

Sleep Phenotypes And Language-specific Cognitive Decline In Hispanic Older Adults



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Key Takeaway: Baseline insomnia was associated with faster longitudinal language decline among Hispanic older adults, whereas no similar effect modification was observed for memory, executive function, processing speed, or global cognition.

BACKGROUND

METHODS

RESULTS

CONCLUSIONS

- Sleep disorders are common in older adults and are associated with cognitive decline.
- Hispanic populations have a higher burden of sleep disorders, but whether Hispanic ethnicity modifies longitudinal cognitive decline remains unclear.
- We examined whether baseline sleep phenotype was associated with language decline over time and whether these associations differed by Hispanic ethnicity.

- Data source:** National Alzheimer's Coordinating Center (NACC) (2015–2024).
- Participants:** Age ≥60 years; ≥3 visits
- Sleep phenotypes:** Neither, insomnia only, obstructive sleep apnea (OSA) only, and co-morbid insomnia and sleep apnea (COMISA).
- Outcome:** Language composite score (Boston Naming, Animal Fluency, Vegetable Fluency).
- Analysis:** Linear mixed-effects models with random intercepts and slope, adjusted for age, sex, education, race, and APOE ε4 status. Sleep phenotype, Hispanic ethnicity, and time interaction was tested.

- 5,549 participants (23,231 observations).
- Overall Sleep Phenotype × Hispanic × Time interaction for language decline approached significance ($\chi^2 = 7.63$, $P = 0.054$).
- Insomnia-only significantly modified the association between Hispanic ethnicity and longitudinal language decline ($\beta = -0.039$ /year, $SE = 0.018$, $P = 0.029$).
- No significant interaction was observed for OSA-only or COMISA.
- Sensitivity analyses attenuated the interaction after combining insomnia groups and after adjustment for baseline clinician-rated cognitive status.

- Hispanic ethnicity may modify the association between baseline sleep phenotype and longitudinal language decline.
- The interaction was driven primarily by **insomnia-only**, which was associated with faster language decline among Hispanic participants.
- No significant effect modification was **observed** for OSA-only or COMISA.
- Larger, more diverse longitudinal studies are needed to confirm these findings.

Sleep Phenotype × Hispanic Ethnicity × Time Interaction on Language Decline

Overall 3-Way Interaction (Sleep Phenotype × Hispanic × Time)		
Cognitive Domain	χ^2 (df=3)	P-value
Language (Primary Outcome)	7.63	0.054

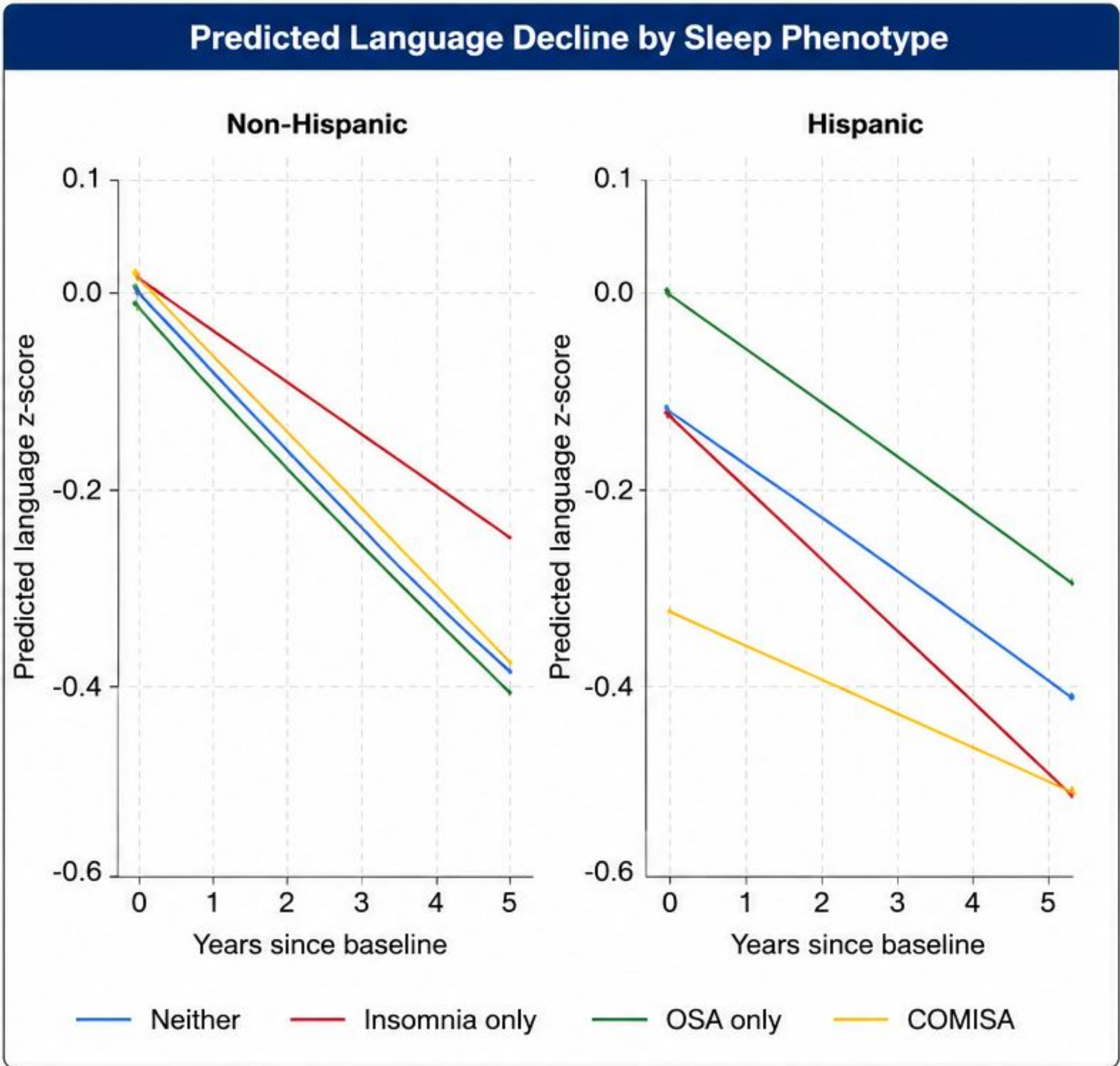
Test of overall three-way interaction in mixed-effects model adjusted for age, sex, education, race, and APOE ε4 status.

Individual Three-Way Interaction Terms (Sleep Phenotype × Hispanic × Time)			
Sleep Phenotype	Interaction β (per year)	SE	P-value
Insomnia only	-0.039	0.018	0.029
OSA only	0.001	0.019	0.976
COMISA	0.035	0.026	0.172

β represents the additional annual change in language z-score associated with the Sleep Phenotype × Hispanic Ethnicity × Time interaction from the mixed-effects model.

Key Findings

- Overall Sleep Phenotype × Hispanic × Time interaction approached significance ($P = 0.054$).
- Insomnia-only significantly modified the association between Hispanic ethnicity and longitudinal language decline (interaction $\beta = -0.039$ per year, $P = 0.029$).
- No significant interaction was observed for OSA-only or COMISA.



Interpretation: Hispanic participants with insomnia-only at baseline experience faster annual language decline compared with non-Hispanic participants with insomnia-only and with Hispanic participants without insomnia ($\beta = -0.039$ per year).

Baseline Characteristics (N = 5,518)

Characteristic	Overall
Age, mean ± SD (years)	71.8 ± 6.8
Female, n (%)	3,128 (56.7)
Education, mean ± SD (years)	16.3 ± 2.7
Hispanic, n (%)	373 (6.8)
APOE ε4 carrier, n (%)	2,205 (40.0)
Sleep phenotype, n (%)	
• Neither	3,866 (70.1)
• Insomnia only	584 (10.6)
• OSA only	892 (16.2)
• COMISA	176 (3.2)

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