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RESEARCH ARTICLE

Occupational complexity and cognitive function among United States Hispanic/Latino adults: Results from the Health and Aging Brain Study–Health Disparities (HABS-HD)

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Abstract

INTRODUCTION: Greater occupational complexity is associated with better cognition, but whether this relationship holds among US Hispanic/Latino adults is unclear.

METHODS: Using multiple linear regression, this cross-sectional study examined the associations between occupational complexity and cognitive outcomes among 1231 US Hispanic/Latino adults. We tested for effect modification by employment status, English language proficiency, and sex.

RESULTS: Greater occupational complexity was associated with higher Spanish–English Verbal Learning Test (SEVLT)-Recall and SEVLT-Sum scores among employed adults, and with lower scores among retired adults ($\beta_{\text{SEVLT-Recall}} = -0.025$; 95% confidence interval [CI] = −0.050, 0.000 and $\beta_{\text{SEVLT-Sum}} = -0.018$; 95% CI = −0.042, 0.005; $P_{\text{Interaction}} \leq 0.05$), and with higher Digit Span scores among those who were English language proficient ($\beta = 0.035$; 95% CI = 0.013, 0.057), and with lower scores among those who were not English language proficient ($\beta = -0.011$; 95% CI = −0.033, 0.011; $P_{\text{Interaction}} < 0.01$).

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DISCUSSION: The association between occupational complexity and cognition varies by employment status and English language proficiency among US Hispanic/Latino adults, highlighting the importance of sociocultural and contextual factors in shaping cognitive aging.

KEYWORDS
aging, cognition, cognitive reserve, employment, Hispanic/Latino health, occupation, occupational complexity, retirement

Highlights

- Occupational complexity was not associated with cognition overall.
- Employment status modified links between occupational complexity and memory.
- English proficiency conditioned associations with working memory performance.
- Cognitive reserve benefits may depend on sociocultural context.

1 | BACKGROUND

Alzheimer's disease (AD) impacts over seven million US adults aged ≥ 65 years[1] as well as their families and caregivers. Additionally, AD and related dementias (ADRD) place a substantial strain on the health-care system with estimated costs reaching $300 billion annually.[2] As the US population aged ≥ 65 years is expected to triple by 2060,[3] the number of individuals living with AD will rise to 13.8 million,[4] with associated annual medical care costs surpassing one trillion dollars by 2060.[2] Importantly, the burden of ADRD is not distributed equally. Older US Hispanic/Latino adults are one and one-half times as likely to be diagnosed with dementia than older non-Hispanic White adults.[5] This disparity stems from multiple factors including a higher burden of adverse social determinants of health among US Hispanic/Latino adults, who remain relatively understudied.

Occupation is one important social determinant of health, as it influences the level of cognitive stimulation and access to higher wages, flexible work conditions, and employer-sponsored health insurance. However, historical and structural factors have led to unequal access to these occupational advantages[6] and today, US Hispanic/Latino adults are overrepresented in low-wage and physically demanding occupations compared to non-Hispanic White adults, particularly among recent immigrants.[7] Since the 1970s, occupational complexity, defined as the level of cognitive demands embedded in work-related activities, has been hypothesized to be an important factor influencing cognitive health in older age.[8] Additionally, occupational complexity has been proposed as a proxy for cognitive reserve, which may delay the clinical expression of AD.[9] However, little is known about how occupational complexity relates to cognitive function within Hispanic/Latino adults in the United States.[10]

Furthermore, although studies have examined moderators of the association between occupational complexity and cognition, few have done so among US Hispanic/Latino adults. Being retired may lead to a lack of mentally challenging activities which may exacerbate the loss of cognitive function[11], whereas being employed may provide continued opportunities for cognitive stimulation, social interaction, and economic resources.[12] Similarly, English language proficiency may influence the types of jobs an individual can successfully perform and is known to influence cognitive performance in US Hispanic/Latino adults.[13] However, the role of English language proficiency within the context of occupational complexity and cognition has not been examined in this population. In addition to race and ethnicity, inequalities in the labor market are also shaped by sex.[6] Sex differences have also been reported in cognitive function among middle aged to older US Hispanic/Latino adults, with women outperforming men in verbal processing speed tests[13], suggesting the importance of considering sex when examining cognitive correlates in the US Hispanic/Latino population.

To address these gaps in the existing literature, this study examined the association between occupational complexity and cognitive function among predominantly middle aged and older US Hispanic/Latino adults, most notably Mexican Americans in Texas, from the Health and Aging Brain Study–Health Disparities (HABS-HD). We also examined the moderating roles of employment status (employed versus retired), English language proficiency (proficient versus not proficient), and sex (female versus male) on the association between occupational complexity and cognitive function. We hypothesized that high occupational complexity would be associated with better cognitive function, particularly among those who were currently employed, among those who were English language proficient, and among women.

2 | METHODS

This cross-sectional study used baseline data from the Health and Aging Brain Study–Health Disparities (HABS-HD), an ongoing community-based study of the biological, social, and environmental factors that impact brain aging among diverse communities living in Texas. Details of the HABS-HD have been previously published.[14] In brief, since 2017, HABS-HD has recruited adults ≥ 50 years of age

RESEARCH IN CONTEXT

1. **Systematic review**: We reviewed prior epidemiologic and neuropsychological studies examining occupational complexity and its association with late-life cognition and dementia risk. Most evidence comes from predominantly non-Hispanic White populations or international populations, with limited and mixed findings among US Hispanic/Latino adults, and little attention to sociocultural modifiers such as employment status or language proficiency.
2. **Interpretation**: In this study of US Hispanic/Latino adults, occupational complexity was not associated with cognition overall, but its association with episodic and working memory differed by employment status and English language proficiency. These findings extend prior work by demonstrating that cognitive reserve benefits may not be uniform and may depend on continued cognitive engagement and sociolinguistic context, offering insight into heterogeneity in dementia-relevant cognitive aging.
3. **Future directions**: Future studies should examine longitudinal cognitive change and dementia incidence, and evaluate how retirement timing, bilingualism, and occupational exposures interact to influence cognitive reserve across diverse populations.

who self-identify as Hispanic/Latino, non-Hispanic White, or Black. At enrollment all participants completed an interview and underwent neuropsychological testing, clinical laboratory blood work, and other assessments. All aspects of the HABS-HD study protocol were conducted in Spanish or English according to participant preference. The current study included the 1231 HABS-HD participants enrolled as of January 2024 (Data Release 5) who self-identified as Hispanic or Latino, with the majority of these (96%) self-identifying as Mexican American.

Written informed consent was obtained from all study participants prior to data collection. The HABS-HD was approved by the University of North Texas Health Science Center Institutional Review Board.

2.1 | Cognitive function

Cognitive function at baseline was assessed using a battery of neuropsychological tests including a measure of global cognitive status (the Mini-Mental State Examination [MMSE]);[15] measures of attention and executive function (the Wechsler Memory Scale-III Digit Span[16], Trail Making Test Parts A and B[17], Digit Symbol Substitution[18]); measures of episodic learning and memory (the Spanish-English Verbal Learning Test [SEVLT-Sum and SEVLT-Recall][19] and Wechsler Memory Scale-III Logical Memory I and II);[16] and measures of language fluency (semantic [animals] and letter [FAS] fluency).[18] Raw scores from each test were converted to *z* scores that were adjusted for age (stratified by ≤ 65 or ≥ 66 years), education (stratified by 0 to 7, 8 to 12, and ≥ 13 years) and primary language (English or Spanish).

2.2 | Occupational complexity

At enrollment, participants were asked if they were retired. If so, they were asked to report their primary occupation while they were working, and if not, they were asked to report their current occupation or whether they were unemployed or disabled. Occupational complexity was defined by matching occupational titles to occupations listed in the Dictionary of Occupational Titles (DOT)[20], a catalog of occupations used in the United States from 1939 to 1977. DOT 4th Edition was first published in 1977 and updated in 1991 and includes > 12,000 occupations that were rated based on observations by job analysts. The DOT classifies occupations based on a 9-digit code with the fourth, fifth, and sixth digits being the Worker Functions ratings and representing occupational complexity with data, people, and things, respectively (e.g., 092.227–010, primary school teacher). In this classification, the most complex jobs are coded "0." The scores for each Worker Function were reverse coded and summed to create a continuous index ranging from 0 to 21 with higher scores indicating greater occupational complexity across the three categories.

2.3 | Covariates

Covariates with the potential to confound the association between occupational complexity and cognitive function or that were a priori considered effect modifiers were assessed by self-report and included: age (continuous in years); sex (female or male); education (less than high school, high school, or college); English language proficiency (yes or no, defined by whether English was the primary or secondary language and the participant could read and write in English); physical activity, assessed using the Rapid Assessment of Physical Activity[21] (inactive [RAPA < 6] or active [RAPA≥ 6]); smoking status (never, former, or current smoker); body mass index (BMI, < 25.0, 25–29.9, or ≥ 30 kg/m^2); and history of diabetes (yes or no), hypertension (yes or no), and dyslipidemia (yes or no).

2.4 | Statistical analysis

We characterized the study population using means and medians for continuous variables and frequencies for categorical variables, overall and by occupational status (unemployed, employed, or retired) and occupational complexity categorized at the score range midpoint (≤ 10, low complexity or > 10, high complexity). We used multiple linear regression to examine the associations (Betas [βs] and 95% confidence intervals [CIs]) between the continuous measure of occupational complexity and each neuropsychological test *z* score. We examined effect

measure modification by retirement status (employed or retired only as occupational complexity was not calculated for those who were unemployed or disabled), by English language proficiency (English language proficient or not English language proficient), and by sex (female or male). In separate fully adjusted multiple linear regression models, we tested the multiplicative interactions ($P_{Interaction}$) between occupational complexity and retirement status, English language proficiency, or sex. In sensitivity analyses, we restricted our analysis to those who self-identified as Mexican American ($n = 1184$) to determine the impact of including US Hispanic/Latino adults of Puerto Rican origin ($n = 10$), Cuban origin ($n = 2$), and those from other countries ($n = 35$).

3 | RESULTS

The descriptive characteristics of the 1231 participants included in this study are reported in Table 1. The median (interquartile range [IQR]) age of the study participants was 62 (57, 69) years overall, 57 (54, 62) years among those currently employed, and 68 (65, 73) years among those who were retired. Most participants were female (67%), Mexican American (96%), and had a high school education or greater (57%). Approximately half (52%) were English language proficient. More than one third (35%) had diabetes, ≈ two thirds (63%) had hypertension, and close to three quarters (73%) had dyslipidemia. The mean ± standard deviation occupational complexity scores were 6.4 ± 4.2 for all participants overall and 3.9 ± 3.8 among those who were unemployed or disabled, 6.4 ± 4.4 among those who were employed, and 6.6 ± 4.1 among those who were retired. Among those who were currently employed ($n = 486$), 27% had high complexity occupations (e.g., attorney, business owner, school counselor, electrical engineer, social worker, or accountant) and 73% had low complexity occupations (e.g., custodian, construction worker, housekeeper, cafeteria worker, factory worker, or machine operator). Among those who were retired ($n = 503$), 15% had high complexity occupations and 85% had low complexity occupations. Compared to those who had low complexity occupations, those who had high complexity occupations were more likely to have a college education and were more likely to be English language proficient.

As shown in Table 2, in the overall sample, occupational complexity was not associated with any of the cognitive tests with estimates ranging from −0.007 (95% CI = −0.024, 0.011) for Trails A to 0.012 (95% CI = −0.004, 0.027) for Digit Span. However, we observed statistically significant effect measure modification by employment status (Table 3) and English language proficiency (Table 4). Greater occupational complexity was significantly associated with higher SEVLT-Sum ($\beta = 0.020$; 95% CI = 0.000, 0.039) and SEVLT-Recall ($\beta = 0.025$; 95% CI = 0.005, 0.045) scores among those who were currently employed. Among those who were retired, there was a significant negative association between SEVLT-Recall ($\beta = -0.025$; 95% CI = −0.050, 0.000) scores and occupational complexity ($P_{Interactions} \leq 0.01$). Greater occupational complexity was significantly associated with higher Digit Span scores ($\beta = 0.035$; 95% CI = 0.013, 0.057) among those who were English language proficient but not among those who were not English language proficient ($P_{Interactions} \leq 0.01$). Sex did not modify the associations between occupational complexity and cognitive function (Table S1 in supporting information), and results were nearly identical when we restricted our analysis of occupational complexity and cognitive function to those who self-identified as Mexican American (Table S2 in supporting information).

4 | DISCUSSION

We examined the association between occupational complexity and cognitive function scores among middle aged and older US Hispanic/Latino adults (96% Mexican American) living in Texas. While occupational complexity was not associated with cognitive scores in the overall sample, we found that the association between occupational complexity and cognitive performance varied by employment status and English language proficiency. Specifically, greater occupational complexity was associated with higher scores on tests of verbal learning and memory, but only among those who were currently employed, whereas a weak inverse association with delayed recall was observed among those who were retired. These findings suggest that the cognitive benefits of occupational complexity may depend on continued engagement in cognitively demanding activities, with potential attenuation or reversal after retirement.

Prior studies among Hispanic/Latino adults living in Latin America (namely, Mexico, Argentina, and Panama) have consistently reported positive associations between occupational complexity and higher cognitive performance and later life cognitive function.[22–25] These findings contrast with our results reported here among the sample overall in which we found that occupational complexity was not associated with cognitive function, suggesting that these associations may be influenced by sociocultural factors and other contexts such as migration history, country of origin, and structural inequalities. Most studies of occupational complexity and cognition examining effect measure modification have focused on differences by sex and education attainment. Consistent with most[26–30], but not all[23] studies that examined sex as a modifier, we observed no differences by sex. However, it is important to note that we did not code occupational complexity for unpaid domestic labor including homemaking as well as for students, and military personnel (unless a specific occupational title was specified), for consistency with previous studies that have used the job complexity rating systems which have been developed largely on work for pay. Given emerging literature highlighting that unpaid domestic labor involves substantial cognitive load and may influence cognitive aging trajectories[31], our results may underestimate the association between occupational complexity and cognitive function, particularly among women. This is a substantive conceptual limitation and not only a technical one as women made up two thirds of our sample, and many women in this generation may have spent much of their adult lives in unpaid household management, child care, and elder care, or in informal or intermittent paid work, activities that require planning, problem solving, and social coordination but are not rated by the DOT. As a result, women's lifetime cognitive engagement is likely under-

TABLE 1 Baseline characteristics of Hispanic/Latino HABS-HD participants, overall and by employment status and occupational complexity ($n = 1231$).

Characteristic	Overall *n* (column %)	Employment status and occupational complexity[a]				
		Unemployed	Employed		Retired	
			Low complexity	High complexity	Low complexity	High complexity
		n (column %)	*n* (column %)	*n* (column %)	*n* (column %)	*n* (column %)
n	1231 (100)	215 (100)	378 (100)	108 (100)	426 (100)	77 (100)
Age in years, median [IQR]	62 [57, 69]	59 [55, 64]	57 [54, 62]	59 [54, 63]	68 [65, 72]	69 [63, 74]
Sex						
Female	824 (67)	196 (91)	235 (62)	62 (57)	258 (61)	50 (65)
Male	407 (33)	19 (9)	143 (38)	46 (43)	168 (39)	27 (35)
Hispanic/Latino heritage						
Mexican American	1,184 (96)	209 (97)	358 (95)	105 (97)	414 (97)	73 (95)
Other	47 (4)	6 (3)	20 (5)	3 (3)	12 (3)	4 (5)
Education						
Less than high school	533 (43)	137 (64)	141 (38)	27 (25)	198 (47)	14 (18)
High school	516 (42)	66 (31)	186 (50)	48 (44)	170 (40)	39 (51)
College	179 (15)	12 (6)	49 (13)	33 (31)	58 (14)	23 (30)
English language proficiency						
Yes	633 (52)	63 (29)	192 (51)	68 (63)	247 (58)	54 (70)
No	595 (48)	151 (71)	185 (49)	40 (37)	178 (42)	23 (30)
Physical activity[b]						
RAPA ≥ 6	314 (26)	43 (20)	113 (30)	32 (30)	90 (21)	28 (36)
RAPA < 6	914 (74)	172 (80)	265 (70)	76 (70)	334 (79)	49 (64)
Smoking status						
Never smoker	732 (60)	141 (66)	220 (58)	68 (63)	237 (56)	45 (58)
Former smoker	404 (33)	57 (27)	125 (33)	30 (28)	160 (38)	27 (35)
Current smoker	93 (8)	17 (8)	32 (9)	10 (9)	29 (7)	5 (7)
Body mass index in kg/m^2						
<25.0	164 (13)	20 (9)	58 (15)	9 (8)	62 (15)	10 (13)
25.0–29.9	456 (37)	71 (33)	144 (38)	46 (43)	162 (38)	28 (37)
≥30.0	605 (49)	123 (58)	175 (46)	53 (49)	200 (47)	37 (49)
Mean ± SD	30.9 ± 6.1	31.8 ± 5.9	30.7 ± 6.3	31.0 ± 5.4	30.5 ± 5.9	31.3 ± 7.7
Diabetes						
Yes	431 (35)	90 (42)	100 (27)	25 (23)	182 (43)	22 (29)
No	800 (65)	125 (58)	278 (74)	83 (77)	244 (57)	55 (71)
Hypertension						
Yes	781 (63)	140 (65)	194 (51)	64 (59)	314 (74)	50 (65)
No	450 (37)	75 (35)	184 (49)	44 (41)	112 (26)	27 (35)
Dyslipidemia						
Yes	903 (73)	160 (74)	263 (70)	76 (70)	323 (76)	58 (75)
No	328 (27)	55 (26)	115 (30)	32 (30)	103 (24)	19 (25)

[a]Occupational complexity was defined using the 9-digit DOT occupational codes with the fourth, fifth, and sixth digits being the Worker Functions ratings and representing occupational complexity with data, people, and things, respectively. The scores for each Worker Function were reverse coded and summed to create a continuous index ranging from 0 to 21 with higher scores indicating greater occupational complexity across the three categories. Occupational complexity was categorized at the score range midpoint (≤10, low complexity or > 10, high complexity).

[b]Physical activity was assessed using the RAPA and categorized as inactive (RAPA < 6) or active (RAPA≥6).

Abbreviations: DOT, Dictionary of Occupational Titles; HABS-HD, Health and Aging Brain Study–Health Disparities; IQR, interquartile range; RAPA, Rapid Assessment of Physical Activity; SD, standard deviation.

TABLE 2 Associations between occupational complexity and cognitive function among Hispanic/Latino HABS-HD participants ($n = 1231$).

	Mean ± SD	β (95% CI)[a]	p
MMSE	26.0 ± 3.8	0.002 (−0.011, 0.014)	0.78
SEVLT-Sum	29.1 ± 8.4	0.004 (−0.011, 0.019)	0.63
SEVLT-Recall	7.0 ± 3.4	0.003 (−0.013, 0.019)	0.68
LM1	31.0 ± 10.7	−0.002 (−0.018, 0.014)	0.78
LM2	18.6 ± 8.1	−0.005 (−0.021, 0.011)	0.52
Digit Span	11.5 ± 3.6	0.012 (−0.004, 0.027)	0.14
Trails A	49.6 ± 28.7	−0.007 (−0.024, 0.011)	0.46
Trails B	154.9 ± 91.9	0.006 (−0.016, 0.028)	0.59
FAS	27.9 ± 11.1	−0.002 (−0.018, 0.014)	0.82
Animal Naming	16.6 ± 4.9	0.003 (−0.012, 0.018)	0.70
DSS	36.0 ± 13.4	0.002 (−0.014, 0.018)	0.82

[a]Models included the continuous measure of occupational complexity and were adjusted for age, sex, education, smoking status, body mass index, physical activity, hypertension, dyslipidemia, English language proficiency, and employment status.

Abbreviations: CI, confidence interval; DSS, Digit Symbol Substitution; HABS-HD, Health and Aging Brain Study–Health Disparities; LM, Logical Memory; MMSE, Mini-Mental State Examination; SD, standard deviation; SEVLT, Spanish–English Verbal Learning Test.

estimated, which may have attenuated associations among women and limited our ability to detect sex differences. Our null findings by sex should therefore not be interpreted as evidence that occupational and domestic experiences are unrelated to cognition among women.

Studies focused on older adults have generally combined those who are currently employed with those who retired rather than stratifying by current occupational status. In our study, greater occupational complexity was positively associated with episodic learning and memory performance among employed participants who were younger on average, and weakly inversely associated with delayed recall among retired participants who were older on average. These findings should be interpreted with caution and as hypothesis generating rather than as evidence of a detrimental effect of prior occupational complexity after retirement because the cross-sectional design cannot separate the effects of retirement from those of aging, birth cohort, or reverse causation, and residual confounding is possible given the age difference between groups. Additionally, selection processes may differ between groups with employed participants potentially representing a healthier subset of workers (i.e., healthy worker effect), whereas retirees may have left the workforce for health-related reasons or because of early cognitive change (i.e., selection into retirement). These processes could distort the association between prior occupational complexity and current cognition, in either direction. Similar to our findings, studies analyzing employment status as a modifier have found that the protective effect of higher occupational complexity on cognitive decline was only observed in participants who were currently employed.[28,32] A recently published longitudinal study using data from the Health and Retirement Study found that retirement was associated with accelerated cognitive decline for individuals working in low complexity jobs, but not for those who retired from a job with higher occupational complexity.[33] However, it is unclear whether the findings from Carr et al.[33] are generalizable to US Hispanic/Latino adults.

To our knowledge, ours is the first study to consider whether English language proficiency modified the association between occupational complexity and cognition in US Hispanic/Latino adults. We found that greater occupational complexity was associated with higher working memory scores among those who were English language proficient but with lower working memory scores among those who were not English language proficient. Consistent with this finding, in the Hispanic Community Health Study Investigation of Neurocognitive Aging, a community-based multisite study of US Hispanic/Latino adults, participants who were English language proficient at baseline had better performance on measures of verbal fluency and working memory at a 7-year follow-up assessment.[34] This may be partially explained by the fact that processing speed, attention, and working memory are needed for individuals who are bilingual to efficiently manage the use of both languages in daily life.[35] Similarly, those in occupationally complex jobs may have more opportunity to practice these cognitive skills that ultimately support cognitive functioning. Importantly, English language proficiency is an indicator of differential exposure to sociocultural factors that can impact cognitive function such as socioeconomic status, migration history, employment, access to health care and education, and acculturation[36–38], which may further explain why occupational complexity was associated with better working memory performance among English language proficient adults.

The cognitive reserve hypothesis[9] is commonly cited to explain the link between occupational complexity and cognitive performance. This hypothesis proposes that lifetime experiences such as engaging in intellectually demanding occupations can build cognitive reserve, a form of resilience that enhances brain structure, function, and the efficiency of neural networks. This enriched reserve allows individuals to better compensate for age-related changes or neuropathology, thereby maintaining cognitive function for a longer period despite accumulating brain damage.[9] Fujishiro et al. argue that the degree to which occupational complexity may impact cognitive reserve differs by racial group because different ethnic and racial groups may not have the same opportunities to engage in complex jobs that enhance cognitive reserve, despite higher education achievement.[39] Others[40] have proposed alternative hypotheses such as the environmental and occupational complexity hypothesis, which posits that cognitively stimulating environments motivate individuals to develop their cognitive capacities, but the benefits in cognitive capacities may be attenuated or even lost when mental activities are not continued after retirement. Our results of modification by occupational status are in line with, but do not test, the environmental and occupational complexity hypothesis, which others have attributed to reflecting loss of social support after retirement or increased psychological distress as a response to being more socially and psychologically attached to more complex and prestigious jobs.[41] Of particular relevance to Hispanic/Latino adults in the United States is the minority stress framework[42], which may offer another lens for further interpreting these associations. Although

TABLE 3 Associations between occupational complexity and cognitive function by employment status.

Employment status	Employed		Retired		
	β (95% CI)[a]	p	β (95% CI)[a]	p	$P_{Interaction}$
MMSE	0.003 (−0.013, 0.018)	0.72	0.000 (−0.021, 0.021)	0.99	0.40
SEVLT-Sum	0.020 (0.000, 0.039)	0.05	−0.018 (−0.042, 0.005)	0.13	0.01
SEVLT-Recall	0.025 (0.005, 0.045)	0.02	−0.025 (−0.050, 0.000)	0.05	< 0.01
LM1	0.000 (−0.021, 0.021)	0.98	−0.007 (−0.032, 0.017)	0.56	0.88
LM2	−0.002 (−0.023, 0.018)	0.83	−0.011 (−0.036, 0.014)	0.38	0.61
Digit Span	0.018 (−0.003, 0.040)	0.10	0.000 (−0.024, 0.024)	0.99	0.24
Trails A	0.006 (−0.017, 0.029)	0.60	−0.024 (−0.051, 0.004)	0.09	0.14
Trails B	−0.004 (−0.034, 0.027)	0.81	0.018 (−0.016, 0.052)	0.30	0.33
FAS	0.002 (−0.020, 0.024)	0.85	−0.010 (−0.034, 0.013)	0.39	0.78
Animal Naming	0.002 (−0.018, 0.022)	0.86	−0.002 (−0.026, 0.022)	0.89	0.72
DSS	0.008 (−0.013, 0.029)	0.46	−0.007 (−0.032, 0.018)	0.59	0.23

[a]Models included the continuous measure of occupational complexity and were adjusted for age, sex, education, smoking status, body mass index, physical activity, hypertension, dyslipidemia, and English language proficiency.
Abbreviations: CI, confidence interval; DSS, Digit Symbol Substitution; HABS-HD, Health and Aging Brain Study–Health Disparities; LM, Logical Memory; MMSE, Mini-Mental State Examination; SEVLT, Spanish–English Verbal Learning Test.

TABLE 4 Associations between occupational complexity and cognitive function by English language proficiency.

	English language proficient		Not English language proficient		
	β (95% CI)[a]	p	β (95% CI)[a]	p	$P_{Interaction}$
MMSE	0.004 (−0.009, 0.018)	0.52	−0.005 (−0.027, 0.018)	0.69	0.39
SEVLT-Sum	0.011 (−0.010, 0.033)	0.29	−0.004 (−0.025, 0.018)	0.74	0.22
SEVLT-Recall	0.006 (−0.016, 0.029)	0.58	0.000 (−0.023, 0.022)	0.98	0.33
LM1	0.000 (−0.022, 0.022)	0.99	−0.004 (−0.026, 0.019)	0.76	0.62
LM2	−0.003 (−0.025, 0.020)	0.82	−0.006 (−0.029, 0.016)	0.58	0.66
Digit Span	0.035 (0.013, 0.057)	< 0.01	−0.011 (−0.033, 0.011)	0.33	< 0.01
Trails A	−0.002 (−0.024, 0.020)	0.86	−0.012 (−0.040, 0.017)	0.43	0.69
Trails B	0.019 (−0.010, 0.048)	0.20	−0.003 (−0.038, 0.031)	0.85	0.59
FAS	−0.003 (−0.026, 0.020)	0.78	0.002 (−0.020, 0.024)	0.87	0.93
Animal Naming	0.014 (−0.007, 0.035)	0.20	−0.007 (−0.030, 0.016)	0.55	0.06
DSS	0.009 (−0.013, 0.031)	0.43	−0.005 (−0.029, 0.018)	0.65	0.35

[a]Models included the continuous measure of occupational complexity and were adjusted for age, sex, education, smoking status, body mass index, physical activity, hypertension, dyslipidemia, and employment status.
Abbreviations: CI, confidence interval; DSS, Digit Symbol Substitution; HABS-HD, Health and Aging Brain Study–Health Disparities; LM, Logical Memory; MMSE, Mini-Mental State Examination; SEVLT, Spanish–English Verbal Learning Test.

higher occupational complexity is hypothesized to promote cognitive capacities (i.e., the cognitive reserve hypothesis), being employed in low complexity occupations, which is common among Hispanic/Latino adults living in the United States[7], may reflect challenges associated with resource deprivation including increased stress associated with work demands or pressures that are perceived to be challenging. Fujishiro et al. found that the degree to which occupational complexity supports cognitive reserve may not be equal across race and sex subgroups[39], further highlighting the need for analyses to account for social determinants of health that may impact how occupational complexity affects individuals across the lifetime.

This study has several notable strengths including a large sample of community-dwelling US Hispanic/Latino adults from a relatively homogeneous background and geographical location, which allowed us to examine unique moderators such as English language proficiency. Moreover, we used a robust battery of neuropsychological tests which enabled us to examine tests within multiple cognitive domains including learning, memory, and executive function, and detailed data on occupations allowed us to operationalize and quantify occupational complexity. However, several limitations should be noted. First, the cross-sectional design of this study limits our ability to make inferences about causality and evaluate whether occupational complexity is asso-

ciated with trajectories of cognition over time. This cross-sectional design also pooled data over 7 years, during which employment and health contexts may have changed, particularly in relation to the COVID-19 pandemic. Although neuropsychological testing procedures were standardized across the enrollment window, we cannot rule out period effects on employment status, health, or test performance. Second, although this study leverages data from a relatively large sample of US Hispanic/Latino adults, our stratified analyses may have been underpowered to detect an association, although we did detect significant interactions. Third, although our approach to quantifying occupational complexity, which relied on the DOT occupational titles, is consistent with many of the previous studies conducted on the topic, people with the same occupations may exert different intellectual effort, which would lead to exposure misclassification. Last, most of the sample of US Hispanic/Latino adults included in this study self-identified as Mexican or Mexican American, limiting the generalizability of our findings. For example, our results reported here may not be generalizable to Hispanic/Latino populations residing in Latin America who may have occupational experiences that differ substantially from those residing in the United States. Despite these limitations, our study offers preliminary evidence of the importance of occupational complexity for cognitive function among US Hispanic/Latino adults particularly within specific subgroups including those who are currently employed and among those who are English language proficient.

5 | CONCLUSION

Using data from a community-based sample of middle and older aged predominantly Mexican American US Hispanic/Latino adults in Texas, we examined the cross-sectional associations between occupational complexity and cognitive function among HABS-HD participants overall and by occupational status, English language proficiency, and sex. While occupational complexity was not associated with cognition overall, we observed significant effect modification by occupational status and English language proficiency, whereby greater occupational complexity was associated with higher verbal learning and memory scores among those who were currently employed, but with null or weakly inverse associations among those who were retired and with higher working memory scores among those who were English language proficient, but not among those who were not. Given the disparities in the prevalence of dementia among US Hispanic/Latino adults[43], future studies should continue to examine whether and how occupation and other social determinants of health influence cognition and brain health in the aging US Hispanic/Latino population including approaches that capture the cognitive demands of unpaid domestic and caregiving labor, which standard occupational complexity measures do not reflect.

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CONFLICT OF INTEREST STATEMENT

The authors declare they have no conflicts of interest. Author disclosures are available in the Supporting Information.

CONSENT STATEMENT

Written informed consent was obtained from all study participants prior to data collection. The HABS-HD was approved by the University of North Texas Health Science Center Institutional Review Board.

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REFERENCES

1. Alzheimer's Association. *2025 Alzheimer's Disease Facts and Figures*. vol. 21. Alzheimer's Association; 2025.
2. Nandi A, Counts N, Bröker J, et al. Cost of care for Alzheimer's disease and related dementias in the United States: 2016 to 2060. *Npj Aging* 2024;10:1-8. doi:10.1038/s41514-024-00136-6
3. US Census Bureau. 2023 National Population Projections Tables: main Series. United States Census Bureau 2025. 2025. https://www.census.gov/data/tables/2023/demo/popproj/2023-summary-tables.html
4. Rajan KB, Weuve J, Barnes LL, McAninch EA, Wilson RS, Evans DA, Population estimate of people with clinical Alzheimer's disease and mild cognitive impairment in the United States (2020-2060). *Alzheimers Dement* 2021;17:1966-1975. doi:10.1002/alz.12362
5. Alzheimer's Association. 2025 Alzheimer's disease facts and figures. *Alzheimer's Dementia* 2025;21:e70235.
6. del Río C, Alonso-Villar O, The evolution of occupational segregation in the United States, 1940-2010: gains and losses of gender–race/ethnicity groups. *Demography* 2015;52:967-988. doi:10.1007/s13524-015-0390-5
7. Stanbury M, Rosenman KD, Occupational health disparities: a state public health-based approach. *Am J Ind Med* 2014;57:596-604. doi:10.1002/ajim.22292
8. Kohn ML, Schooler C, The reciprocal effects of the substantive complexity of work and intellectual flexibility: a longitudinal assessment. *Am J Sociol* 1978;84:24-52. doi:10.1086/226739
9. Stern Y, What is cognitive reserve? Theory and research application of the reserve concept. *J Int Neuropsychol Soc* 2002;8:448-460.
10. Gonzales E, Whetung C, Lee YJ, Kruchten R, Work demands and cognitive health inequities by race and ethnicity: a scoping review. *Gerontologist* 2022;62:e282-92. doi:10.1093/geront/gnac025
11. Xue B, Cadar D, Fleischmann M, et al. Effect of retirement on cognitive function: the Whitehall II cohort study. *Eur J Epidemiol* 2018;33:989-1001. doi:10.1007/s10654-017-0347-7
12. Vance DE, Bail J, Enah CC, Palmer JJ, Hoenig AK, The impact of employment on cognition and cognitive reserve: implications across diseases and aging. *NRR* 2016;6:61-71. doi:10.2147/NRR.S115625
13. Lamar M, León A, Romo K, et al. The independent and interactive associations of bilingualism and sex on cognitive performance in Hispanics/Latinos of the Hispanic Community Health Study/Study of Latinos. *J Alzheimers Dis* 2019;71:1271-1283. doi:10.3233/JAD-190019
14. O'Bryant SE, Johnson LA, Barber RC, et al. The health & aging brain among Latino elders (HABLE) study methods and participant characteristics. *Alzheimers Dement (Amst)* 2021;13:e12202. doi:10.1002/dad2.12202

15. Tombaugh TN, McIntyre NJ, The mini-mental state examination: a comprehensive review. *J Am Geriatr Soc* 1992;40:922-935. doi:10.1111/j.1532-5415.1992.tb01992.x
16. Wechsler D, *Weschler Adult Intelligence Scale—III*. 3rd ed. The Psychological Corporation; 1997.
17. Strauss E, Sherman EMS, Spreen O, *A Compendium of Neuropsychological Tests: Administration, Norms, and Commentary*. 3rd ed. Oxford University Press; 2006.
18. Lezak MD, Howieson DB, Loring DW, *Neuropsychological Assessment*. 4th ed. Oxford University Press; 2004.
19. González HM, Mungas D, Haan MN, A verbal learning and memory test for English- and Spanish-speaking older Mexican-American adults. *Clin Neuropsychol* 2002;16:439-451. doi:10.1076/clin.16.4.439.13908
20. US Department of Labor. Dictionary of Occupational Titles 2011. https://www.occupationalinfo.org/ 2024.
21. Topolski TD, LoGerfo J, Patrick DL, Williams B, Walwick J, Patrick MMB, The rapid assessment of physical activity (RAPA) among older adults. *Prev Chronic Dis* 2006;3:A118.
22. Posada Rodríguez C, Rodríguez-Araña S, Oviedo DC, et al. Depression mediates the association between occupational complexity and late-life cognition in Hispanics. *J Alzheimer's Dis Rep* 2021;5:881-886. doi:10.3233/ADR-210040
23. Kobayashi LC, O'Shea BQ, Wixom C, et al. Lifetime occupational skill and later-life cognitive function among older adults in the United States, Mexico, India, and South Africa. *Alzheimers Dement* 2024;20:1933-1943. doi:10.1002/alz.13665
24. Feldberg C, Stefani D, Tartaglini MF, et al. The influence of education and occupational complexity in the cognitive performance of older adults with mild cognitive impairment. *CienciasPsi* 2020;14(1):e-2194. doi:10.22235/cp.v14i1.2194
25. Mani SS, Kezios KL, Delaporte M, et al. Later-life cognitive function at the intersection of gender and occupation across Harmonized cognitive assessment protocols (HCAPs) in the United States, Chile, Mexico, India, and South Africa. *Alzheimers Dement* 2025;21:e70923. doi:10.1002/alz.70923
26. Andel R, Dávila-Roman AL, Grotz C, Small BJ, Markides KS, Crowe M, Complexity of work and incident cognitive impairment in Puerto Rican older adults. *J Gerontol B Psychol Sci Soc Sci* 2019;74:785-795. doi:10.1093/geronb/gbx127
27. Curreri C, Trevisan C, Grande G, et al. The influence of occupation type and complexity on cognitive performance in older adults. *Psychiatry Res Neuroimaging* 2022;326:111542. doi:10.1016/j.pscychresns.2022.111542
28. Finkel D, Andel R, Gatz M, Pedersen NL, The role of occupational complexity in trajectories of cognitive aging before and after retirement. *Psychol Aging* 2009;24:563-573. doi:10.1037/a0015511
29. Gomes Goncalves N, Mininel de Medeiros G, Ciciliati A, et al. Association between occupational complexity and cognitive function in older adults from Brazil and Mexico. *Neuroscience* 2025;568:446-453. doi:10.1016/j.neuroscience.2025.01.051
30. Hyun J, Hall CB, Katz MJ, et al. Education, occupational complexity, and incident dementia: a COSMIC collaborative cohort study. *J Alzheimer's Dis* 2022;85:179-196. doi:10.3233/JAD-210627
31. Grewal DK, Patapoff MA, Liou-Johnson V, Adamson MM, Jester DJ, The absence of formal work experience may affect the rate of cognitive decline in older adult women: findings from the health and retirement study. *Front Glob Womens Health* 2024;5:1458553. doi:10.3389/fgwh.2024.1458553
32. Benn EKT, Fox A, Fei K, Roberts E, Boden-Albala B, Moving towards a more comprehensive investigation of racial/ethnic differences in cognitive disability among US adults. *J Immigrant Minority Health* 2015;17:1105-1113. doi:10.1007/s10903-014-0073-0
33. Carr DC, Willis R, Kail BL, Carstensen LL, Alternative retirement paths and cognitive performance: exploring the role of preretirement job complexity. *Gerontologist* 2020;60:460-471. doi:10.1093/geront/gnz079
34. Lamar M, Tarraf W, Wu B, et al. English language proficiency and patterns of use as related to cognitive change in native Spanish speakers of the Hispanics/Latinos of the hispanic community health study/study of Latinos-investigation of neurocognitive aging. *Alzheimer's Dementia* 2022;18:e065961. doi:10.1002/alz.065961
35. Grant A, Dennis N, Increased processing speed in young adult bilinguals: evidence from source memory judgments. *Biling Lang Cogn* 2017;20:327-336. doi:10.1017/S1366728916000729
36. Cerhan JR, Folsom AR, Mortimer JA, et al. Correlates of cognitive function in middle-aged adults. Atherosclerosis risk in communities (ARIC) study investigators. *Gerontology* 1998;44:95-105. doi:10.1159/000021991
37. Duncan GJ, Magnuson K, Socioeconomic status and cognitive functioning: moving from correlation to causation. *Wiley Interdiscip Rev Cogn Sci* 2012;3:377-386. doi:10.1002/wcs.1176
38. Gee GC, Walsemann KM, Takeuchi DT, English proficiency and language preference: testing the equivalence of two measures. *Am J Public Health* 2010;100:563-569. doi:10.2105/AJPH.2008.156976
39. Fujishiro K, MacDonald LA, Crowe M, McClure LA, Howard VJ, Wadley VG, The role of occupation in explaining cognitive functioning in later life: education and occupational complexity in a U.S. National sample of Black and White Men and Women. *J Gerontol B Psychol Sci Soc Sci* 2019;74:1189-1199. doi:10.1093/geronb/gbx112
40. Schooler C, Mulatu MS, Oates G, The continuing effects of substantively complex work on the intellectual functioning of older workers. *Psychol Aging* 1999;14:483-506. doi:10.1037//0882-7974.14.3.483
41. Dang L, Ananthasubramaniam A, Mezuk B, Spotlight on the challenges of depression following retirement and opportunities for interventions. *Clin Interv Aging* 2022;17:1037-1056. doi:10.2147/CIA.S336301
42. Forrester SN, Gallo JJ, Whitfield KE, Thorpe RJ, A framework of minority stress: from physiological manifestations to cognitive outcomes. *Gerontologist* 2019;59:1017-1023. doi:10.1093/geront/gny104
43. Mehta KM, Yeo GW, Systematic review of dementia prevalence and incidence in United States race/ethnic populations. *Alzheimer's Dementia* 2017;13:72-83. doi:10.1016/j.jalz.2016.06.2360

SUPPORTING INFORMATION

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

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