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Perceived discrimination and nativity status: risk of cognitive impairment among Latin American older adults

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ABSTRACT

Objectives: We examined the association between perceived discrimination and the risk of cognitive impairment with no dementia (CIND) and Alzheimer's disease and related dementias (ADRD) while considering the potential effects of nativity status.

Design: A prospective analysis of discrimination and nativity status with dementia and cognitive impairment was conducted among Latinx adults aged 51 years and older who participated in the Health and Retirement Study.

Setting: A national representative sample.

Participants: A sample of 1,175 Latinx adults aged 51 years and older.

Measurements: Demographics, cognitive functioning, perceived discrimination, and nativity status (US-born vs. non-US born) were assessed. Traditional survival analysis methods (Fine and gray models) were used to account for the semi-competing risk of death with up to 10 years of follow-up.

Results: According to our results, neither everyday discrimination nor nativity status on their own had a statistically significant association with CIND/ADRD; however, non-US-born Latinx adults who reported no discrimination had a 42% lower risk of CIND/ADRD (SHR = 0.58 [0.41, 0.83], $p = .003$) than US-born adults.

Conclusions: These results highlight the need for healthcare providers to assess for discrimination and provide support and resources for those experiencing discrimination. It also highlights the need for better policies that address discrimination and reduce health disparities.

Key words: Latinx, cognition, discrimination, nativity status

Introduction

Latin Americans (referred to as Latinx from hereon) in the United States (US) live longer than non-Latinx-White Americans (White) (Cantu *et al.*, 2013; Goldman, 2016), but also live with more disease morbidity, disabilities, and functional limitations than White peers (Cantu *et al.*, 2013; Hayward *et al.*, 2014; Garcia *et al.*, 2019; Garcia, Garcia, *et al.*, 2018). Also, in comparison to White adults, Latinx adults are more likely to have cognitive concerns with advancing age (Cantu *et al.*, 2013), whether defined in terms of cognitively impaired with no dementia (CIND), mild cognitive impairment (MCI), or Alzheimer's disease and related dementias (ADRD) (Manly *et al.*, 2008; Plassman *et al.*, 2011; Royse *et al.*, 2021).

Although cognitive impairment in the absence of gross impairment in everyday functioning is generally studied in reference to MCI, CIND is a related construct that has been employed in population-based studies of cognitive functioning when performance is measured over the telephone. CIND has been described as a less severe presentation of cognitive impairment or as a state between normal

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levels of cognition and dementia (Fisher *et al.*, 2011) and it is expected that 10–15% of those with CIND will develop dementia per year (Peters *et al.*, 2013).

Although data suggest Latinx and Black older adults are more likely to develop ADRDs than their White peers, they are less likely to receive a diagnosis and are more often diagnosed in the later stages of the disease (Lin *et al.*, 2021). This raises the question as to whether the different recognition and diagnosis rates reflect simple bias by the diagnosticians or may be due to a failure to consider the impact of factors such as race, ethnicity, education, socioeconomic status (SES), healthcare access/utilization, and medical comorbidity (Barnes *et al.*, 2005; Crowe *et al.*, 2013; Mayeda *et al.*, 2016).

One path to understanding differential dementia risk is elucidating the factors influencing cognition within different racial and ethnic groups. We focus on two frequent sources of potential variability within adult Latinx communities: (1) nativity status, and (2) adverse effects related to discrimination.

Cognition and nativity status

According to 2021 US Census data (US Census Bureau, 2021), an estimated 43% of Latinx adults living in the US were born outside the US. Although the findings have not been fully consistent, some of the prior studies suggest that nativity status (US vs. non-US born) among persons currently residing in the US may be associated with rates of accelerated cognitive aging. For instance, a study found that US-born Latinx persons were at *higher* risk for cognitive impairment and dementia relative to non-US-born Latinx persons (Garcia *et al.*, 2020). Similar results were reported by Weden *et al.* (2017), but the pattern reversed when they adjusted models for group differences in SES, i.e., in the SES-adjusted models, non-US-born status was associated with *lower* incidence of cognitive impairment. Such results point to the importance of identifying confounding factors that may underlie group differences in cognitive outcomes, such as education and income, as well as variables that may be present due to differential sampling of groups (e.g., age and possibly gender) (Garcia *et al.*, 2020; Weden *et al.*, 2017; Garcia, Reyes, *et al.*, 2018; Garcia *et al.*, 2021; Garcia and Tarraf, 2021).

Discrimination and health outcomes

Level of perceived discrimination (PD) is known to predict adverse health outcomes. The mechanisms of this association are not fully known, but one contribution may be the biologically toxic effects of a sustained stress response. For example, the threat of loss, actual loss, or lack of resources to cope with an adverse event such as discrimination can lead to heightened psychological stress (Hobfoll, 1989, 2001, 2002). That heightened stress, in turn, may contribute to a decline in mental health, leading to a further degradation of stress-coping resources that may make one even more susceptible to the future experience of stress. As such, discrimination can be considered a psychosocial stressor (Arellano-Morales *et al.*, 2015) that negatively influences an individual's mental health (LeBlanc *et al.*, 2015; Paradies *et al.*, 2015; Sellers and Shelton, 2003; Torres and Ong, 2010) and physical health (Williams *et al.*, 2019; Pascoe and Smart Richman, 2009).

Few studies have examined the association between PD and cognition and how this association may vary between individuals from different racial and ethnic backgrounds, and results have been inconsistent with some findings with group differences in level of PD being associated with worse cognitive test performance (Barnes *et al.*, 2012; Thames *et al.*, 2013; Wang *et al.*, 2022) but others finding a reverse pattern (Meza *et al.*, 2022). Comparisons between existing studies are limited by differences in ethnic and racial groups sampled, and in methods of assessment of PD and cognitive functioning.

There is a need for further research to reduce the gap in knowledge that pertains to the influence of discrimination on the cognitive functioning of Latinx adults living in the US by nativity status. Although recognizing the substantial diversity of experiences and cultures under the broad label "Latinx," such information may help begin the process of prioritizing US and local policy development for prevention of cognitive decline and ADRDs among Latinx persons. To begin this process of filling the present information gap, the current study is focused on examining the association between nativity status, PD, and cognition in a longitudinal study. Based on the existing literature reviewed above, the following hypotheses were examined: 1) non-US-born participants will have a lower risk of progression to CIND/ADRD than US-born participants (main effect of nativity status); 2) greater PD will be associated with a higher risk of progression to CIND/ADRD (main effect of PD); and 3) non-US-born participants with the greatest levels of PD will have the highest risk of progression to CIND/ADRD (interaction effect of nativity status and PD).

Methods

Study population

Data were drawn from the Health and Retirement Study (HRS). The HRS involves a longitudinal nationally representative sample of participants

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interviewed biannually via telephone or in person since 1992. HRS measures include self-reported economic, social, and health information (Sonnega *et al.*, 2014). The present analyses represent a multicohort design with data from base years of 2008 (Cohort 1), 2010 (Cohort 2), 2012 (Cohort 3), or 2014 (Cohort 4) and follow-up through 2018. For present analyses, we restricted the analytic sample to Latinx adults ages ≥ 51 years at baseline. Other inclusion criteria included presence of the following information: (1) nativity status, (2) baseline and at least one follow-up measure of cognitive functioning, and (3) baseline data on PD. Respondents were excluded if they had a baseline diagnosis of an ADRD or scored in the CIND category at baseline ($n = 539$ excluded with prevalent CIND/ADRD). Respondents who had scored in the CIND category at an assessment prior to baseline, but at baseline had scored above threshold (i.e., not CIND/ADRD) were included in the analysis. Application of these inclusion/exclusion criteria resulted in an analytic sample of $n = 1{,}175$ Latinx adults.

Measures

Discrimination

Discrimination was measured with a modified version of the six-item Everyday Discrimination Scale (EDS; Williams, Yan *et al.*, 1997), which assesses day-to-day occurrences of maltreatment and thus chronic, routine experiences of discrimination. Individuals were categorized into three groups, corresponding to "none," "moderate," or "high" levels of discrimination. To do so, responses on each of the six items were dichotomized into "never" = 0 or "ever" (collapsing those reporting *less than once a year* or greater into the ever category) = 1 and summed. Total sum scores ranged from 0 to 6, and the three groups were defined as total scores 0 = none, 1–2 = moderate, or 3–6 = high discrimination (Pengpid and Peltzer, 2021).

Cognitive status

Cognitive functioning was assessed using an adapted version of the Telephone Interview for Cognitive Status (TICS), which included immediate and delayed 10-word free recall tests of memory (range: 0–10 points each), serial 7s subtraction test of working memory (range: 0–5 points), and a backward counting test to assess attention and processing speed (range: 0–2 points). Possible scores ranged from 0 to 27, with higher scores indicating better cognitive performance. This measure will be referred to as TICS-27 from here on forward. The Langa-Weir approach (Crimmins *et al.*, 2011; Langa *et al.*, 2005) was used to establish cut-points for CIND and ADRD (CIND: 7–11 out of 27; ADRD: 0–6 out of 27; referred to hereafter as CIND/ADRD), and previously shown to correctly differentiate age-normal from cognitively impaired (i.e. CIND or ADRD) in older adults with 87% accuracy (Crimmins *et al.*, 2011).

Nativity status

Nativity status was dichotomized (US-born/non-US-born).

Covariates

Covariates consisted of education (years completed), gender (male, female), number of years worked, Medicaid beneficiary (yes/no), Medicare beneficiary (yes/no), annual income (US dollar; natural log-transformed to reduce impact of positive skew in the distribution), presence of each of eight chronic medical conditions (see Table 1), marital/partnered status, inpatient hospitalization within preceding 2 years (yes/no), physician visits within preceding two years (yes/no), depressive symptoms (8-item Center for Epidemiologic Studies-Depression Scale; CES-D-8; Radloff, 1977), and social support. The HRS obtains information on chronic medical conditions (i.e., comorbidities) directly from participants or their proxies, using the prompt, "*Has a doctor or other health professional ever told you that you have*...." These items have been found to have excellent validity (Fisher *et al.*, 2005). Social support from participants' spouse/partner, children, family members, and friends was assessed using three items of the Social Support Scale (Walen and Lachman, 2000). Mean scores from each of the four sources were calculated separately, and the mean from each source was then averaged to derive an overall social support score for each participant. All covariates were measured at each participant's base assessment.

Statistical analysis

All statistical analyses were performed in R version 4.2.0. Descriptive statistics were reported with means, standard deviations, and effect sizes in Cohen's *d*, which were derived from *t*-tests or χ^2 tests for continuous and categorical variables, respectively. To compute effect sizes for categorical variables, χ^2 statistics were converted to phi coefficients, and then into Cohen's *d* as previously described (Lipsey and Wilson, 2001). For group comparisons across EDS categories, Tukey-adjusted posthoc tests were conducted using *emmeans* in R for continuous variables, and Holm-corrected posthoc χ^2 tests using *fifer* in R for categorical variables. To determine the effects of everyday discrimination and nativity status on incident CIND/ADRD, Fine-Gray competing risks

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Table 1. Descriptive characteristics of the sample at HRS enrollment by nativity status and discrimination, mean (SD)

	All US-born ($N = 494$)	No discrimination ($N = 164$)	Moderate discrimination ($N = 133$)	High discrimination ($N = 197$)	All non-US-born ($N = 678$)	No discrimination ($N = 325$)	Moderate discrimination ($N = 196$)	High discrimination ($N = 157$)	US vs. non-US born
Age (years)[a]	62.6 (7.8)	65.2 (7.8)[1,2]	62.1 (7.8)	60.8 (7.1)	61.9 (8.1)	62.0 (8.6)	62.0 (7.7)	61.4 (7.4)	$t_{1170} = -1.50$; $d = 0.04$
EDS group (%)		33%	27%	40%		48%	29%	23%	χ^2 (2) = 41.7, $d = 0.38$
Sex (%F)	57.5%	59.8%	60.2%	53.8%	57.5%	60.9%	53.6%	55.4%	χ^2 (1) = 0.01, $d < 0.01$
Married (%)	69.8%	67.7%	69.9%	71.1%	72.7%	74.5%	73.0%	68.8%	χ^2 (1) = 1.07, $d = 0.06$
Median Income^ ($1k USD)	35.6	30.5	39.0	41.3	24.5	22.8	26.9	24.0	$t_{1170} = -4.23^{**}$; $d = 0.07$
Education (years)[a]	12.2 (3.1)	11.1 (3.6)[1,2]	12.7 (2.7)	12.9 (2.7)	9.9 (4.4)	9.6 (4.4)	9.9 (4.6)	10.4 (4.2)	$t_{1164} = -10.2^{**}$; $d = 0.29$
Maternal Education (years)[a]	7.3 (4.4)	6.4 (4.4)[1,2]	7.8 (4.1)	7.8 (4.5)	5.4 (4.4)	5.4 (4.3)	5.2 (4.6)	5.6 (4.6)	$t_{1049} = -7.10^{**}$; $d = 0.21$
Paternal Education (years)[a]	7.2 (4.6)	6.4 (4.5)[2]	7.2 (4.4)	7.8 (4.7)	6.1 (4.9)	5.7 (4.8)	6.3 (5.1)	6.6 (4.9)	$t_{923} = -3.33^{**}$; $d = 0.11$
Number of Years Worked	28.5 (15.2)	30.3 (13.9)	26.7 (16.0)	28.3 (15.6)	20.9 (15.8)	20.4 (15.8)	22.0 (16.1)	20.7 (15.4)	$t_{1049} = -8.22^{**}$; $d = 0.23$
Employer Insured (%)[a]	31.6%	22.1%[2]	32.1%	39.1%	21.1%	17.8%	24.1%	24.2%	χ^2 (1) = 15.8**, $d = 0.24$
Medicaid Beneficiary (%)	10.8%	11.7%	11.5%	9.7%	18.3%	15.8%	19.5%	21.8%	χ^2 (1) = 11.7**, $d = 0.21$
Medicare Beneficiary (%)[a]	42.4%	55.5%[1,2]	40.9%	32.5%	34.3%	34.0%	33.3%	36.3%	χ^2 (1) = 7.57**, $d = 0.16$
TICS-27 Score[a]	15.9 (2.7)	15.5 (2.6)[2]	16.1 (2.7)	16.3 (2.8)	15.5 (2.6)	15.6 (2.3)	15.6 (2.9)	15.5 (2.6)	$t_{1170} = -2.58^{*}$; $d = 0.08$
CI or ADRD at Follow-up (%)[a]	33.6%	46.3%[1,2]	30.1%	25.4%	34.7%	32.3%	36.7%	36.9%	X^2 (1) = 0.00, $d = 0.00$
CES-D-8 Score[a,b]	1.78 (2.2)	1.31 (1.8)[2]	1.77 (2.3)	2.19 (2.3)	1.70 (2.2)	1.26 (2.0)[2]	1.69 (2.0)[2]	2.60 (2.6)	$t_{1170} = 1.58$; $d = 0.02$
Number of Comorbidities*[,b]	1.81 (1.33)	1.77 (1.3)	1.78 (1.3)	1.85 (1.4)	1.50 (1.33)	1.35 (1.2)[2]	1.54 (1.4)	1.76 (1.5)	$t_{1170} = -3.93^{**}$; $d = 0.11$
Doctor Visit in past 2 years (%)	91.3%	91.5%	90.9%	91.4%	79.2%	76.9%	79.6%	83.4%	χ^2 (1) = 30.5**, $d = 0.33$

Table 1. Continued

	All US-born ($N = 494$)	No discrimination ($N = 164$)	Moderate discrimination ($N = 133$)	High discrimination ($N = 197$)	All non-US-born ($N = 678$)	No discrimination ($N = 325$)	Moderate discrimination ($N = 196$)	High discrimination ($N = 157$)	US vs. non-US born
Died During Study Period (%)	5.7%	7.9%	6.0%	3.6%	2.5%	2.5%	2.0%	3.2%	χ^2 (1) = 4.19*, $d = 0.13$
Hospitalization in past 2 years (%)	18.2%	15.9%	19.5%	19.3%	17.7%	17.0%	17.3%	19.7%	χ^2 (1) = 0.02, $d = 0.01$
Social Support [Partner][b]	3.33 (0.7)	3.39 (0.8)	3.35 (0.7)	3.26 (0.7)	3.44 (0.7)	3.56 (0.7)[2]	3.44 (0.7)[2]	3.15 (0.8)	$t_{842} = 2.17$*; $d = 0.07$
Social Support [Child][a,b]	3.23 (0.7)	3.37 (0.8)[2]	3.22 (0.7)	3.12 (0.7)	3.36 (0.7)	3.55 (0.6)[1,2]	3.30 (0.7)[2]	3.04 (0.8)	$t_{1059} = 2.92$**; $d = 0.09$
Social Support [Family][a,b]	2.92 (0.8)	3.07 (0.8)[2]	2.97 (0.8)	2.77 (0.8)	3.13 (0.9)	3.30 (0.8)[1,2]	3.09 (0.8)[2]	2.86 (0.9)	$t_{1114} = 4.19$**; $d = 0.12$
Social Support [Friends][a,b]	2.96 (0.8)	3.09 (0.7)[2]	2.91 (0.8)	2.88 (0.8)	3.01 (0.7)	3.13 (0.7)[2]	3.02 (0.8)[2]	2.77 (0.7)	$t_{1017} = 1.19$; $d = 0.04$
Social Support [Total][a,b]	3.09 (0.5)	3.21 (0.6)[2]	3.11 (0.5)	2.97 (0.5)	3.22 (0.6)	3.37 (0.5)[1,2]	3.21 (0.5)[2]	2.91 (0.6)	$t_{1163} = 3.93$**; $d = 0.11$

Note. [1]Significant difference from Moderate Discrimination subgroup by Tukey-adjusted posthoc test $p < 0.05$ or Holm-adjusted χ^2 test. [2]Significant difference from High Discrimination subgroup by Tukey-adjusted posthoc test $p < 0.05$ or Holm-adjusted χ^2 test. TICS-27: Telephone Interview for Cognitive Status, modified 27-item. CES-D-8: 8-item Center for Epidemiological Studies-Depression Scale. *Chronic conditions included: high blood pressure or hypertension; diabetes or high blood sugar; cancer or a malignant tumor of any kind except skin cancer; chronic lung disease except asthma such as chronic bronchitis or emphysema; heart attack, coronary heart disease, angina, congestive heart failure, or other heart problems; stroke or transient ischemic attack; emotional, nervous, or psychiatric problems; and arthritis or rheumatism. Positivity for CI (cognitive impairment) or ADRD at follow-up was based on TICS-27 <12 or adjudicated dementia diagnosis, omitting deaths during the follow-up period. Cohort 1: Baseline assessments at Wave 9, 2008. Cohort 2: Baseline assessments at Wave 10, 2010. Cohort 3: Baseline assessments at Wave 11, 2012. Cohort 4: Baseline assessments at Wave 12, 2014. ** $p < 0.01$; * $p < 0.05$ based on Type II ANOVA F-test or *t*-test; ^natural log-transformed for statistical test.

[a]Indicates significant differences in US-born individuals across everyday discrimination scores (EDS) groups based on Type II ANOVA F-test, or χ^2 test.

[b]Indicates significant differences in non-US-born individuals across EDS groups based on Type II ANOVA F-test or χ^2 test.

regressions were conducted, as a full model and as a stratified model (e.g., stratified by EDS levels: none, moderate, and high). These models are an extension of the Cox proportional hazards regression, but control for the competing risk of all-cause mortality. For example, some Latinx adults may have developed CIND/ADRD if they lived sufficiently long enough but were censored due to death. The Fine-Gray competing risks regression adjusts the sub-distribution hazard ratios (SHR) to control for this likely scenario. Participants were followed over time until the outcome of interest occurred (CIND or ADRD), until they were censored (lost to follow-up), or until their death was noted (competing risk). SHRs were reported with 95% confidence intervals and *p*-values. All models contained the aforementioned covariates, except for unadjusted cumulative incidence functions generated for visualization, which compared sub-distribution hazards by nativity status groups, stratified by level of PD (i.e., gray's test). The proportional hazards assumption was visually examined with Schoenfeld residuals for each independent variable and covariate, and no issues were found. Sensitivity analyses were performed for left-censored respondents (i.e., those who had previously scored <12 on the TICS prior to baseline but were included in the analysis) by implementing Fine-Gray competing risks regression excluding those respondents. In addition, baseline characteristics were compared between left-truncated respondents (i.e., those who met specified criteria for CIND/ADRD at baseline) and those included in the analysis who converted to CIND/ADRD (see table S1 published as supplementary material online attached to the electronic version of this paper at https://www.cambridge.org/core/journals/international-psychogeriatrics).

Results

Mean baseline age for the 1,175 respondents was 62.2 (SD = 8.0) years; 57.7% were non-US-born (Table 1). As shown in Table 1, US-born participants completed more years of formal education than non-US-born ($M = 12.2$; SD = 3.1 vs. $M = 9.9$; SD = 4.4). Relative to those born outside of the US, US-born respondents had higher median income ($36k vs. $24k) and were more likely to receive insurance through their workplace (32% vs. 21%). Most respondents in both groups were women (57.5%).

Discrimination

Worse levels of everyday discrimination were reported among US-born compared to non-US-born participants ($\chi^2 = 41.7$, $d = 0.38$) (Table 1). In comparison to those who did not report everyday discrimination, US-born respondents reporting high discrimination also reported more symptoms of depression ($M = 2.19$; SD = 2.3 vs. $M = 1.31$; SD = 1.8, $t_{491} = 3.83$, $p < 0.001$), were younger in age ($M = 60.8$; SD = 7.1 vs. $M = 65.2$; SD = 7.8, $t_{491} = 5.48$, $p < 0.001$), and had more years of paternal ($M = 7.8$; SD = 4.7 vs. $M = 6.4$; SD = 4.5, $t_{491} = 2.73$, $p = 0.02$) and maternal education ($M = 7.8$; SD = 4.5 vs. $M = 6.4$; SD = 4.4, $t_{491} = 2.91$, $p = 0.01$). Non-US-born respondents who reported experiencing high levels of everyday discrimination also reported more symptoms of depression ($M = 2.60$; SD = 2.6) than those who did not report discrimination experiences ($M = 1.26$; SD = 2.0, $t_{675} = 6.40$, $p < 0.001$).

Cognition at baseline

US-born respondents who reported experiencing high levels of discrimination had worse TICS-27 scores than those who did not endorse the experience of discrimination ($M = 16.3$; SD = 2.8 vs. $M = 15.5$; SD = 2.6, $t_{491} = 2.75$, $p = 0.02$). There were no significant differences in TICS-27 scores among non-US-born participants across EDS groups.

Risk of CIND/ADRD

Of the US-born participants, 166 (33.6%) converted to CIND/ADRD and 28 (5.7%) died upon follow-up (Table 1). Of the non-US-born participants, 235 (34.7%) converted to CIND/ADRD and 17 (2.5%) died upon follow-up. In unadjusted cumulative incidence function plots stratified by EDS (Figure 1), nativity status (non-US-born) was protective among those who reported no EDS, but a slight risk factor among those who reported moderate or high EDS.

In fully adjusted models without stratification, neither EDS (Moderate SHR = 1.05 [0.83, 1.34], $p = .70$; High SHR = 0.94 [0.72, 1.21], $p = .60$) nor nativity status (SHR = 0.83 [0.66, 1.05], $p = .12$] were associated with risk of CIND/ADRD (Table 2). Older age (SHR = 1.32 [1.14, 1.53], $p < .001$) and higher depressive symptoms (SHR = 1.11 [1.00, 1.23], $p = .042$) were significantly associated with risk of CIND/ADRD, whereas female gender (SHR: 0.78 [0.63, 0.98], $p = .029$), higher educational attainment (SHR: 0.71 [0.64, 0.79], $p < .001$), greater years of employment (SHR: 0.85 [0.76, 0.95], $p = .006$), and occurrence of at least one doctor visit in the preceding two years (SHR: 0.67 [0.51, 0.89], $p = .006$) were significantly associated with reduced risk of CIND/ADRD.

Findings were also stratified by EDS (none, moderate, high) (Table 3, Figures 1 and 2). Among Latinx participants who reported no EDS, being

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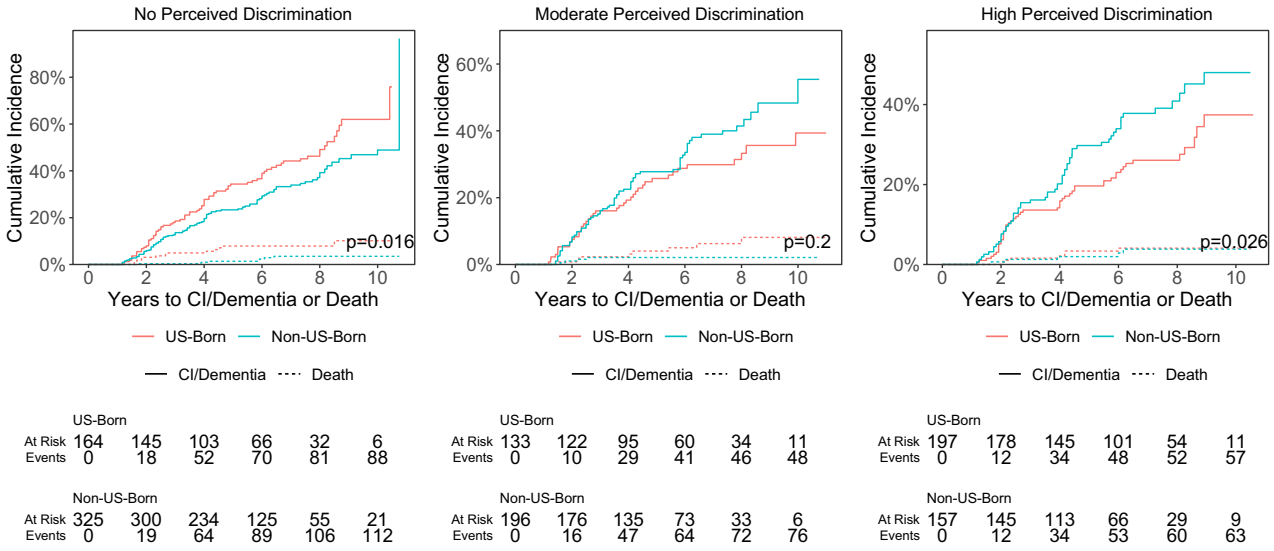

Figure 1. Cumulative incidence stratified by discrimination level.

Table 2. Competing risks regression measuring risk of cognitive impairment/dementia after accounting for all-cause mortality (main model without stratification)

Characteristic	SHR[1]	95% CI	*p*-value
Perceived Discrimination			
None	—	—	
Moderate	1.05	0.83, 1.34	0.70
High	0.94	0.72, 1.21	0.60
Non-US-born	0.83	0.66, 1.05	0.12
Age	**1.32**	**1.14, 1.53**	**<0.001**
Years of Education	**0.71**	**0.64, 0.79**	**<0.001**
Gender			
Male	—	—	
Female	**0.78**	**0.63, 0.98**	**0.029**
Years of Employment	**0.85**	**0.76, 0.95**	**0.006**
Medicaid			
No	—	—	
Yes	1.11	0.84, 1.46	0.50
Medicare			
No	—	—	
Yes	1.17	0.85, 1.60	0.30
Income (log)	0.98	0.88, 1.08	0.70
Medical Comorbidities	1.09	0.98, 1.22	0.11
Marital Status			
Single	—	—	
Married/Partnered	0.79	0.62, 1.01	0.063
Recent Doctor Visit			
No	—	—	
Yes	**0.67**	**0.51, 0.89**	**0.006**
Recent Hospitalization			
No	—	—	
Yes	1.11	0.85, 1.45	0.50
Social Support	0.98	0.88, 1.08	0.70
CES-D	**1.11**	**1.00, 1.23**	**0.042**

Notes. CES-D = Center for Epidemiological Studies-Depression; SHR = Sub-distribution hazard ratio.

born outside of the US was associated with a 42% decreased risk of CIND/ADRD (SHR = 0.58 [0.41, 0.83], $p = .003$). However, nativity status was not associated with risk of CIND/ADRD among those reporting moderate (SHR = 0.94 [0.60, 1.48], $p = .81$) and high levels of EDS (SHR = 1.05 [0.65, 1.71], $p = .84$). Sensitivity analyses that excluded respondents who had scored in the CIND/ADRD range of the TICS prior to their baseline assessment ($n = 106$; 9%) did not yield meaningful differences compared to the full respondent sample (no EDS: SHR = 0.60 [0.41, 0.88]; moderate EDS: SHR = 0.98 [0.61, 1.59]; high EDS: SHR = 0.95 [0.56, 1.61]).

Among those who did not report EDS, higher educational attainment (SHR: 0.69 [0.58, 0.81], $p < .001$) and higher years of employment (SHR: 0.83 [0.70, 0.99], $p = .038$) were significantly associated with reduced risk of CIND/ADRD (Table 3). Recent hospitalization (SHR: 1.54 [1.03, 2.30], $p = .04$) and older age (SHR: 1.28 [1.01, 1.64], $p = .045$) were significantly associated with higher risk of CIND/ADRD. Among participants who reported moderate levels of discrimination, higher educational achievement (SHR: 0.71 [0.57, 0.88], $p = .002$) was significantly associated with reduced risk of CIND/ADRD, whereas older age (SHR: 1.46 [1.11, 1.91], $p = .007$) and depression (SHR: 1.25 [1.03, 1.51], $p = .03$) were significantly associated with higher risk of CIND/ADRD. Lastly, among participants who reported high levels of EDS, higher educational achievement (SHR: 0.79 [0.65, 0.98], $p = .03$) and occurrence of at least one doctor visit in the preceding two years (SHR: 0.54 [0.32, 0.93],

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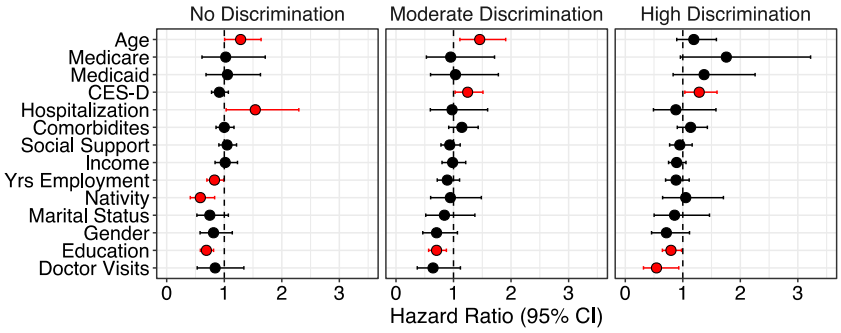

Figure 2. Hazard ratio stratified by discrimination level.

Table 3. Competing risks regression measuring risk of CI/dementia after accounting for all-cause mortality, stratified by perceived discrimination

	No perceived discrimination ($N = 477$)			Moderate perceived discrimination ($N = 324$)			High perceived discrimination ($N = 345$)		
Characteristic	HR	95% CI	*p*-value	HR	95% CI	*p*-value	HR	95% CI	*p*-value
Non-US-born	**0.58**	**0.41, 0.83**	**0.003**	0.94	0.60, 1.48	0.81	1.05	0.65, 1.71	0.84
Age	**1.28**	**1.01, 1.64**	**0.045**	**1.46**	**1.11, 1.91**	**0.007**	1.19	0.90, 1.58	0.23
Years of Education	**0.69**	**0.58, 0.81**	**<0.001**	**0.71**	**0.57, 0.88**	**0.002**	**0.79**	**0.65, 0.98**	**0.03**
Gender									
Male	—	—		—	—		—	—	
Female	0.81	0.58, 1.14	0.23	0.70	0.46, 1.07	0.099	0.71	0.46, 1.12	0.14
Years of Employment	**0.83**	**0.70, 0.99**	**0.038**	0.89	0.72, 1.11	0.29	0.88	0.70, 1.11	0.29
Medicaid									
No	—	—		—	—		—	—	
Yes	1.06	0.68, 1.63	0.81	1.03	0.60, 1.78	0.91	1.37	0.83, 2.26	0.22
Medicare									
No	—	—		—	—		—	—	
Yes	1.02	0.61, 1.71	0.92	0.95	0.53, 1.71	0.87	1.76	0.96, 3.22	0.07
Income (log)	1.02	0.84, 1.23	0.87	0.98	0.80, 1.21	0.88	0.89	0.75, 1.06	0.18
Medical Comorbidities	1.00	0.86, 1.17	1.0	1.14	0.92, 1.43	0.23	1.14	0.90, 1.43	0.27
Marital Status									
Single	—	—		—	—		—	—	
Married/Partnered	0.75	0.52, 1.07	0.11	0.84	0.52, 1.37	0.49	0.86	0.50, 1.46	0.57
Recent Doctor Visit									
No	—	—		—	—		—	—	
Yes	0.84	0.53, 1.34	0.47	0.64	0.37, 1.12	0.12	**0.54**	**0.32, 0.93**	**0.03**
Recent Hospitalization									
No	—	—		—	—		—	—	
Yes	**1.54**	**1.03, 2.30**	**0.04**	0.97	0.60, 1.59	0.92	0.88	0.49, 1.58	0.67
Social Support	1.05	0.91, 1.21	0.52	0.93	0.78, 1.12	0.45	0.95	0.77, 1.16	0.61
CES-D	0.91	0.78, 1.07	0.27	**1.25**	**1.03, 1.51**	**0.03**	**1.29**	**1.04, 1.59**	**0.02**

Notes. CES-D = Center for Epidemiological Studies-Depression; SHR = Sub-distribution hazard ratio.

$p = .03$) were significantly associated with reduced risk of CIND/ADRD. Depression (SHR: 1.29 [1.04, 1.59], $p = .02$) was significantly associated with higher risk of CIND/ADRD. These estimates are shown in Figure 2 for ease of interpretation and comparison.

Discussion

In the current analyses of data from Latinx, respondents ages 51 years and above in the HRS, we examined the association between PD and the risk of CIND/ADRD while considering nativity status. Contrary to our first and second hypotheses,

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the present analyses revealed no main effects of nativity status or perceived everyday discrimination on risk of CIND/ADRD. However, consistent with our third hypothesis, there was a significant interactive effect of nativity status and everyday discrimination on risk of CIND/ADRD, such that non-US-born Latinx adults who reported no discrimination had 42% lower risk of CIND/ADRD relative to US-born Latinx adults.

Nativity status has been thought to be a risk for ADRD through disparities in SES status and educational attainment, such that non-US-born Latinx adults have a greater risk of CIND/ADRD when analyses do not consider inequities in income and years of education, yet are at a lower risk of CIND/ADRD when socioeconomic and educational inequities are properly controlled for (Weden *et al.*, 2017; Garcia, Saenz, *et al.*, 2018). While our study found no main effect of nativity status on CIND/ADRD risk in the full model, it is worth noting that our results showed that higher educational attainment, greater years of employment, and occurrence of at least one doctor visit were associated with decreased risk of CIND/ADRD which is consistent with the notion from prior studies that SES may drive some of the risk for CIND/ADRD. Women were also at reduced risk of CIND/ADRD, while older age and depressive symptoms were associated with an increased risk of CIND/ADRD. Low educational attainment (Nianogo *et al.*, 2022), older age (Lindsay *et al.*, 2002), and greater depressive symptom burden (Gallagher *et al.*, 2018) have also been shown in several previous studies to be risk factors for Alzheimer's disease.

When considering the interaction between nativity status and everyday discrimination, it was found that the protective effect of nativity status (non-US-born) was only observed in respondents reporting no discrimination; by contrast, nativity status (non-US-born) conferred no difference in risk for CIND/ADRD in respondents perceiving moderate or high levels of discrimination. Specifically, we found that non-US-born Latinx older adults perceiving no discrimination had a 42% lesser risk of CIND/ADRD upon follow-up after considering the competing risk of mortality. Why non-US-born Latinx older adults have a *lower risk* of CIND/ADRD than their US-born counterparts (when adjusting for sociodemographic disadvantages) is not fully clear. However, our study provides evidence that experiences of discrimination in moderate at high levels may negate the protective effect of nativity status, further showcasing how immigrant-related inequities and psychosocial stressors related to migration exacerbate risk of CIND/ADRD. Social determinants explain a large portion (76%) of the Latinx-White disparity in cognitive functioning (Jester, Kohn, *et al.*, 2023) and formal years of education specifically influence Latinx adults' time to cognitive decline (Jester, Palmer *et al.*, 2023). While the literature acknowledges that several social determinants of health are known to affect the risk of ADRD, few have looked at the *interactive effects* of social determinants. Our study provides a basis for continuing this necessary investigation.

Notably, one prior study did not find an association between but not everyday discrimination and cognitive functioning, but it found major lifetime discrimination to be associated with *better* cognition (Meza *et al.*, 2022). This was significant for Black older adults, but not for other racial/ethnic groups. Results were also significant based on nativity status; for instance, it showed that this association was found for US-born older adults, but not for non-US-born older adults. Similarly, in a prior report using HRS data, although the association between cognitive health and everyday discrimination varied based on the type of discrimination or it was not existent, an association between *better* cognitive health and everyday discrimination (racial discrimination, specifically) among Black participants was identified (Sutin *et al.*, 2015). One potential explanation for a positive association between cognition and experiences of discrimination is the *steeling effect*, which posits that exposure to moderate stressors enhances well-being by inducing resilience (Rutter, 2012). Those who have developed a greater ability to cope with stress may be less likely to develop cognitive dysfunction. It is unclear if the *steeling effect* exists or is as significant for non-US-born Latinx adults, such that additional psychosocial stressors related to discrimination appear to ameliorate the protective effect of nativity status on CIND/ADRD. In addition, it is possible that individuals with greater educational attainment (or cognitive reserve) were more likely to report or experience discrimination, as has been reported elsewhere for Black adults (Cintron *et al.*, 2021; Mouzon *et al.*, 2020). One counterargument to the latter suggestion is that models were adjusted for differences in education and related socioeconomic variables and yet we still found no evidence of a steeling effect.

Individuals may experience different types of discrimination (e.g., weight, physical disability, race, sex) and the impact of one or more types of discrimination can vary. Although we did not investigate the type and number of types of discrimination participants were experiencing, prior research has indicated that the effect of PD on cognition depends on the type of discrimination. For instance, Sutin *et al.* (2015) reported that sex

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discrimination was associated with better performance on memory tasks, while discrimination based on physical disability, race, and/or sexual orientation was associated with lower memory performance. Although their study included participants from different racial and ethnic backgrounds, the vast majority were White (84%) and Black (13%), and only about 3% identified other ethnicities. Future studies should consider the type and number of types of discrimination experienced when examining the association between discrimination, cognition, and nativity status among Latinx older adults.

Clearly, the effects of discrimination on cognition are multifaceted and complex; more work is needed to disentangle the biological and psychological mechanisms by which discrimination *may* affect cognitive health. Our results, overall, did not show substantial evidence that discrimination contributes to decline in cognitive functioning among Latinx adults living in the US. The findings herein highlight the importance of assessing and addressing discrimination in clinical settings since discrimination, a psychosocial stressor, can contribute to mental and physical health. However, professionals may not address these experiences in treatment due to a variety of reasons, including e.g., denial, silence, fear of engaging in related discussions, lack of understanding the connection between discrimination and health, and lack of training. Clinicians and other healthcare professionals need to be trained to assess and address experiences of discrimination as part of their treatment plan, as these experiences may be contributing to or exacerbating health conditions. Although this may not eliminate the existence of discriminatory experiences, it could raise awareness among professionals and create clinical settings that foster a supportive culture. Lastly, we assessed cognitive functioning via an adaptation of TICS-27, i.e. using categorical rather than continuous score interpretations. Our use of cut-off scores improves the clinical utility of our findings.

Limitations

As with any empirical study, there are some limitations and caveats that should be considered in interpretation of the present results. One of these limitations is that the sample was limited to just under 2,000 Latinx older adults, of which fewer than half were US-born. Also, Latinx individuals living in the US belong to a variety of subgroups, with Mexican Americans representing the largest proportion of Latinx Americans and the largest proportion sampled by the HRS. Hence, there exists some level of selection bias for Latinx American participants in the HRS sample (i.e., majority of non-US-born participants are Spanish-speaking, and non-US-born participants are typically healthier than the US-born participants). Though we sought to understand the nuances within this heterogeneous community by examining the effects of nativity status, other factors such as nationality and other cultural factors should be considered in future research.

We were also limited by the TICS-27 and physician diagnoses of CIND/ADRD. Although the TICS-27 has excellent properties at identifying CIND/ADRD, it remains an imperfect screening tool and may be affected by different forms of bias such as stereotype threat and "test-wiseness" or the accumulated knowledge of test-taking strategies by those with higher levels of formal education that may inflate scores. Employing a full neuropsychological battery and adding reliable clinician-adjudicated diagnoses of CI or ADRD would be useful in future research to more fully establish the pattern of effects of PD and nativity status on cognitive health.

Another potential limitation is our use of a stratification approach to modeling the effects of nativity status and PD on cognitive outcomes, whereby EDS subgroups (i.e., none, moderate, and high discrimination) were analyzed separately. While this approach may inflate Type I error, the application of complex interaction terms (e.g., three-level categorical EDS by nativity) can significantly complicate model interpretation, especially when the sample size is modest and when competing risks differ by group (i.e., US-born participants were twice as likely to die than non-US-born participants). These difficulties noted, however, that a salient benefit of stratification is that the estimates are not complicated by the underlying differences between groups that led to censoring (e.g., drop-out) or a secondary outcome (e.g., mortality) and that findings were not in reference to a specific group. Nevertheless, we do acknowledge that our study was underpowered, and that Type I error may be a concern.

Although EDS has been vastly used to assess daily discrimination, it is possible that the categorization schemes utilized herein may not represent a comprehensive association with cognitive health. Michaels *et al.* (2019) examined the association between the effect of coding on exposure classification and health outcomes among Black women and raised concerns regarding the different EDS categorization schemes. The field would benefit from better understanding of the association among Latinx individuals. In addition, future consideration should also be given to experiences of major lifetime discrimination when studying the effects of discrimination on health outcomes.

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We also recognize that participants were left-truncated (i.e., could not be tracked as they had tested in the CIND/ADRD range at baseline), which may introduce bias into CIND/ADRD risk estimates. Although these participants were not older and did not differ by nativity status from those in the included sample who went on to develop CIND/ADRD, they had lower educational attainment, more medical comorbidities, lower incomes, and greater depressive symptoms. It is therefore possible that the analyzed sample had greater cognitive reserve relative to those with prevalent CIND/ADRD at the baseline assessment. Intraindividual fluctuation in cognitive performance is also an important nuance, but one that cannot be adequately studied with our modest sample size and current approach. Nonetheless, a small number of participants in our analysis sample had tested in the CIND/ADRD range prior to their baseline assessment, though a sensitivity analysis that excluded these individuals yielded similar results to the full analysis.

Finally, several relevant chronic conditions are known to impact the risk of CIND/ADRD (e.g., cardiovascular conditions, diabetes) and may differ by nativity status. Research is needed to better understand how specific comorbidities may impact progression to CIND/ADRD or whether adequate treatment of chronic conditions serves as a protective factor in these populations.

Conclusions

The effects of nativity status and perceived discrimination on cognitive health are complex. Our study examined the main effects of these factors and the interactive effect between them as well as to inform public policy and prevention strategies. We found an interactive effect of nativity status and perceived discrimination, such that non-US-born Latinx adults perceiving no discrimination have a 42% decreased risk of CIND/ADRD. There remains no truly effective treatment for ADRD, so efforts to prevent or delay the onset can have enormous individual, social, and humanitarian benefits. More work is urgently needed to understand how different social determinants of health such as nativity status and experiences of discrimination affect risk of ADRD, how social determinants interact, and whether the effects of social determinants are different across racial and ethnic groups.

Conflict of interest

The authors have no conflicts.

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Description of author(s)' roles

Lize Tibiriçá: Conceptualization, Investigation, Writing – original draft & editing. Dylan Jester: Acquisition of data, Data analyses, Writing – review & editing, Jordan Kohn: Data Analyses, Writing – review & editing. Allison P. Williams: Writing – review & editing. Linda McEvoy: Writing – review & editing, Supervision, Barton W. Palmer: Writing – review & editing, Supervision.

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Supplementary material

To view supplementary material for this article, please visit https://doi.org/10.1017/S1041610223004374.

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