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NEUROPSYCHOLOGY

The association between bilingual semantic fluency and episodic memory among bilingual Mexican American older adults.

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Abstract

Background: Bilingualism is increasingly common in older adults in the US and may impact the expression and course of Alzheimer's Disease and related dementias (ADRD). Optimal methods for assessing cognition in population-based studies of bilingual older adults are not established. Given that declines in semantic fluency are associated with declines in episodic memory in ADRD, we examined the degree to which animal naming in English and Spanish is associated with memory performance in a sample of bilingual Mexican American (MA) older adults.

Method: The Brain Attack Surveillance in Corpus Christi-Cognitive study is a population-based study of cognition in MA and non-Hispanic white adults 65+ in south Texas. We included US-born, bilingual MA participants who completed in-person neuropsychological assessment in their preferred language (English) with the Harmonized Cognitive Assessment Protocol. We added a Spanish animal naming trial to the standard animal naming trial in English. We used the delayed recall score from a word list as the indicator of memory performance. We performed a series of regression analyses with delayed recall as the dependent variable and the English and Spanish animal naming scores as the independent variables, with age, sex, years of education, and a self-reported bilingualism index score to account for level of bilingualism (range 0–1; 0 indicates monolingual Spanish; 1 indicates monolingual English) as covariates.

Result: Ninety-six participants were included (*M*age = 73yrs±6; *M*education = 11±4; 60% women; Table 1). In separate regression models including covariates, English animal naming ($b = 0.25$, $p<.0001$) and Spanish animal naming ($b = 0.20$, $p <.05$) were each associated with delayed recall. When considered together, English animal naming (b = 0.24, p = <.0001) and not Spanish animal naming ($b = 0.03$, $p = .69$) was associated with delayed recall, after accounting for age, sex, years of education, and level of bilingualism (Table 2). Results were consistent when the analysis was restricted to balanced bilinguals (Table 3).

Conclusion: Semantic fluency in English and Spanish were each related to episodic memory among bilingual MA older adults assessed in English, although the Spanish trial did not add unique information in its association with episodic memory. Future studies should evaluate how bilingual semantic fluency is associated with longitudinal cognitive decline in ADRD.

Table 1. Descriptive characteristics of analytic sample (n = 96)

	M (SD) or n (%)
Age	73.10 (6.08)
Sex/Gender (women)	58 (60%)
Years of education[1]	10.95 (3.57)
Bilingualism classification[2]	
Balanced bilingual	74 (77%)
English Dominant	21 (22%)
Spanish dominant	1 (1%)

Note: [1]Years of education is capped at 17 (Graduate Education). [2]Bilingualism classification determined by self-reported language proficiency scale (Likert scale 1-7 rating speaking, understanding, reading, and writing).

Table 2. Linear regression models for CERAD delayed recall, all bilinguals (n = 96)

	Model 1 Estimate (95% CI)	Model 2 Estimate (95% CI)	Model 3 Estimate (95% CI)	Model 4 Estimate (95% CI)	Model 5 Estimate (95% CI)	Model 6 Estimate[2] (95% CI)
Intercept	5.11 (4.68, 5.55)***	5.11 (4.62, 5.61)***	5.11 (4.68, 5.55)***	5.60 (5.05, 6.16)***	5.65 (5.02, 6.27)***	5.62 (5.04, 6.20)***
English Animal Naming (centered)	0.26 (0.16, 0.35)***		0.28 (0.17, 0.40)***	0.25 (0.15, 0.35)***		0.24 (0.12, 0.35)***
Spanish Animal Naming (centered)		0.13 (-0.02, 0.28)^	-0.06 (-0.21, 0.08)		0.20 (0.08, 0.32)*	0.03 (-0.10, 0.16)
Age (per year; centered)				-0.07 (-0.15, 0.01)^	-0.12 (-0.20, -0.04)*	-0.07 (-0.15, 0.01)^
Sex/Gender[1]				-1.24 (-2.09, -0.39)*	-1.35 (-2.31, -0.38)*	-1.28 (-2.20, -0.37)*
Years of Education (per year; centered)				-0.02 (-0.16, 0.13)	0.08 (-0.05, 0.22)	-0.01 (-0.15, 0.13)
Language Dominance Index (centered)				2.27 (-3.26, 7.79)	2.44 (-3.99, 8.86)	2.42 (-3.27, 8.10)

Note: [1]Reference category is female. *** $p < 0.0001$ ** $p < 0.001$ * $p < 0.05$ ^ $p < 0.10$. [2]Collinearity diagnostics: All condition indices < 2.52; Variance inflation factors < 1.79.

Table 3. Linear regression models for CERAD delayed recall, balanced bilinguals only (n = 74)

	Model 1 Estimate (95% CI)	Model 2 Estimate (95% CI)	Model 3 Estimate (95% CI)	Model 4 Estimate (95% CI)	Model 5 Estimate (95% CI)	Model 6 Estimate[2] (95% CI)
Intercept	5.04 (4.54, 5.54) ***	5.04 (4.47, 5.61)***	5.04 (4.53, 5.55)***	5.31 (4.64, 5.97) ***	5.33 (4.59, 6.07)***	5.32 (4.63, 6.01***
English Animal Naming (centered)	0.26 (0.16, 0.36)***		0.28 (0.15, 0.42)***	0.22 (0.10, 0.33)**		0.20 (0.06, 0.35)*
Spanish Animal Naming (centered)		0.16 (-0.02, 0.34)^	-0.06 (-0.24, 0.13)		0.19 (0.06, 0.32)*	0.03 (-0.13, 0.18)
Age (per year; centered)				-0.08 (-0.17, 0.01)^	-0.14 (-0.22, -005)*	-0.09 (-0.18, 0.01)^
Sex/Gender[1]				-0.68 (-1.67, 0.32)	-0.75 (-1.85, 0.35)	-0.72 (-1.80, 0.36)
Years of Education (per year; centered)				-0.01 (-0.16, 0.14)	0.06 (-0.08, 0.20)	-0.005 (-0.15, 0.14)
Language Dominance Index (centered)				10.28 (-1.78, 22.35)^	13.20 (0.55, 25.84)*	10.51 (-1.83, 22,84)^

Note: [1]Reference category is female. *** $p < 0.0001$ ** $p < 0.001$ * $p < 0.05$ ^ $p < 0.10$. [2]Collinearity diagnostics: All condition indices < 2.69; Variance inflation factors < 2.13.