may also be due in part to factors that are related to the decision to migrate. Foreign-born Mexican American women who migrate in late life may be at an increased risk for CI because these individuals migrate to reunite with family and may already be experiencing declines in health (J. L. Angel, Buckley, & Sakamoto, 2001). Unlike mid-life migrants, late-life migrants have fewer opportunities to incorporate into mainstream institutions that can lead to greater educational attainment and labor force participation (J. L. Angel et al., 2001). Higher education and occupational status are associated with lower risk of dementia (Stern et al., 1994) and may contribute to the lower risk of CI for foreign-born men who migrated to the United States during mid-life.

The definition of CI in the present study required participants to have impairments in cognitive and functional domains. This makes it necessary to consider the relationship between nativity, age of migration, and functional limitations when interpreting the results of this analysis. Prior research indicates that nativity and age of migration are related to ADL and IADL active life expectancies (Garcia, Angel, Angel, Chiu, & Melvin, 2015; Garcia & Chiu, 2016). Foreign-born men who migrate during mid-life live a similar number of years with ADL limitations compared to U.S.-born men but live a greater number of years with IADL limitations (Garcia & Chiu, 2016). The similarities in ADL limitations among Mexican American men according to nativity may contribute to the nonsignificant results for the risk of CI among men who migrated to the United States during mid-life. This is supported by the findings of an additional analysis in which men who migrated to the United States during mid-life had significantly lower risk for CI (i.e., MMSE score <21 points) compared to U.S.-born men (results available upon request).

The findings of the present study need to be interpreted in the context of the increasing diversity of the aging population in the United States. Hispanics are the largest minority population in the United States and proportion of older adults in the United States who are Hispanic will increase from 7% in 2009 to 20% by 2050 (Jacobsen, Kent, Lee, & Mather, 2011). The anticipated growth and aging of the Hispanic population means continued research is necessary to examine how the unique demographic, social, and cultural characteristics of Hispanics influence the aging of this population. Also, older Hispanics are less likely to receive care in a nursing facility (Thomeer, Mudrazija, & Angel, 2015), and Hispanics provide more informal care than non-Hispanic Whites (Rote & Moon, 2016).

This study has important limitations that need to be acknowledged. First, the MMSE is the only cognitive measure that has been included in each wave of the H-EPESE. The MMSE is routinely used in epidemiological studies to screen for dementia and CI, but the accuracy of the MMSE may be reduced when used in populations with low educational attainment such as the H-EPESE (Mungas, Marshall, Weldon, Haan, & Reed, 1996). Second, cultural biases in the items of the MMSE and challenges with accurately translating items to Spanish can further decrease the ability of the MMSE to provide an accurate measure of cognition in Spanish-speaking populations (Ostrosky-Solis, Lopez-Arango, & Ardila, 2000; Reyes de Beaman et al., 2004). The H-EPESE also does not include a proxy measure of cognition, and observations in which participants needed a proxy to complete an interview were excluded from the analysis. It is likely that a disproportionate number of H-EPESE participants who

required a proxy have CI or dementia and the findings of this analysis may be different if the reason for the proxy was related to the cognitive functioning of the target respondent. Last, our sample has received education in both the United States and Mexico. Future studies should examine possible heterogeneity in the associations between educational attainment and cognition across educational contexts.

In summary, this study provides evidence that the risk for CI among foreign-born Mexican Americans varies according to age of migration. This study extends previous research by providing evidence that a substantial portion of the increased risk for CI among foreign-born Mexican Americans is due to lower educational attainment. The present study adds to the growing literature on the relationship between nativity, age of migration, and cognitive function. These results also highlight the heterogeneity of the Mexican American population and the importance of accounting for age of migration to the United States when studying cognitive functioning in Hispanic populations.

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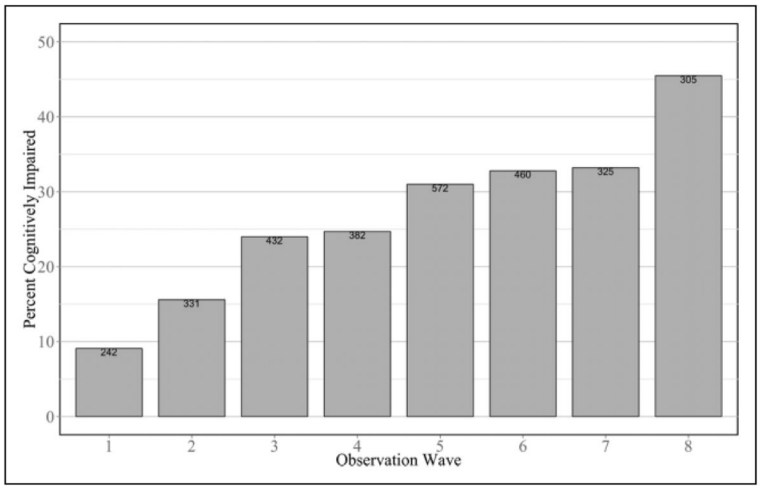

Figure 1.

Percentage of participants classified as severe cognitive impairment at each observation wave. Adapted from H-EPESE Waves 1–8. The numerical value is the number of participants classified as cognitively impaired at each observation wave.

Table 1

Sociodemographic Characteristics Among Mexican-Origin Elders Aged 65 and Older by Gender, Nativity, and Age of Migration.[a]

	Women				Men			
	U.S. Born	Age of Migration			U.S. Born	Age of Migration		
Age of Migration		< 19	20–49	>50		< 19	20–49	>50
n (%)	4,624 (58.5)	788 (10.0)	1,762 (22.3)	732 (9.3)	2,863 (55.8)	512 (10.0)	1,321 (25.8)	431 (8.4)
CI (%)	993 (20.9)	270 (32.4)	456 (24.1)	290 (41.8)	524 (17.9)	120 (24.1)	265 (21.1)	133 (30.9)
Mean age (*SD*)	78.1 (7.1)	80.1 (7.9)	77.9 (7.3)	79.5 (7.3)	77.0 (6.9)	80.1 (7.6)	78.2 (7.0)	78.7 (7.8)
Mean education (*SD*)	6.0 (4.1)	4.7 (3.5)	4.4 (3.5)	3.0 (3.2)	6.5 (4.5)	4.3 (3.7)	3.8 (3.4)	2.2 (2.6)

Note. CI = cognitive impairment; H-EPESE = Hispanic Established Populations for the Epidemiologic Study of the Elderly. Adapted from H-EPESE Waves 1–8. Total number of observations is 13,033 (7,906 observations for females and 5,127 observations for males).

[a]Unweighted *N*s. Weighted percentages and means.

Table 2

Baseline Characteristics According to Number of Observation Waves.

	Women			Men		
Predictor Variables[a]	**Full Sample (*N* = 1,997)**	**≤ 2 Obs (*n* = 506)**	**≥3 Obs (*n* = 1,491)**	**Full Sample (*N* = 1,437)**	**≤ 2 Obs (*n* = 460)**	**≥3 Obs (*n* = 977)**
Age of migration						
U.S.-born	55.0	52.3	56.7	56.3	54.9	54.6
<19	10.5	12.8	9.2	11.2	15.7	8.6
20–49	23.8	22.4	24.0	23.8	20.4	27.3
>50	10.7	12.5	10.1	8.7	9.1	9.5
CI	14.7	19.5	25.5	13.8	20.8	20.8
Age	74.7	75.4	78.8	74.7	75.9	78.1
Education	5.2	5.4	5.2	5.3	5.0	5.2
Morbidities						
Cardio	9.7	12.3	7.5	12.1	11.3	10.9
Stroke	5.1	9.2	5.2	6.5	6.1	6.3
Cancer	7.7	9.9	7.2	6.7	12.0	6.9
Hypertension	54.8	58.1	60.7	40.6	39.9	48.9
Arthritis	54.4	55.5	60.7	34.3	30.7	43.5
Diabetes	28.9	34.9	30.6	29.1	30.6	28.8

Note. Adapted from H-EPESE Waves 1–8. Baseline Wave 1 for original sample and Wave 5 for replenishing sample. Columns for full sample are number of unique observations. Columns for <2 and >3 observation waves reflect average values of the repeated observations. CI = cognitive impairment; H-EPESE = Hispanic Established Populations for the Epidemiologic Study of the Elderly.

[a]Proportions and means.

Table 3

Poisson Regression (Rate Ratios) Predicting Cognitive Impairment Among Mexican-Origin Elders Aged 65 and Older.

	Females			Males		
Predictor Variables[a]	**Model 1**	**Model 2**	**Model 3**	**Model 1**	**Model 2**	**Model 3**
Age of migration						
<19	1.25*	1.09	1.07	0.96	0.83	0.84
20–49	1.24**	1.06	1.06	1.06	0.89	0.88
>50	1.71***	1.28**	1.29**	1.33*	0.98	0.98
Age	1.08***	1.08***	1.08***	1.10***	1.10***	1.09***
Education		0.88***	0.89***		0.90***	0.89***
Morbidities						
Cardio			1.12			1.34**
Stroke			1.39***			1.62***
Cancer			0.82			0.99
Hypertension			0.94			0.98
Arthritis			1.11*			1.18*
Diabetes			1.26***			1.20*
N	7,906	7,873	7,834	5,127	5,093	5,058

Note. Adapted from H-EPESE Waves 1–8. Sample sizes change because participants with missing data for education and morbidities were removed from the sample. H-EPESE = Hispanic Established Populations for the Epidemiologic Study of the Elderly.

[a]The reference category in the Poisson regression is U.S.-born persons.

Table 4

Decomposition of Association Between Age of Migration and Cognitive Impairment.

Age of migration among foreign-born females						
	<19		**20–49**		**>50**	
Women (ref = U.S. born)	**(OR)**	**% Diff**	**(OR)**	**% Diff**	**(OR)**	**% Diff**
Total Effect	.15 (1.16)		.54 (1.72) **		.96 (2.61) ***	
Direct Effect	−.11 (0.90)		.21 (1.23)		.39 (1.48)	
Indirect Effect	.26 *	177.9	.33 **	61.1	.57 **	59.4
Age of migration among foreign-born males						
	<19		20–49		>50	
Men (ref = U.S. born)	(OR)	% Diff	(OR)	% Diff	(OR)	% Diff
Total Effect	−.26 (0.77)		.32 (1.38)		.41 (1.51)	
Direct Effect	−.68 (0.50) *		−.19 (0.83)		−.31 (0.73)	
Indirect Effect	.42 ***	161.3	.51 ***	159.6	.73 ***	175.6

Note. H-EPESE = Hispanic Established Populations for the Epidemiologic Study of the Elderly; OR = odds ratio. Adapted from H-EPESE Waves 1–8. is the coefficient estimate.

* Significant at the .05 level.

** Significant at the .01 level.

*** Significance at the .001 level.