

UC San Diego

UC San Diego Previously Published Works

Title

Psychosocial factors associated with 7-year change in cognition among middle-aged and older Hispanics/Latinos: The Hispanic Community Health Study/Study of Latinos-Investigation of Neurocognitive Aging (SOL-INCA) and Sociocultural ancillary studies.

Permalink

<https://escholarship.org/uc/item/9c3959nm>

Journal

Alzheimers & Dementia: The Journal of the Alzheimers Association, 20(2)

Authors

Estrella, Mayra
Tarraf, Wassim
Kuwayama, Sayaka
[et al.](#)

Publication Date

2024-02-01

DOI

10.1002/alz.13527

Peer reviewed

RESEARCH ARTICLE

Psychosocial factors associated with 7-year change in cognition among middle-aged and older Hispanics/Latinos: The Hispanic Community Health Study/Study of Latinos-Investigation of Neurocognitive Aging (SOL-INCA) and Sociocultural ancillary studies

Mayra L. Estrella^{1,2}  | Wassim Tarraf³ | Sayaka Kuwayama⁴ | Linda C. Gallo⁵ | Benson Wu⁴ | María J. Marquine⁶ | Krista M. Perreira⁷ | Priscilla M. Vasquez⁸ | Carmen R. Isasi⁹ | Richard B. Lipton¹⁰ | Josiemer Mattei¹¹ | Hector M. González⁴ | Martha L. Daviglius² | Melissa Lamar^{2,12}

¹Department of Epidemiology, Human Genetics and Environmental Sciences, University of Texas Health Sciences Center at Houston (UTHealth Houston) School of Public Health, Brownsville, Texas, USA

²Institute for Minority Health Research, University of Illinois at Chicago, Chicago, Illinois, USA

³Institute of Gerontology and Department of Healthcare Sciences, Wayne State University, Detroit, Michigan, USA

⁴Department of Neurosciences and Shiley-Marcos Alzheimer's Disease Research Center, University of California, San Diego, California, USA

⁵Department of Psychology, San Diego State University, San Diego, California, USA

⁶Departments of Medicine and Psychiatry, Duke Center for the Study of Aging and Human Development, Duke University, Durham, North Carolina, USA

⁷Department of Social Medicine, University of North Carolina School of Medicine, Chapel Hill, North Carolina, USA

⁸Department of Urban Public Health, Charles R. Drew University of Medicine and Science, Los Angeles, California, USA

⁹Department of Epidemiology and Population Health, Albert Einstein College of Medicine, Bronx, New York, USA

¹⁰Department of Neurology, Albert Einstein College of Medicine, New York, New York, USA

¹¹Department of Nutrition, Harvard T.H. Chan School of Public Health, Boston, Massachusetts, USA

¹²Rush Alzheimer's Disease Center and the Department of Psychiatry and Behavioral Sciences, Rush University Medical Center, Chicago, Illinois, USA

Correspondence

Mayra L. Estrella, Department of Epidemiology, Human Genetics, and Environmental Sciences, UTHealth Houston School of Public Health, One West University Blvd. SPH Building, Brownsville, TX 78520, USA.

Email: mayra.l.estrella@uth.tmc.edu

Funding information

University of North Carolina, Grant/Award Number: HHSN2682013000011 / N01-HC-65233; University of Miami,

Abstract

INTRODUCTION: Few studies have examined the associations of psychosocial factors with cognitive change in Hispanics/Latinos.

METHODS: Data from the Hispanic Community Health Study/Study of Latinos-Investigation of Neurocognitive Aging (HCHS/SOL INCA) and Sociocultural studies were used ($n = 2,155$; ages ≥ 45 years). Psychosocial exposures included intrapersonal (ethnic identity, optimism, purpose in life), interpersonal (family cohesion, familism, social networks, social support), and social factors (ethnic discrimination, loneliness, subjective social status). Survey-linear regression models examined associations

This is an open access article under the terms of the [Creative Commons Attribution-NonCommercial-NoDerivs](https://creativecommons.org/licenses/by-nc-nd/4.0/) License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.

© 2023 The Authors. *Alzheimer's & Dementia* published by Wiley Periodicals LLC on behalf of Alzheimer's Association.

Grant/Award Number: HHSN2682013000041 / N01-HC-65234; Albert Einstein College of Medicine, Grant/Award Number: HHSN2682013000021 / N01-HC-65235; University of Illinois at Chicago, Grant/Award Number: HHSN2682013000031 / N01-HC-65236; San Diego State University, Grant/Award Number: HHSN2682013000051 / N01-HC-65237; National Institute on Aging, Grant/Award Numbers: R01AG048642, K01AG075353, P30AG059305; National Institute on Minority Health and Health Disparities, Grant/Award Number: L60MD015551

between psychosocial exposures and 7-year cognitive change (global cognition [GC], verbal learning, memory, word fluency [WF], and digit symbol substitution [DSS]).

RESULTS: Familism predicted decline in GC, verbal learning, and memory; family cohesion predicted DSS decline; and loneliness predicted memory decline. Ethnic identity was protective against decline in GC and memory, optimism and social support were protective against decline in memory, and purpose in life was protective against WF decline.

DISCUSSION: Psychosocial factors are differentially related to cognitive changes. Culturally relevant factors should be explored in Hispanic/Latino cognitive aging research.

KEYWORDS

cognition, ethnic discrimination, ethnic identity, familism, family cohesion, Hispanics/Latinos, loneliness, optimism, psychosocial factors, purpose in life, social networks, social support, subjective social status

Highlights

- Psychosocial factors are differentially related to cognitive changes in Latinos.
- Role of culturally relevant factors on cognition should be further explored.
- Familism predicted decline in global cognition, verbal learning, and memory.
- Ethnic identity predicted increase in global cognition and memory.

1 | BACKGROUND

Psychosocial factors, generally conceptualized in ecological models of health as a construct that relates the socioenvironmental context to individual-level physiological changes,¹ have been increasingly associated with cognitive change in older adults. A growing body of literature has documented the role of favorable levels of psychosocial factors, including intrapersonal resources such as greater purpose in life²⁻⁵ and interpersonal resources such as larger social networks⁶ and greater social support,⁷⁻⁹ on slower global cognitive decline among older non-Hispanic white adults. Studies, also in mostly older non-Hispanic white cohorts,^{10,11} have reported associations of lower levels of social stressors such as loneliness with slower global cognitive decline. Taken together, previous studies have reported distinct relationships between psychosocial factors with cognitive change in older non-Hispanic white adults. However, it is unclear whether these findings are generalizable to middle-aged and older US-based Hispanic/Latino adults, who represent the largest minority racial and ethnic group in the US¹² and carry a disproportionate burden of mild cognitive impairment and dementia.¹³

It is also unclear whether culturally relevant psychosocial factors such as ethnic identity (ie, sense of identification and belonging with an ethnic or cultural group), familism (ie, a cultural value emphasizing family over self), and/or experiences of ethnic discrimination are related to cognitive change in middle-aged and older US-based Hispanic/Latino adults. However, there is a growing body of literature¹³ that calls for research investigating whether culturally relevant psychosocial fac-

tors, including those associated with acculturation in context¹⁴ and the larger lived experience of US racial and ethnic minorities,¹⁵ partially shape the level of and change in cognition over time. Despite mounting evidence, to our knowledge, there are no comprehensive examinations in the cognitive aging literature that include positive and negative psychosocial factors, as well as more culturally relevant constructs. To this end, we previously applied the Reserve Capacity Model^{16,17} as a guiding conceptual framework to examine cross-sectional associations of psychosocial factors with cognition in middle-aged and older US-based Hispanic/Latino adults. The Reserve Capacity Model considers a complex interplay between macro- and micro-level socioeconomic and cultural factors hypothesized to influence psychosocial risk and resilience processes, ultimately contributing to cardiometabolic health outcomes in the Hispanic/Latino population. We suggest this model can also be applied to study cognitive health outcomes. As such, to advance research in this area, our previous cross-sectional study¹⁸ focused on selected psychosocial factors from the Reserve Capacity Model, particularly those factors previously proposed and/or demonstrated to be associated with cognition. In our previous study, we found that psychosocial factors were differentially associated with level of global cognition and individual tests of verbal learning and memory, word fluency (WF), and digit symbol substitution (DSS), regardless of adjustments for sociodemographic factors and depressive symptoms.¹⁸ Specifically, greater familism was associated with lower scores, and greater ethnic identity was associated with higher scores of global cognition, WF, and DSS. Greater loneliness was associated with lower global cognition, verbal learning, memory, and DSS

RESEARCH IN CONTEXT

- 1. Systematic review:** The authors reviewed the literature to define their measures of psychosocial factors and identify previous studies on the role of psychosocial factors as they relate to cognition and dementia in middle-aged and older Hispanic/Latino adults.
- 2. Interpretation:** Our study answers important questions regarding the independent relationships of a comprehensive array of well-recognized psychosocial factors with 7-year changes in cognition within one study, including more traditional factors (eg, purpose in life and social support) as well as more novel, culturally relevant (ethnic identity, familism, and ethnic discrimination) factors.
- 3. Future directions:** The article suggests ways to improve future research on the role of family relations, social networks, discrimination, and purpose in life in Hispanic/Latino adults as it relates to longitudinal cognitive change, and proposes the need to examine intersectional social positions across sex, race, socioeconomic status, and acculturation.

scores, and greater family cohesion was associated with a higher verbal learning score.¹⁸

This study extends our cross-sectional work¹⁸ to examine whether the same psychosocial factors at baseline were associated with a 7-year change in global cognition and individual tests among a large sample of middle-aged and older US-based adults from diverse Hispanic/Latino backgrounds (namely, Cuban, Dominican, Central and South American, Puerto Rican, and other or more than one heritage). We hypothesized that greater levels of familism, ethnic discrimination, and loneliness at baseline would be associated with decline (more pronounced 7-year change) in cognition, whereas all other psychosocial exposures would be protective against decline (less pronounced 7-year change) in cognition. Study findings could inform the development of culturally relevant psychosocial interventions to promote cognitive health among middle-aged and older Hispanic/Latino adults living in the United States. This is a particularly crucial public health consideration given that Hispanic/Latino adults are underrepresented in non-pharmaceutical cognitive health interventions,¹⁹ despite the looming dementia crisis²⁰ in this rapidly growing population.¹²

2 | METHODS**2.1 | Study design**

The Hispanic Community Health Study/Study of Latinos (HCHS/SOL) is a multisite (Bronx, NY; Chicago, IL; Miami, FL; San Diego, CA) prospective cohort study that enrolled 16,415 individuals aged 18 to 74 years at recruitment.²¹ The cohort included non-institutionalized commu-

nity living participants self-identified as having Cuban, Central American, Dominican, Mexican, Puerto Rican, South American, or other/more than one Hispanic/Latino background. The detailed sampling procedures and study protocols have been previously published.^{21,22} During the HCHS/SOL baseline evaluation (2008 to 2011), information on sociodemographic characteristics was gathered from all participants, and a baseline cognitive assessment battery was administered only to participants aged 45 to 75 years.

The Sociocultural Ancillary Study (SCAS; 2010 to 2011) was designed to examine the associations of a wide array of risk and protective sociocultural and psychosocial factors with cardiovascular disease and related outcomes among a subsample ($n = 5,313$; aged 18 to 74 years) of the baseline HCHS/SOL cohort.¹⁶ All the psychosocial factors used in our current study were obtained in the SCAS,¹⁶ except for subjective social status, which was assessed in the HCHS/SOL baseline examination. The Study of Latinos-Investigation of Neurocognitive Aging (SOL-INCA) Ancillary Study was conducted during the second HCHS/SOL visit (2015 to 2018). SOL-INCA was designed to examine the risk and protective factors for cognitive decline and related disorders in participants who were originally evaluated at baseline.¹³ Therefore, the cognitive function assessment from the HCHS/SOL baseline examination was repeated in the SOL-INCA study ($n = 6,377$). The SOL-INCA study also used the complex design features of the parent study to ensure valid generalization to the HCHS/SOL target population.¹³ Trained bilingual interviewers administered the questionnaires in the preferred language of the participants (ie, English or Spanish). At all study sites, Institutional Review Board (IRB) approval was obtained for the study, and participants provided written informed consent in accordance with the Declaration of Helsinki.

2.2 | Analytic sample

For the present analysis, we included SCAS participants aged 45 years and older who completed all psychosocial questionnaires and cognitive assessments at baseline and were also part of the SOL-INCA ancillary study (and, as such, completed a second cognitive assessment). Of the 2537 SCAS and SOL-INCA participants aged ≥ 45 years, we excluded 127 participants with self-reported heart attack or stroke (due to potential confounding effects on cognition²³) and 20 participants with low mental status (due to the self-reported nature of our psychosocial measurements), which was defined as a score of < 3 out of 6 in the brief Six-Item Screener for cognitive impairment.²⁴ We also excluded 125 participants with missing data on any of the psychosocial variables, 87 with missing data on any of the cognitive function variables, and 23 with missing data on any of the study covariates. The final analytic (unweighted) sample comprised 2155 participants.

2.3 | Psychosocial factors

We previously defined and described the psychosocial measures used in the current study and the rationale for inclusion in our work in

detail, based on the Reserve Capacity Model^{16,17} and previous literature supporting their potential relationship with cognitive outcomes.¹⁸ Psychosocial factors were categorized into three conceptually relevant categories: intrapersonal factors, interpersonal factors, and social stressors. For all psychosocial exposures, items were reverse coded as appropriate, so that higher scores corresponded to higher levels of the underlying trait. Subsequently, z-scores $[(\text{individual score} - \text{mean})/\text{SD}]$ were calculated for each psychosocial factor to facilitate interpretation of the results across a common metric.

Intrapersonal factors included ethnic identity (range: 2 to 5), optimism (range: 1 to 24), and purpose in life (range: 6 to 30). Briefly, the 12-item Ethnic Identity Subscale of the Scale of Ethnic Experiences²⁵ was used to measure ethnic identity (ie, sense of belonging based on one's cultural heritage, background, traditions, and importance of one's ethnic identity in life); items were rated on a 5-point scale ranging from strongly agree to strongly disagree (eg, "I have a strong sense of myself as a member of my ethnic group"). The 6-item Life Orientation Test-Revised²⁶ was used to measure optimism (ie, one's general life orientation and expectations of positive outcomes in life); participants were asked about their extent of agreement with statements such as: "In uncertain times, I usually expect the best." The 12-item Life Engagement Test²⁶ was used to assess purpose in life (ie, engagement in activities that are personally valuable); participants were asked about their extent of agreement with statements such as: "There is not enough purpose in my life."

Interpersonal factors included family cohesion (range: 0 to 8), familism (range: 29 to 70), social network embeddedness (range: 0 to 7), and social support (range: 0 to 36). Briefly, the 18-item Family Cohesion Subscale of the Family Environment Scale²⁷ was used to measure family cohesion (ie, perceived presence of supportive and close relations with one's family members); participants were asked whether statements such as "Family members really help and support each other" were true or false. The 14-item Familism Scale²⁸ was used to measure the Latino-centric ethos of familism (ie, prioritizing one's family over the self). The familism scale includes three subscales assessing family obligations (ie, the belief that one has a personal obligation and responsibility to attend to one's family needs, including financial ones), family support (ie, the belief of reliability, support, and emotional closeness among family members), and family as referent (ie, the belief that one's behaviors should meet familial expectations). For example, items on the family as referent subscale included the extent of agreement with items such as: "I have a strong sense of myself as a member of my ethnic group." The 12-item Social Network Embeddedness Index²⁹ was used to measure social network embeddedness, which refers to the sum of the number of network domains (ie, family, friends, church/temple, school, work, neighbors, volunteering, and groups) that a participant saw or talked to a person at least once every 2 weeks. The Interpersonal Support Evaluation List³⁰ was used to measure social support (ie, perceived availability of social support); participants were asked whether statements such as "When I need suggestions on how to deal with a personal problem, I know someone I can turn to" were true or false.

Finally, social stressor metrics included perceived ethnic discrimination (range: 17 to 78), loneliness (range: 3 to 9), and subjective

social status (range: 1 to 10). The 17-item Brief Perceived Ethnic Discrimination Questionnaire-Community Version³¹ was used to measure ethnic discrimination; participants were asked about their extent of agreement with statements on perceived discrimination targeted at their ethnic group (eg, "I often have to defend my ethnic group from criticism by people outside of my ethnic group"). The three-item Revised University of California Los Angeles Loneliness Scale³² was used to measure loneliness, including dimensions of relational connectedness, social connectedness, and self-perceived isolation (ie, "How often do you feel isolated from others?"). The MacArthur Subjective Social Status Scale³³ assesses how individuals perceived themselves on a social ladder relative to "other people in the US." Ethnic identity, familism, and ethnic discrimination represent culturally relevant psychosocial factors. The adequate reliability of these psychosocial metrics has been previously established¹⁸ with the exception of the relatively lower reliability of the Life Orientation (optimism) metric (ie, $\alpha = 0.65$ in English; $\alpha = 0.54$ in Spanish); however, lower reliability estimates may be considered because the optimism scale consists of six items.^{34,35}

2.4 | Cognitive assessment

As previously described,^{13,36} three cognitive tests were used to assess outcomes associated with verbal learning and memory, verbal fluency, and executive functioning. Trained interviewers administered the cognitive battery in the participant's preferred language (English or Spanish). The psychometric properties of these measures and their validity for use in English and Spanish have been previously deemed adequate.^{13,36} The Brief Spanish English Verbal Learning Test (B-SEVLT)³⁷ was used to assess verbal learning and memory. The B-SEVLT consisted of three consecutive 15-item learning trials, followed by a distractor list and a 15-item memory trial to assess free recall after interference. Verbal learning (range: 0 to 45) is the sum of the items correctly recalled from list A across the three learning trials and memory (range: 0 to 15) is the sum of the number of items correctly recalled after interference. The WF³⁸ score (range: 0 to 50) is the sum of the correctly generated words in 60 s that began with letters F and A, respectively. The WF test instructions to the participants indicated that they could mention words in English or Spanish if they were different. The DSS test³⁹ was used to assess mental processing speed. Participants were asked to write the corresponding symbol for each digit based on the provided key; the score is the sum of the correctly identified symbols in 90 s (range: 0 to 83). These tests were administered at the HCHS/SOL baseline and SOL-INCA with higher scores representing better cognition in all the cognitive tests.

A global cognition score was derived by averaging the z-scores $[(\text{individual score} - \text{mean})/\text{SD}]$ of the four individual tests (ie, verbal learning, verbal memory after interference, WF, and DSS) at the HCHS/SOL baseline and SOL-INCA visit. Changes in cognitive outcomes from HCHS/SOL baseline to SOL-INCA were derived using survey regressions⁴⁰ that predict cognitive score at SOL-INCA as a function of baseline cognitive score adjusting for the time elapsed

between assessments (mean 6.94 years, SD = 1.16). Test-specific measures of change and global cognitive change were calculated using $(T2 - T2_{pred})/RMSE$, where $T2$ represents a respondent's score on a cognitive test at SOL-INCA, $T2_{pred}$ is the predicted score, and $RMSE$ is the root mean squared error of the fitted model. The detailed rationale for this technique has been published previously.⁴⁰

2.5 | Covariates

Covariates were measured at baseline, identified a priori, and, in keeping with our previous cross-sectional study,¹⁸ included age (continuous), sex (male/female), self-identified Hispanic/Latino background (Central or South American, Cuban, Dominican, Mexican, Puerto Rican, and other/more than one), education (< high school, high school graduate, or > high school), annual household income (\leq \$20,000, \$20,001 to \$50,000, > \$50,000, or not reported), and language used for testing (ie, language preference categorized as English or Spanish). Participants who declined to report their annual household income were included in the 'Not reported' category to avoid deleting those observations from our analytic sample. Depressive symptoms were assessed using a 10-item version of the Center for Epidemiologic Studies Depression scale.⁴¹

2.6 | Statistical analysis

SOL-INCA uses the complex design features of HCHS/SOL and probability weights that account for non-response and attrition.^{13,22} Briefly, at the baseline examination, a stratified two-stage area probability sample of household addresses was selected from each field center. The first sampling stage randomly selected Census block groups with stratification based on Hispanic/Latino concentration and the proportion of high/low socioeconomic status. The second sampling stage randomly selected households with stratification from the US Postal Service registries. Both stages oversampled certain strata to increase the likelihood of a selected address yielding a Hispanic/Latino household. After the households were sampled, in-person or telephone contacts were made to screen eligible households and to roster their members. Finally, the study oversampled the 45 to 74 age range to facilitate the examination of target outcomes.

All reported values were weighted to account for the disproportionate selection of the sample and to partially adjust for any bias effects due to differential non-response in the selected sample at the household and person levels. The adjusted weights were also trimmed to limit precision losses due to the variability of the adjusted weights and calibrated to the 2010 Census characteristics by age, sex, and Hispanic/Latino background in each field site's target population. In accordance with our previous cross-sectional study,¹⁸ adjustments for multiple comparisons were not conducted in the current study due to distinct a priori hypotheses and to facilitate comparisons with previous studies. Analyses were performed using Stata Release 17 (StataCorp LLC, College Station, TX) with a significance level of $p < 0.05$. All

reported values were weighted, except for the sample size, which is reported as an unweighted value.

Descriptive statistics were calculated for the target population. Weighted bivariate Pearson's r correlation coefficients were calculated to characterize the degree to which psychosocial factors were related to each other. Survey-weighted adjusted linear regression models were used to evaluate the associations of each psychosocial factor with each cognitive change outcome (verbal learning, verbal memory, WF, DSS, and global cognition separately). The base model (Model 1) was adjusted for age, sex, and education (shown to enable comparisons across studies). The fully adjusted model (Model 2) included additional adjustments for Hispanic/Latino background, annual household income, language preference, and depressive symptoms. Finally, in secondary analyses, all psychosocial factors were entered simultaneously into the fully adjusted regression model to examine which psychosocial variable(s) remained related to cognitive change outcomes regardless of all other psychosocial factors.

3 | RESULTS

3.1 | Sociodemographic characteristics

The mean age at baseline was 56 years (Table 1). More than half (54%) were female, approximately 34% were of Mexican background, followed by 25% of Cuban background, 16% of Puerto Rican background, 12% of Central or South American background, 11% of Dominican background, and 2% of other or more than one background. About one-third (35%) had less than a high school education, and about half (49%) reported an annual household income below or equal to \$20,000. The majority (86%) of the population preferred to be interviewed in Spanish. Only the following psychosocial factors had significant correlations ≥ 0.40 (Table 2): optimism was positively correlated with both purpose in life ($r = 0.51$, $p < 0.001$) and social support ($r = 0.42$, $p < 0.001$), while loneliness and social support were negatively correlated ($r = -0.41$, $p < 0.001$).

3.2 | Associations of each psychosocial factor (baseline z-scores) with 7-year change in each cognitive outcome

3.2.1 | Intrapersonal resources

In the demographically adjusted Model 1, no associations were observed between ethnic identity and change in global cognition or any of the individual cognitive tests (although effect estimates were in the expected positive direction). When additional covariates were added to the fully adjusted Model 2, we observed that greater ethnic identity at baseline was independently protective against 7-year decline (less pronounced change) in global cognition ($\beta = 0.058$, standard error [SE] = 0.028, $p < 0.05$) and memory ($\beta = 0.064$, SE = 0.031, $p < 0.05$). Greater optimism at baseline was protective against a 7-year decline in verbal learning ($\beta = 0.069$, SE = 0.033, $p < 0.05$) and

TABLE 1 Target population characteristics (n = 2155), HCHS/SOL Visit 1.

Characteristics	Percentage (SE) or mean (SD)
Age (years), M	55.9 (7.9)
Female, %	53.7 (1.5)
Hispanic/Latino background, %	
Central or South American	12.4 (1.0)
Cuban	25.0 (2.4)
Dominican	10.6 (1.1)
Mexican	33.6 (2.2)
Puerto Rican	16.2 (1.3)
Other/more than one	2.2 (0.6)
Education, %	
<High school	34.7 (1.6)
High school	20.5 (1.3)
>High school	44.8 (1.7)
Annual household income, %	
≤\$20,000	49.2 (1.8)
\$20,001 to \$50,000	32.7 (1.5)
>\$50,000	10.2 (1.3)
Not reported	7.9 (0.8)
Tested in Spanish, %	86.0 (1.2)
CES-D 10 score, M	7.3 (6.6)
Cognitive outcomes, M	
Δ Global cognition	0.1 (1.0)
Δ Verbal learning	0.1 (1.0)
Δ Memory	0.0 (1.0)
Δ Word fluency	0.1 (1.1)
Δ Digit symbol substitution	0.0 (1.0)

Note: Sample size is unweighted; all other reported values are weighted to represent the target population.

Abbreviations: CES-D, Center for Epidemiologic Study of Depression; M, mean; SD, standard deviation; SE, standard error; Δ, change.

memory ($\beta = 0.111$, SE = 0.030, $p < 0.001$) in Model 1; however, only the association between optimism and change in memory remained statistically significant when the additional covariates were added in Model 2 ($\beta = 0.086$, SE = 0.032, $p < 0.01$). Greater purpose in life at baseline was protective against 7-year decline in global cognition ($\beta = 0.066$, SE = 0.031, $p < 0.05$), verbal learning ($\beta = 0.074$, SE = 0.035, $p < 0.05$), memory ($\beta = 0.076$, SE = 0.031, $p < 0.05$), and WF ($\beta = 0.068$, SE = 0.029, $p < 0.05$) in Model 1. However, upon additional adjustments in Model 2, only the association between purpose in life and change in WF remained statistically significant ($\beta = 0.069$, SE = 0.028, $p < 0.05$). The detailed estimates for all results are outlined in Table 3.

3.2.2 | Interpersonal resources

In Models 1 and 2, greater family cohesion at baseline was associated with decline (more pronounced 7-year change) in DSS (Model 1:

$\beta = -0.070$, SE = 0.032, $p < 0.05$; Model 2: $\beta = -0.080$, SE = 0.030, $p < 0.01$). Additionally, we observed that greater familism at baseline was associated with decline in global cognition ($\beta = -0.069$, SE = 0.031, $p < 0.05$), verbal learning ($\beta = -0.069$, SE = 0.032, $p < 0.05$), and memory ($\beta = -0.063$, SE = 0.031, $p < 0.05$) in Model 2 (but not in Model 1). Familism was not associated with world fluency or DSS. In Models 1 and 2, social network embeddedness was not associated with any of the cognitive outcomes. Greater social support at baseline was protective against decline in verbal learning ($\beta = 0.054$, SE = 0.027, $p < 0.05$) and memory ($\beta = 0.079$, SE = 0.033, $p < 0.05$) in Model 1; however, only the association between social support and memory remained significant in Model 2 ($\beta = 0.070$, SE = 0.033, $p < 0.05$). Social support was not associated with global cognition, WF, or DSS.

3.2.3 | Social stressors

Finally, in terms of social stressors, we observed that greater loneliness at baseline was associated with a more pronounced decline in the memory score regardless of adjustments (Model 1: $\beta = -0.063$, SE = 0.028, $p < 0.05$; Model 2: $\beta = -0.060$, SE = 0.030, $p < 0.05$). Greater subjective social status was protective against decline in DSS performance in Model 1 only ($\beta = 0.068$, SE = 0.030, $p < 0.05$). No other associations between social stressors and cognitive change met the threshold for statistical significance (Table 3).

3.2.4 | Post hoc analysis

Post hoc analyses were conducted to examine the associations of each of the three familism subscales (ie, family obligations, family support, and family as referent) with 7-year changes in verbal learning, memory, WF, DSS, and global cognition. While all estimates were in the same negative direction, the results revealed that only the family as referent subscale (ie, the belief that one's behaviors should be based on familial expectations) was associated with adverse 7-year change in global cognition ($\beta = -0.077$, SE = 0.032, $p < 0.05$), verbal learning ($\beta = -0.076$, SE = 0.032, $p < 0.05$), and memory ($\beta = -0.083$, SE = 0.032, $p < 0.05$) in the fully adjusted Model 2 (Table 4).

3.3 | Associations of all psychosocial factors (baseline z-scores) with 7-year change in each cognitive outcome

In the secondary analyses (Table 5), all psychosocial factors were entered into the fully adjusted model to examine their relationships when considered together with each of the cognitive change outcomes. Approximately half of the significant associations of each psychosocial factor at baseline with cognitive changes observed in the fully adjusted models described above remained significant. More specifically, purpose in life at baseline remained positively associated with 7-year change in WF ($\beta = 0.076$, SE = 0.033, $p < 0.05$); family cohesion

TABLE 2 Mean, standard deviation, range, and bivariate correlations of psychosocial factors ($n = 2155$), HCHS/SOL Visit 1 and sociocultural ancillary study.

Psychosocial factor	M (SD)	Range	1	2	3	4	5	6	7	8	9	10
<i>Intrapersonal Factors</i>												
1. Ethnic identity ^{CR}	3.6 (0.5)	2 to 5	1.00									
2. Optimism	17.2 (3.9)	1 to 24	0.25***	1.00***								
3. Purpose in life	25.2 (3.6)	6 to 30	0.29***	0.51***	1.00							
<i>Interpersonal Factors</i>												
4. Family cohesion ^{CR}	6.9 (1.8)	0 to 8	0.09**	0.27***	0.19***	1.00						
5. Familism ^{CR}	54.2 (6.7)	29 to 70	0.18***	0.02	0.07*	0.13***	1.00					
6. Social network embeddedness	1.7 (1.4)	0 to 7	0.07	0.15***	0.18***	0.16***	-0.04	1.00				
7. Social support	26.0 (6.8)	0 to 36	0.25***	0.42***	0.36***	0.33***	0.05	0.35***	1.00***			
<i>Social Stressors</i>												
8. Ethnic discrimination ^{CR}	24.4 (8.5)	17 to 78	0.05	-0.13***	-0.08**	-0.18***	-0.07*	0.00	-0.14***	1.00***		
9. Loneliness	4.5 (1.7)	3 to 9	-0.03	-0.29***	-0.27***	-0.33***	0.01	-0.27***	-0.41***	0.24***	1.00	
10. Subjective social status	4.2 (1.8)	1 to 10	0.02	0.10***	0.12**	0.03	-0.14***	0.09***	0.12***	0.01	-0.12***	1.00***

Note: ^{CR} = Culturally relevant psychosocial factor. Sample size is unweighted; all other reported values are weighted to represent the target population. Values in bold indicate a correlation coefficient equal or greater than 0.40 in magnitude.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

at baseline remained negatively associated with 7-year change in DSS ($\beta = -0.077$, $SE = 0.033$, $p < 0.05$); familism at baseline remained negatively associated with 7-year change in global cognition ($\beta = -0.080$, $SE = 0.032$, $p < 0.05$), verbal learning ($\beta = -0.079$, $SE = 0.033$, $p < 0.05$), and memory ($\beta = -0.077$, $SE = 0.032$, $p < 0.05$). In contrast, the associations of greater ethnic identity at baseline with 7-year change in global cognition and memory as well as the associations of optimism, social support, and loneliness at baseline with 7-year change in memory no longer met the threshold for significance.

4 | DISCUSSION

This is one of the first studies to assess the associations of a comprehensive battery of psychosocial factors with 7-year cognitive change among a diverse sample of over 2000 middle-aged and older US-based Hispanic/Latino adults. Greater familism (valuing family over individual needs) and a greater score in its family as referent subscale (belief that parents' desires come first) were each associated with a more pronounced 7-year decline in global cognition and tests of verbal memory and learning. In contrast, greater ethnic identity was protective against 7-year decline in global cognition and memory. These results highlight the potential role of familism and ethnic identity as culturally relevant, but understudied, psychosocial factors that should be further considered when addressing healthy cognitive aging in this population. Regarding psychosocial factors that have been more traditionally investigated in the cognitive aging literature, we observed that greater purpose in life was protective against decline in WF, while greater optimism and social support were positively associated (less

pronounced decline), and loneliness was negatively associated (more pronounced decline) with change in verbal memory. Taken together, our results highlight differential associations of psychosocial factors with cognitive change, emphasize the importance of examining both risk and resilient psychosocial factors, and underscore the role of cultural factors on cognitive change in Hispanic/Latino adults.

Our study contributes to the small but growing body of research on the role of psychosocial factors on the cognitive health of middle-aged and older Hispanic/Latino adults. Our findings on the associations of culturally relevant psychosocial factors with selected cognitive outcomes confirm and extend previous research to include familism and ethnic identity.^{14,18} We also show that purpose in life is associated with better executive function in middle-aged and older Hispanic/Latino adults, as seen in older non-Hispanic whites.^{2,4,5} Finally, the observed relationships of greater optimism and social support and lower loneliness with change in memory extend previous reports of the association between greater optimism and lower risk of cognitive impairment,⁴² greater social support and better global cognition,⁷ and loneliness and accelerated global cognitive decline¹⁰ in mostly older non-Hispanic white adults, demonstrating these relationships are also observed when examining memory changes in middle-aged and older Hispanic/Latino adults.

Results on family-related psychosocial factors suggest their nuanced role in cognition for middle-aged and older Hispanic/Latino adults. Our findings on familism suggest that it may be a potential risk factor, not only protective one, as it has been generally considered.⁴³⁻⁴⁶ Notably, the family as referent subscale was largely driving the negative familism-cognition associations, and this subscale did not exhibit a strong or moderate correlation with other familism

TABLE 3 Associations of psychosocial factor (z-scores) at baseline with 7-year change in cognition ($n = 2155$), HCHS/SOL Visit 1, sociocultural ancillary study, and SOL-INCA ancillary study.

	Δ Global cognition	Δ Verbal learning	Δ Memory	Δ Word fluency	Δ DSS
	β (SE)	β (SE)	β (SE)	β (SE)	β (SE)
Intrapersonal Factors					
Ethnic identity ^{CR}					
Model 1	0.052 (0.027)	0.022 (0.027)	0.044 (0.030)	0.049 (0.034)	0.033 (0.028)
Model 2	0.058* (0.028)	0.043 (0.027)	0.064* (0.031)	0.044 (0.036)	0.043 (0.028)
Optimism					
Model 1	0.059 (0.032)	0.069* (0.033)	0.111*** (0.030)	0.019 (0.034)	-0.020 (0.031)
Model 2	0.032 (0.033)	0.029 (0.032)	0.086** (0.032)	0.009 (0.033)	-0.027 (0.033)
Purpose in life					
Model 1	0.066* (0.031)	0.074* (0.035)	0.076* (0.031)	0.068* (0.029)	0.026 (0.026)
Model 2	0.054 (0.030)	0.048 (0.037)	0.059 (0.032)	0.069* (0.028)	0.023 (0.025)
Interpersonal Factors					
Family cohesion ^{CR}					
Model 1	-0.015 (0.033)	0.007 (0.026)	0.040 (0.033)	-0.007 (0.030)	-0.070* (0.032)
Model 2	-0.026 (0.029)	-0.019 (0.024)	0.024 (0.031)	-0.008 (0.029)	-0.080** (0.030)
Familism ^{CR}					
Model 1	-0.033 (0.030)	-0.041 (0.032)	-0.046 (0.029)	-0.006 (0.029)	-0.053 (0.030)
Model 2	-0.069* (0.031)	-0.069* (0.032)	-0.063* (0.031)	-0.027 (0.030)	-0.051 (0.032)
Social network embeddedness					
Model 1	0.018 (0.037)	0.032 (0.030)	0.050 (0.034)	0.037 (0.036)	-0.010 (0.031)
Model 2	0.033 (0.037)	0.030 (0.028)	0.048 (0.035)	0.049 (0.036)	-0.015 (0.031)
Social support					
Model 1	0.041 (0.031)	0.054* (0.027)	0.079* (0.033)	0.028 (0.034)	0.006 (0.025)
Model 2	0.035 (0.031)	0.032 (0.027)	0.070* (0.033)	0.026 (0.035)	-0.001 (0.027)
Social Stressors					
Ethnic discrimination ^{CR}					
Model 1	-0.015 (0.027)	-0.014 (0.030)	-0.002 (0.033)	-0.010 (0.029)	0.004 (0.030)
Model 2	0.018 (0.026)	0.024 (0.031)	0.027 (0.032)	0.011 (0.029)	0.005 (0.029)
Loneliness					
Model 1	0.012 (0.031)	-0.007 (0.029)	-0.063* (0.028)	0.005 (0.033)	0.012 (0.030)
Model 2	0.010 (0.031)	0.015 (0.029)	-0.060* (0.030)	0.002 (0.033)	0.022 (0.031)
Subjective social status					
Model 1	0.016 (0.032)	0.024 (0.035)	0.021 (0.033)	-0.008 (0.028)	0.068* (0.030)
Model 2	0.024 (0.031)	0.015 (0.033)	0.009 (0.032)	-0.000 (0.028)	0.062 (0.032)

Note: ^{CR} = Culturally relevant psychosocial factors. Sample size is unweighted, and all other reported values are weighted to represent the target Hispanic/Latino population. Each psychosocial factor was entered separately into the model with each cognitive outcome. Time in years between cognitive function assessments was included in the calculation of the cognitive function outcome; thus, models are not adjusted for time between assessments. Bolded values denote statistical significance.

Abbreviation: DSS, digit symbol substitution.

Model 1 was adjusted for age, sex, and education. Model 2 was adjusted for Model 1 + Hispanic/Latino background, annual household income, language preference, and depressive symptoms.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

TABLE 4 Associations of each familism subscale (z-scores) at baseline with 7-year changes in cognition ($n = 2155$), HCHS/SOL Visit 1, sociocultural ancillary study, and SOL-INCA ancillary study.

	Δ Global cognition	Δ Verbal learning	Δ Memory	Δ Word fluency	Δ DSS
	β (SE)	β (SE)	β (SE)	β (SE)	β (SE)
Familism subscale					
Family obligations	-0.019 (0.030)	-0.021 (0.030)	-0.005 (0.028)	0.021 (0.032)	-0.036 (0.032)
Family support	-0.064 (0.035)	-0.061 (0.032)	-0.054 (0.033)	-0.036 (0.034)	-0.014 (0.034)
Family as referent	-0.077* (0.032)	-0.076* (0.032)	-0.083* (0.032)	-0.047 (0.033)	-0.058 (0.032)

Note: Sample size is unweighted, and all other reported values are weighted to represent the target Hispanic/Latino population. Time in years between cognitive function assessments was included in the calculation of the cognitive function outcome; thus, models are not adjusted for time between assessments. Bolded values denote statistical significance.

Abbreviation: DSS, digit symbol substitution.

Fully adjusted model included adjustment for age, sex, education, Hispanic/Latino background, annual household income, language preference, and depressive symptoms.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

TABLE 5 Associations of all psychosocial factors (z-scores) at baseline with 7-year change in cognition ($n = 2155$), HCHS/SOL Visit 1, sociocultural ancillary study, and SOL-INCA ancillary study.

		Δ Global cognition	Δ Verbal learning	Δ Memory	Δ Word fluency	Δ DSS
		β (SE)	β (SE)	β (SE)	β (SE)	β (SE)
<i>Intrapersonal factors</i>	Ethnic identity ^{CR}	0.057 (0.030)	0.040 (0.028)	0.052 (0.033)	0.035 (0.037)	0.059 (0.032)
	Optimism	-0.001 (0.040)	-0.001 (0.038)	0.051 (0.039)	-0.034 (0.041)	-0.049 (0.041)
	Purpose in life	0.043 (0.036)	0.042 (0.043)	0.013 (0.038)	0.076* (0.033)	0.036 (0.031)
<i>Interpersonal factors</i>	Family cohesion ^{CR}	-0.029 (0.030)	-0.018 (0.025)	0.003 (0.031)	-0.012 (0.030)	-0.077* (0.033)
	Familism ^{CR}	-0.080* (0.032)	-0.079* (0.033)	-0.077* (0.032)	-0.040 (0.031)	-0.052 (0.033)
	Social network embeddedness	0.026 (0.037)	0.023 (0.028)	0.024 (0.035)	0.044 (0.039)	-0.013 (0.032)
	Social support	0.025 (0.032)	0.027 (0.032)	0.026 (0.035)	0.008 (0.042)	0.022 (0.033)
<i>Social stressors</i>	Ethnic discrimination ^{CR}	0.011 (0.027)	0.019 (0.034)	0.038 (0.033)	0.006 (0.030)	-0.009 (0.030)
	Loneliness	0.023 (0.031)	0.029 (0.029)	-0.039 (0.030)	0.018 (0.036)	0.008 (0.032)
	Subjective social status	0.016 (0.030)	0.007 (0.032)	-0.001 (0.031)	-0.006 (0.028)	0.058 (0.033)

Note: ^{CR} = Culturally relevant psychosocial factors. Sample size is unweighted, and all other reported values are weighted to represent the target Hispanic/Latino population. All psychosocial factors were entered into the same model with each cognitive outcome (separately). Time in years between cognitive function assessments was included in the calculation of the cognitive function outcome; thus, models are not adjusted for time between assessments. Bolded values denote statistical significance.

Abbreviation: DSS, digit symbol substitution.

Fully adjusted model included adjustment for age, sex, education, Hispanic/Latino background, annual household income, language preference, and depressive symptoms.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

subscales (Supplemental Table S1), suggesting that a pronounced sense of family obligation may contribute to the role of familism as a source of stress in family-centered cultures such as the Hispanic/Latino population.⁴⁶ In additional analyses (Supplemental Tables S2 to S4), we observed that greater familism was related to lower annual household income and Spanish-speaking preference. As such, the role of familism as a potential stressor may be particularly relevant in light of the relatively long life expectancy of Hispanic/Latino adults that is often accompanied by socioeconomic adversity.⁴⁷ Our findings on the asso-

ciation between greater family cohesion and adverse change in the DSS test suggest that this measure of perception of the quality of one's family social environment may capture a different dimension of family relations than our familism scale. In fact, the correlation between familism and family cohesion was relatively low. Future research should examine the association between various dimensions of family relations and cognition to better understand the role of familism and family cohesion as potential sources of stressors or resilience in this population.

Our findings on the lack of an association between purpose in life and change in global cognition disagree with previous studies^{2,4,5,48} that reported an association between greater purpose in life and slower global cognitive decline and less perceived cognitive decline in non-Hispanic white and African American adults. Given the limited research on purpose in life and cognition in Hispanic/Latino adults, additional research is needed to confirm our findings and to further elucidate whether a longer follow-up time is needed to observe an association. Potential explanations for the lack of association between purpose in life and global cognition in our study include the existence of a threshold effect whereby purposeful living can yield cognitive benefits in Hispanic/Latino adults and differences in the larger socioeconomic context between our population of interest and non-Hispanic white adults, which may contribute to differential associations between purpose in life and cognition across racial and ethnic groups.⁴⁹

We found no association between cognitive change and social network embeddedness, subjective social status, and ethnic discrimination. Few studies have been conducted on this topic among middle-aged and older adults, making comparisons across studies difficult. The lack of a relationship between social network embeddedness and cognitive outcomes may be because other dimensions of social networks such as relationships quality or contact frequency are more relevant for cognitive aging. Additionally, our results might have varied if the subjective social status measure had asked participants to compare their perceived social position with other Hispanic/Latino adults in their community or country of origin (rather than in comparison to the US). Previous studies suggest that such distinctions are important.⁵⁰ Finally, our null findings on ethnic discrimination and cognitive change may be due to measurement limitations. In previous studies, greater perceived discrimination was linked to poorer cognitive function⁵¹ and faster memory decline⁵² in older African American adults, while neither everyday nor lifetime discrimination was associated with global cognition among older non-Hispanic White, non-Hispanic Black, and Hispanic adults.⁵³ Future studies are needed to clarify the relationship of discrimination (including various forms and acute and chronic exposure) to cognitive change among middle-aged and older Hispanic/Latino adults.

Although the mechanistic pathways underlying psychosocial-cognition associations are beyond the scope of this study, lifestyle factors, cardiovascular health, and inflammatory mechanisms may be involved. For instance, greater social support is linked to healthier lifestyles,⁵⁴ better cardiovascular health,⁵⁵ and lower inflammation,⁵⁶ which in turn have been associated with better cognition.⁵⁷ Lower loneliness may promote engagement in cognitively stimulating activities, which can contribute to lower chronic stress and promote better memory.⁵⁸ Lastly, the protective effect of having greater levels of ethnic identity on cognition may be explained by novel theories of acculturation in context, which seek to understand how sociocultural processes of acculturation contribute to Hispanic/Latino cognitive health outcomes,¹⁴ and by previous work suggesting that ethnic identity is a predictor of psychological well-being that primarily acts by buffering effects of stressors.^{59,60} Additional work is needed to verify

these hypothesized mechanisms and understand how they interact to influence cognitive health.

Our study has several limitations, including potential residual confounding. Our self-reported psychosocial factors were examined at baseline and may have changed over time, but we would argue that many of the processes studied are lifelong, relatively stable constructs in adults.⁶¹ Intersectional social positions across sex, age, race, socioeconomic status, and acculturation may influence the psychosocial-cognition relations we observed. Likewise, each Hispanic/Latino background has a unique history, culture, and health profile that may modify the psychosocial-cognition associations; therefore, the role of these sociodemographic factors should be examined in future studies. The strengths of our study include the large, diverse HCHS/SOL cohort of Hispanic/Latino adults, the probability sampling study design (which extends the generalizability of our results to Hispanics/Latinos living in the target areas), and the 7-year interval between assessments. Moreover, we used robust internal normative data to measure cognitive change considering the time between assessments. Moreover, the cognitive measures used in our study were previously shown to be valid in English and Spanish, and participants could choose either language for cognitive testing.

In summary, we examined the independent relationships of a comprehensive array of well-recognized psychosocial factors with 7-year change in cognitive outcomes within one study, including more traditional (eg, purpose in life and social support) as well as more novel, culturally relevant (ethnic identity, familism, and ethnic discrimination) factors. Our previous cross-sectional study,¹⁸ along with the current longitudinal study, demonstrated that ethnic identity and familism, particularly its family as referent subscale, are each associated with level of and change in global cognition, and social support is associated with level of and change in memory, regardless of socioeconomic characteristics and depressive symptoms. This study could inform future research that tests whether culturally relevant interventions targeting psychosocial factors can improve cognition in middle-aged and older Hispanic/Latino adults. In fact, culturally tailored interventions, such as the Diabetes Education and Empowerment Program,⁶² which incorporate empowerment and ethnic identity themes into modules that promote social support and address family relations, have been effective in providing community-based diabetes prevention education to Hispanic/Latino adults and may be expanded to focus on healthy cognitive aging. In the context of the disproportionate burden of dementia in the fast-growing older segment of the US-based Hispanic/Latino population, coupled with the absence of effective disease-modifying medications, the development of culturally tailored psychosocial interventions to promote healthy cognitive aging is particularly relevant and timely.

ACKNOWLEDGMENTS

The authors would like to thank all the participants and staff of the HCHS/SOL and the SOL-INCA studies for their important contributions and commitment. The HCHS/SOL is a collaborative study supported by contracts from the National Heart, Lung, and Blood Institute (NHLBI) to the University of North Carolina

(HHSN268201300001 / N01-HC-65233), University of Miami (HHSN268201300004 / N01-HC-65234), Albert Einstein College of Medicine (HHSN268201300002 / N01-HC-65235), University of Illinois at Chicago (HHSN268201300003 / N01-HC-65236 Northwestern Univ), and San Diego State University (HHSN268201300005 / N01-HC-65237). The following institutes/centers/offices have contributed to the HCHS/SOL through a transfer of funds to the NHLBI: National Institute on Minority Health and Health Disparities, National Institute on Deafness and Other Communication Disorders, National Institute of Dental and Craniofacial Research, National Institute of Diabetes and Digestive and Kidney Diseases, National Institute of Neurological Disorders and Stroke, National Institutes of Health Office of Dietary Supplements. SOL-INCA received support from the National Institute on Aging (NIA) (R01AG048642). Mayra L. Estrella was supported by the NAI (K01AG075353 and P30AG059305) and National Institute on Minority Health and Health Disparities (L60MD015551).

CONFLICTS OF INTEREST STATEMENT

There are no conflicts of interest to report. Author disclosures are available in the [supporting information](#).

CONSENT STATEMENT

All human subjects provided informed consent to participate in the HCHS/SOL and its SOL-INCA and sociocultural ancillary studies.

ORCID

Mayra L. Estrella  <https://orcid.org/0000-0002-6649-8898>

REFERENCES

- Hemingway H, Marmot M. Evidence based cardiology: psychosocial factors in the aetiology and prognosis of coronary heart disease. Systematic review of prospective cohort studies. *BMJ*. 1999;318(7196):1460-1467.
- Lewis NA, Turiano NA, Payne BR, Hill PL. Purpose in life and cognitive functioning in adulthood. *Neuropsychol Dev Cogn B Aging Neuropsychol Cogn*. 2017;24(6):662-671.
- Boyle PA, Buchman AS, Barnes LL, Bennett DA. Effect of a purpose in life on risk of incident Alzheimer disease and mild cognitive impairment in community-dwelling older persons. *Arch Gen Psychiatry*. 2010;67(3):304-310.
- Wingo AP, Wingo TS, Fan W, et al. Purpose in life is a robust protective factor of reported cognitive decline among late middle-aged adults: the Emory Healthy Aging Study. *J Affect Disord*. 2020;263:310-317.
- Kim G, Shin SH, Scicolone MA, Parmelee P. Purpose in life protects against cognitive decline among older adults. *Am J Geriatr Psychiatry*. 2019;27(6):593-601.
- Kuiper JS, Zuidersma M, Oude Voshaar RC, et al. Social relationships and risk of dementia: a systematic review and meta-analysis of longitudinal cohort studies. *Ageing Res Rev*. 2015;22:39-57.
- Seeman TE, Lusignolo TM, Albert M, Berkman L. Social relationships, social support, and patterns of cognitive aging in healthy, high-functioning older adults: macArthur studies of successful aging. *Health Psychol*. 2001;20(4):243-255.
- Krueger KR, Wilson RS, Kamenetsky JM, Barnes LL, Bienias JL, Bennett DA. Social engagement and cognitive function in old age. *Exp Aging Res*. 2009;35(1):45-60.
- Kats D, Patel MD, Palta P, et al. Social support and cognition in a community-based cohort: the Atherosclerosis Risk in Communities (ARIC) study. *Age Ageing*. 2016;45(4):475-480.
- Donovan NJ, Wu Q, Rentz DM, Sperling RA, Marshall GA, Glymour MM. Loneliness, depression and cognitive function in older U.S. adults. *Int J Geriatr Psychiatry*. 2017;32(5):564-573.
- Boss L, Kang DH, Branson S. Loneliness and cognitive function in the older adult: a systematic review. *Int Psychogeriatr*. 2015;27(4):541-553.
- Vincent GK, Velkoff VA. The next four decades. The older population in the United States: 2010 to 2050. *Population Estimates and Projections US Census Bureau*. <https://www.census.gov/library/publications/2010/demo/p25-1138.html>
- González HM, Tarraf W, Fornage M, et al. A research framework for cognitive aging and Alzheimer's disease among diverse US Latinos: design and implementation of the Hispanic Community Health Study/Study of Latinos-Investigation of Neurocognitive Aging (SOL-INCA). *Alzheimers Dement*. 2019;15(12):1624-1632.
- Lamar M, Barnes LL, Leurgans SE, et al. Acculturation in context: the relationship between acculturation and socioenvironmental factors with level of and change in cognition in older Latinos. *J Gerontol B Psychol Sci Soc Sci*. 2021;76(4):e129-e139.
- Glymour MM, Manly JJ. Lifecourse social conditions and racial and ethnic patterns of cognitive aging. *Neuropsychol Rev*. 2008;18(3):223-254.
- Gallo LC, Penedo FJ, Carnethon M, et al. The hispanic community health study/study of latinos sociocultural ancillary study: sample, design, and procedures. *Ethn Dis*. 2014;24(1):77-83.
- Gallo LC, Matthews KA. Understanding the association between socioeconomic status and physical health: do negative emotions play a role. *Psychol Bull*. 2003;129(1):10-51.
- Estrella ML, Durazo-Arvizu RA, Gallo LC, et al. Psychosocial factors associated with cognitive function among middle-aged and older hispanics/latinos: the Hispanic Community Health Study/Study of Latinos and its Sociocultural Ancillary Study. *J Alzheimers Dis*. 2021;79(1):433-449.
- Shaw AR, Perales-Puchalt J, Valdivieso-Mora E, McGee JL, Vaduvathiryan P, Vidoni ED. Effectiveness of non-pharmaceutical interventions on cognitive function among non-demented African American and Latino older adults in the USA: a scoping review. *Ethn Health*. 2022;27(4):929-945.
- 2023 Alzheimer's disease facts and figures. *Alzheimers Dement*. 2023;19(4):1598-1695.
- Sorlie PD, Avilés-Santa LM, Wassertheil-Smoller S, et al. Design and implementation of the Hispanic Community Health Study/Study of Latinos. *Ann Epidemiol*. 2010;20(8):629-641.
- Lavange LM, Kalsbeek WD, Sorlie PD, et al. Sample design and cohort selection in the Hispanic Community Health Study/Study of Latinos. *Ann Epidemiol*. 2010;20(8):642-649.
- Mijajlović MD, Pavlović A, Brainin M, et al. Post-stroke dementia—a comprehensive review. *BMC Med*. 2017;15(1):11.
- Callahan CM, Unverzagt FW, Hui SL, Perkins AJ, Hendrie HC. Six-item screener to identify cognitive impairment among potential subjects for clinical research. *Med Care*. 2002;40(9):771-781.
- Malcarne VL, Chavira DA, Fernandez S, Liu PJ. The scale of ethnic experience: development and psychometric properties. *J Pers Assess*. 2006;86(2):150-161.
- Scheier MF, Carver CS, Bridges MW. Distinguishing optimism from neuroticism (and trait anxiety, self-mastery, and self-esteem): a reevaluation of the Life Orientation Test. *J Pers Soc Psychol*. 1994;67(6):1063-1078.
- Moos R, Moos B. *Family environment scale manual: development, applications, research—third edition*. 1994.

28. Sabogal F, Marin G, Otero-Sabogal R, Marin BV, Perez-Stable EJ. Hispanic familism and acculturation: what changes and what doesn't? *Hisp J Behav Sci.* 1987;9(4):397-412.
29. Heeler RM. Social ties and susceptibility to the common cold. *JAMA.* 1997;278(15):1231-1232.
30. Cohen S, Mermelstein R. *Social support: theory, research and applications.* Martinus Nijhoff; 1985.
31. Brondolo E, Kelly KP, Coakley V, et al. The perceived ethnic discrimination questionnaire: development and preliminary validation of a community version. *J Appl Soc Psychol.* 2005;35(2):335-365.
32. Hughes ME, Waite LJ, Hawkey LC, Cacioppo JT. A short scale for measuring loneliness in large surveys: results from two population-based studies. *Res Aging.* 2004;26(6):655-672.
33. Adler NE, Boyce T, Chesney MA, et al. Socioeconomic status and health: the challenge of the gradient. *Am Psychol.* 1994;49(1):15-24.
34. Dimitrov DM. Testing for factorial invariance in the context of construct validation. *Meas Eval Couns Dev.* 2010;43(2):121-149.
35. Messick S. Validity of psychological assessment: validation of inferences from persons' responses and performances as scientific inquiry into score meaning. *Am Psychol.* 1995;50(9):741-749.
36. González HM, Tarraf W, Gouskova N, et al. Neurocognitive function among middle-aged and older Hispanic/Latinos: results from the Hispanic Community Health Study/Study of Latinos. *Arch Clin Neuropsychol.* 2015;30(1):68-77.
37. González HM, Mungas D, Reed BR, Marshall S, Haan MN. A new verbal learning and memory test for English- and Spanish-speaking older people. *J Int Neuropsychol Soc.* 2001;7(5):544-555.
38. Lezak M, Howieson DBLD. *Neuropsychological assessment.* 2004.
39. Wechsler D. *WAIS-R Manual.* 1981.
40. Duff K. Evidence-based indicators of neuropsychological change in the individual patient: relevant concepts and methods. *Arch Clin Neuropsychol.* 2012;27(3):248-261.
41. Wassertheil-Smoller S, Arredondo EM, Cai J, et al. Depression, anxiety, antidepressant use, and cardiovascular disease among Hispanic men and women of different national backgrounds: results from the Hispanic Community Health Study/Study of Latinos. *Ann Epidemiol.* 2014;24(11):822-830.
42. Gawronski KA, Kim ES, Langa KM, Kubzansky LD. Dispositional optimism and incidence of cognitive impairment in older adults. *Psychosom Med.* 2016;78(7):819-828.
43. Rinderle S, Montoya D. Hispanic/Latino identity labels: an examination of cultural values and personal experiences. *Howard J Commun.* 2008;19(2):144-164.
44. Losada A, Marquez-Gonzalez M, Knight BG, Yanguas J, Sayegh P, Romero-Moreno R. Psychosocial factors and caregivers' distress: effects of familism and dysfunctional thoughts. *Aging Ment Health.* 2010;14(2):193-202.
45. Campos B, Ullman JB, Aguilera A, Dunkel Schetter C. Familism and psychological health: the intervening role of closeness and social support. *Cultur Divers Ethnic Minor Psychol.* 2014;20(2):191-201.
46. Taylor RJ, Chae DH, Lincoln KD, Chatters LM. Extended family and friendship support networks are both protective and risk factors for major depressive disorder and depressive symptoms among African-Americans and black Caribbeans. *J Nerv Ment Dis.* 2015;203(2):132-140.
47. Balfour PC, Ruiz JM, Talavera GA, Allison MA, Rodriguez CJ, Rodriguez CJ. Cardiovascular disease in Hispanics/Latinos in the United States. *J Lat Psychol.* 2016;4(2):98-113.
48. Wagner M, Guimond AJ, Kubzansky LD, et al. Negative and positive psychosocial factors in relation to cognitive health in older African Americans. *Innov Aging.* 2022;6(3):1-11.
49. Rahmani A, Najand B, Sonnega A, et al. Intersectional effects of race and educational attainment on memory function of middle-aged and older adults with Alzheimer's disease [published online ahead of print, 2022 Dec 28]. *J Racial Ethn Health Disparities.* 2022. [10.1007/s40615-022-01499-w](https://doi.org/10.1007/s40615-022-01499-w)
50. Präg Patrick, Melinda C Mills, Rafael Wittek. Subjective socioeconomic status and health in cross-national comparison. *Soc Sci Med.* 2016;149(2016):84-92.
51. Barnes LL, Lewis TT, Begeny CT, Yu L, Bennett DA, Wilson RS. Perceived discrimination and cognition in older African Americans. *J Int Neuropsychol Soc.* 2012;18(5):856-865.
52. Zahodne LB, Sol KKZ. Psychosocial pathways to racial/ethnic inequalities in late-life memory trajectories. *J Gerontol B Psychol Sci Soc Sci.* 2019;74(3):409-418.
53. Zahodne LB, Sharifian N, Kraal AZ, et al. Socioeconomic and psychosocial mechanisms underlying racial/ethnic disparities in cognition among older adults. *Neuropsychology.* 2021;35(3):265-275.
54. Non AL, Román JC, Clausing ES, et al. Optimism and social support predict healthier adult behaviors despite socially disadvantaged childhoods. *Int J Behav Med.* 2020;27(2):200-212.
55. Kubzansky LD, Huffman JC, Boehm JK, et al. Positive psychological well-being and cardiovascular disease: JACC health promotion series. *J Am Coll Cardiol.* 2018;72(12):1382-1396.
56. Marquine MJ, Gallo LC, Tarraf W, et al. The association of stress, metabolic syndrome, and systemic inflammation with neurocognitive function in the Hispanic Community Health Study/Study of Latinos and Its Sociocultural Ancillary Study. *J Gerontol B Psychol Sci Soc Sci.* 2022;77(5):860-871.
57. González HM, Tarraf W, Gouskova N, et al. Life's simple 7's cardiovascular health metrics are associated with Hispanic/Latino neurocognitive function: hCHS/SOL Results. *J Alzheimers Dis.* 2016;53(3):955-965.
58. Mitchell MB, Cimino CR, Benitez A, et al. Cognitively stimulating activities: effects on cognition across four studies with up to 21 years of longitudinal data. *J Aging Res.* 2012;2012:461592.
59. Molina KM, Estrella ML, Durazo-Arvizu R, et al. Perceived discrimination and physical health-related quality of life: the Hispanic Community Health Study/Study of Latinos (HCHS/SOL) Sociocultural Ancillary Study. *Soc Sci Med.* 2019;222:91-100.
60. Molina KM, Estrella ML, Rivera-Olmedo N, Frisard C, Lemon S, Rosal MC. It weigh(t)s on you: everyday discrimination and adiposity among Latinos. *Obesity.* 2018;26(9):1474-1480.
61. Liu S, Jones RN, Glymour MM. Implications of lifecourse epidemiology for research on determinants of adult disease. *Public Health Rev.* 2010;32(2):489-511.
62. Castillo A, Giachello A, Bates R, et al. Community-based diabetes education for Latinos: the Diabetes Empowerment Education Program. *Diabetes Educ.* 2010;36(4):586-594.

SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

How to cite this article: Estrella ML, Tarraf W, Kuwayama S, et al. Psychosocial factors associated with 7-year change in cognition among middle-aged and older Hispanics/Latinos: The Hispanic Community Health Study/Study of Latinos-Investigation of Neurocognitive Aging (SOL-INCA) and Sociocultural ancillary studies. *Alzheimer's Dement.* 2024;20:1137-1148. <https://doi.org/10.1002/alz.13527>