

Acculturation, Cognition, and Brain Imaging Correlates in a Diverse Cohort



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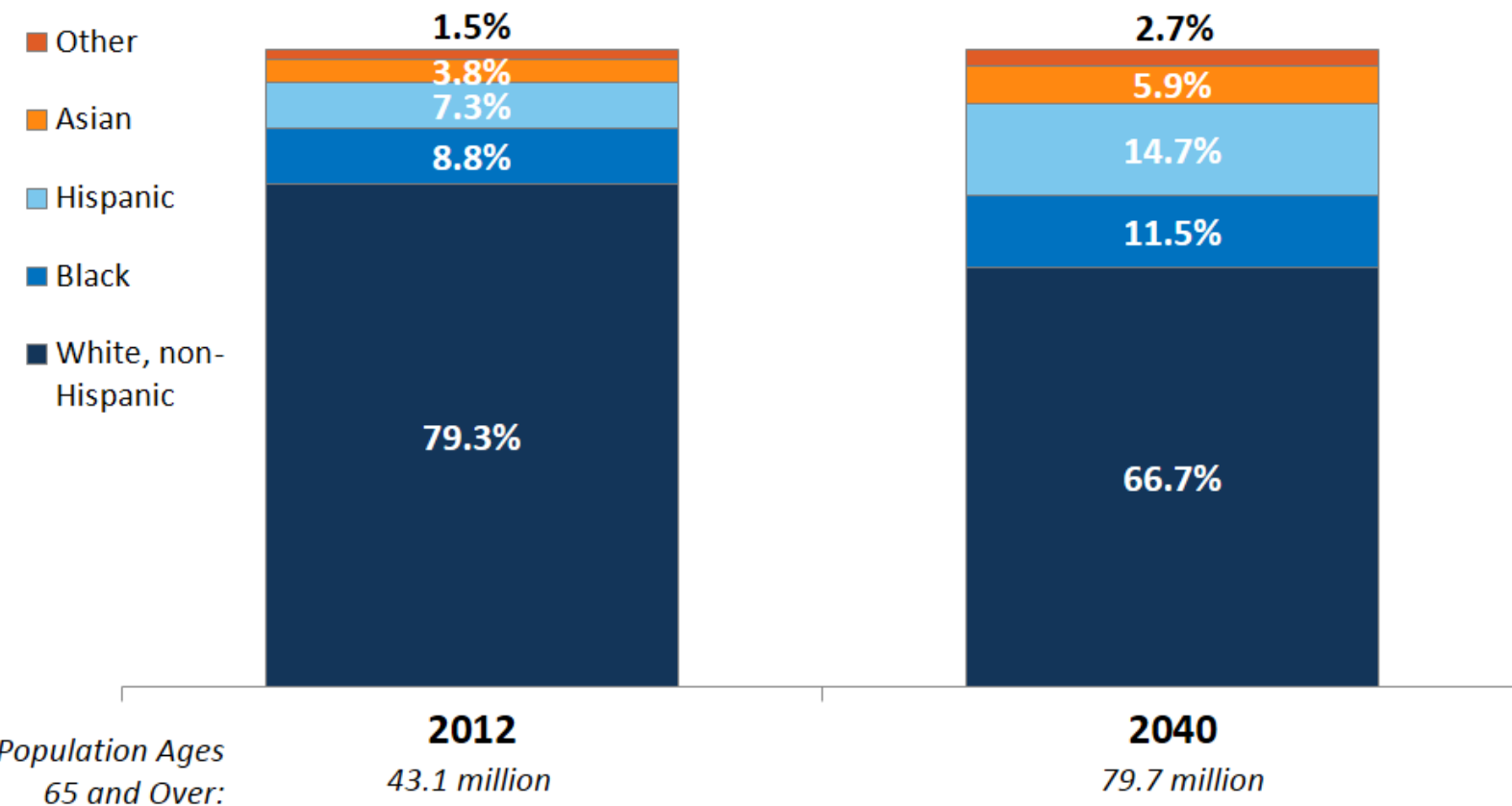
Disclosures

None.

Population of
Hispanic Elders in
the U.S. will
double...

Figure 1

Distribution of U.S. Population Ages 65 and Over, by Race/Ethnicity, 2012 and 2040

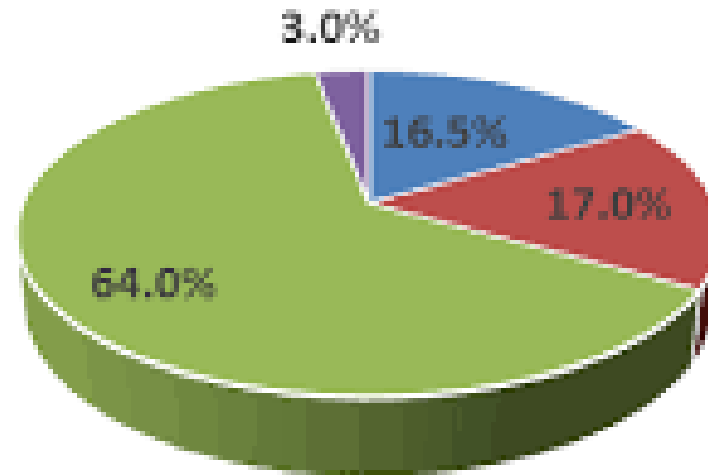


NOTE: Categories sum to more than 100% in both years because Hispanics may be of any race. "Other" includes American Indian and Alaska Native, Native Hawaiian and other Pacific Islander, and people reporting two or more races.

SOURCE: Kaiser Family Foundation analysis of data from U.S. Census Bureau, *An Aging Nation: The Older Population in the United States* (May 2014).

Race/Ethnicity in Miami-Dade County

- Non-Hispanic White
- Non-Hispanic Black
- Hispanic
- Other

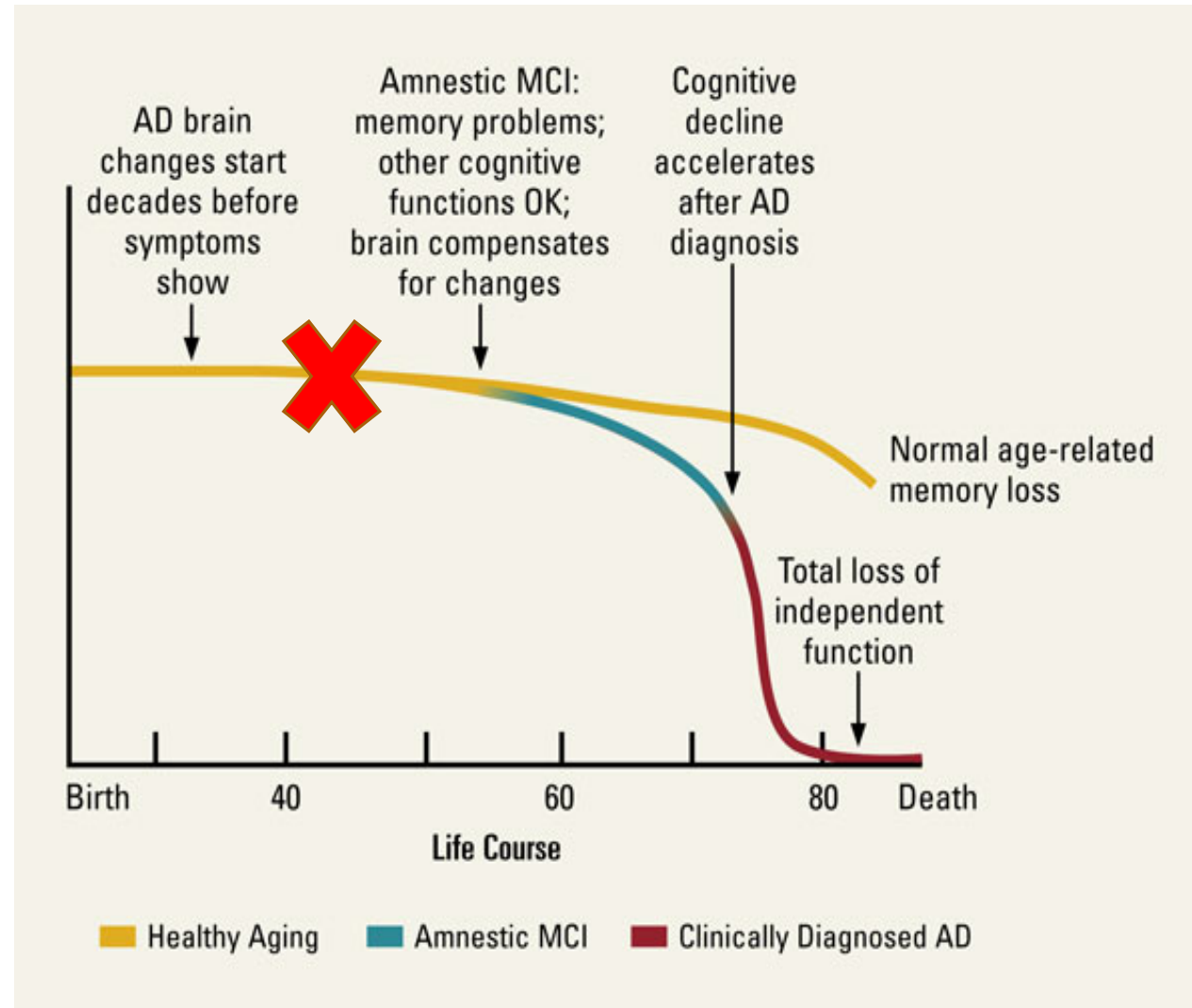


South Florida's Ethno-racial "PARADISE"

An Urgent Call for Novel Assessment Paradigms

- AD-specific cognitive vulnerabilities
- Cross-culturally applicable

Can we identify a sensitive and specific cognitive marker of preclinical AD?



Salient Cognitive Markers of Early AD

- Semantic Interference
 - Proactive Semantic Interference (PSI)
 - Retroactive Semantic Interference(RSI)
 - Failure to Recover from Proactive Semantic Interference (frPSI)
- Semantic Intrusion Errors (SI)

LASSI-L Cognitive Stress Test

- 15 words, each belonging to one of three categories (fruits, musical instruments, clothing)
 - Semantic cues at acquisition; 2 trials
 - **Controlled learning** - promotes optimal encoding of to-be-remembered targets, minimizes individual differences in learning strategies
- A second list of 15 semantically related targets is presented twice with **2 cued recall** trials.
- Produces measures of:
 - A. PSI (B1Cued Recall)
 - B. Recovery from PSI (frPSI) which is unique to the LASSI-L (B2 Cued Recall)
 - C. RSI (short-delayed recall for List A items).
 - D. Semantic Intrusions

frPSI is related to Amyloid Load in Cognitively Normal Elders

	SUVR Total	Anterior Cingulate	Posterior Cingulate	Precuneus	Frontal
LASSI-L Cued 1 (PSI)	rs= -.42*	rs= -.42*	rs= -.41*	rs= -.40	rs= -.31
LASSI-L Cued 2 (frPSI)	rs= -.60**	rs= -.48**	rs= -.50**	rs= -.62**	rs= -.43*
LASSI-L A2 (Maximum Storage)	rs= -.26	rs= -.31	rs= -.19	rs= -.32	rs= -.20
FOME Total Recall	rs= -.16	rs= -.17	rs= -.10	rs= -.16	rs= -.16
NACC Story Delayed Recall	rs= -.29	rs= -.35*	rs= -.08	rs= -.17	rs= -.36*

Note *p<.05; **p≤.01, survived FDR



FEATURED RESEARCH

Cognitive stress test predicts high levels of beta-amyloid

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ARTICLE

Utilizing semantic intrusions to identify amyloid positivity in mild cognitive impairment

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Abstract

Objective

Semantic intrusion (SI) errors may highlight specific breakdowns in memory associated with preclinical Alzheimer disease (AD); however, there have been no investigations to determine whether SI errors occur with greater frequency in persons with amnesic mild cognitive impairment (aMCI) confirmed as amyloid positive (Amy+) vs those who have clinical symptoms of aMCI-AD with negative amyloid scans (suspected non-AD pathology [SNAP]) or persons who are diagnosed with other brain disorders affecting cognition.

Methods

Eighty-eight participants with aMCI underwent brain amyloid PET and MRI scans and were classified as early AD (Amy+), SNAP (Amy-), or other neurological/psychiatric diagnosis (Amy-). We focused on SI on the Loewenstein-Acevedo Scales for Semantic Interference and Learning (LASSI-L) targeting proactive semantic interference (PSI; old semantic learning interferes with new semantic learning), failure to recover from PSI after an additional learning trial (frPSI), and retroactive semantic interference (new semantic learning interferes with memory for old semantic learning).

Results

SIs on measures of PSI and frPSI distinguished between Amy+ AD and SNAP and other non-AD cases. PSI and frPSI intrusions evidenced moderately high associations with reduced volumes in the entorhinal cortex, superior temporal regions, and supramarginal gyrus. No such associations were observed in cases with SNAP.

Conclusions

SIs on the LASSI-L related to PSI and frPSI uniquely differentiated Amy+ and Amy- participants with aMCI and likely reflect deficits with inhibition and source memory in preclinical AD not captured by traditional cognitive measures. This may represent a specific, noninvasive test successful at distinguishing cases with true AD from those with SNAP.

Semantic Intrusions Associated with Amyloid + in MCI due to AD

MCI-AD (n=34)

- Amyloid Positive, Clinical Features of AD, HPC Atrophy+

MCI-SNAP (n=29)

- Amyloid Negative, Clinical features of AD, HPC Atrophy+

MCI- Other Etiologies (n=25)

- Amyloid Negative, cerebrovascular disease, DLBD, FTD, CTE, Mass Effect of Angioma, Depression, Other Psychiatric Conditions and NOS)

	MCI-AD (Amyloid+) (n=34)	MCI-SNAP (Amyloid-) (HPC+) (n=29)	MCI-Non- Alzheimer's (Amyloid-) (n=25)	F-Test or X ² Test	F-test Adjusting for Age, MMSE and Language
Age	75.44 ^a (SD=8.0)	76.42 ^a (SD=7.5)	70.53 ^b (SD=5.9)	3.49 (p=.036)	NA
HVLT-R Total	16.77 (SD=5.0)	18.00 (SD=3.6)	17.88 (SD=7.3)	.44 (.643)	.09 (p=.917)
Category Fluency	35.97 (SD=9.0)	35.58 (SD=8.6)	34.31 (SD=9.7)	.18 (p=.84)	1.01 (p=.371)
Trails B Time	157.63 (SD=72.8)	172.75 (SD=83.9)	130.00 (SD=75.4)	1.48 (.236)	.35 (p=.707)
LASSI-L B1 Semantic Intrusions	6.50 ^b (SD=3.2)	3.00 ^a (SD=2.2)	3.41 ^a (SD=1.8)	14.52 (p<.001)	12.33 (p<.001)
LASSI-L B2 Semantic Intrusions	4.78 ^b (SD=2.5)	2.63 ^a (SD=2.2)	2.29 ^a (SD=1.9)	9.13 (p<.001)	6.28 (p<.001)

Associations Between Different SI Measures and Left Hemisphere AD-prone regions for Amy+ aMCI

	LASSI-L B1 Semantic Intrusions	LASSI-L B2 Semantic Intrusions	HVLT-R Total
Hippocampus	$r = -.31$	$r = -.34$	$r = .41$
Entorhinal Cortex	$r = -.51^{**}$	$r = -.55^{**}$	$r = .43$
Precuneus	$r = -.35$	$r = -.31$	$r = .48^{**}$
Superior Temporal	$r = -.47^{**}$	$r = -.49^{**}$	$r = .26$
Posterior Cingulate	$r = -.27$	$r = -.25$	$r = .43$
Supramarginal	$r = -.62^{***}$	$r = -.48^{**}$	$r = .30$

Cross-Cultural Applications in the U.S.

Do Hispanics differ from Non-Hispanics with regards to semantic intrusion errors?

To what extent does acculturation impact LASSL performance in normal and cognitively impaired groups?

Demographic Characteristics

	Non-Hispanic Normals (n=62)	Hispanic Normals (n=51)	Non-Hispanic aMCI (n=71)	Hispanic aMCI (n=63)	F-Value or X ² Value	p-Value
Age (Range 60-98)	73.89 ^{ab} (SD=8.3)	70.74 ^a (SD=6.2)	75.18 ^b (SD=8.5)	74.00 ^{ab} (SD=7.4)	3.31	.02
Education (Range 4-21)	15.83 ^b (SD=2.6)	13.22 ^a (SD=3.6)	15.78 ^{ab} (SD=2.9)	13.76 ^a (SD=3.4)	12.21	<.001
MMSE (Range 23-30)	29.03 ^b (SD=1.2)	28.59 ^b (SD=1.5)	27.39 ^a (SD=2.1)	26.97 ^a (SD=1.8)	20.2	<.001

Neuropsychological Performance in Normal Cognition

	Non-Hisp Normals (n=62)	Hispanic Normals (n=51)	F-Value Adjusted for Age, Sex & Ed.	p-Value
LASSI-L Cued B1 Semantic Intrusions (PSI)	3. 27 (SD=2.8)	3.12 (SD=2.5)	3.48	.065
LASSI-L Cued B2 Semantic Intrusions (frPSI)	1.83 (SD=1.7)	1.92 (SD=1.6)	.13	.717
HVLT –R Total	25. 37 (SD=4.1)	23.04 (SD= 4.2)	3.90	.05
HVLT-R Delay	9.10 (SD=2.3)	7.94 (SD=2.3)	4.81	.031
Category Fluency	48. 70 (SD=9.1)	39.70 (SD=9.6)	16.47	<.001

Neuropsychological Performance in Mild Cognitive Impairment

	Non-Hisp MCI (n=62)	Hispanic MCI (n=51)	F-Value Adjusted for Age, Sex & Ed.	p-Value
LASSI-L Cued B1 Semantic Intrusions (PSI)	4.37 (SD=3.0)	4.75 (SD=3.0)	.12	.725
LASSI-L Cued B2 Semantic Intrusions (frPSI)	3.40 (SD=2.8)	3.51 (SD=2.3)	.14	.712
HVLT –R Total	17.82 (SD=5.1)	18.56 (SD= 4.4)	2.50	.116
HVLT-R Delay	2.92 (SD=3.1)	2.49 (SD=2.7)	.70	.403
Category Fluency	38.24 (SD=10.2)	36.22 (SD=8.2)	.06	.812

Does Degree of Acculturation Impact
Semantic Intrusion Errors on the LASSI-L?

Bi-dimensional Acculturation Scale for Hispanics (BAS), Marin and Gamba (1996)

1. Language Use
2. Linguistic Proficiency
3. Electronic Media

High versus low acculturation was not related to differences in semantic intrusion errors the LASSI-L among Hispanic individuals.

Acculturation level did not affect performance on other LASSI-L indices.

Semantic Intrusions and Relationship with Cortical Thickness

	Non-Hispanics		Hispanics	
	PSI Intrusions (n=71)	frPSI Intrusions (n=71)	PSI Intrusions (n=62)	frPSI Intrusions (n=62)
Left ERC	r=-.09	r=-.34 **	r=.28*	r=.22
Left Parahippocampal	r=-.01	r=-.35 **	r=-.15	r=-.16
Left Precuneus	r=-.06	r= -.22	r=-.29*	r=-.16
Inferior Temporal	r=-.03	r= .14	r=-.32*	r=-.22
Superior Temporal	r=-08	r= -.31*	r=.25	r=-.04

Summary

- The LASSI-L distinguishes between cognitively normal elders from those on the preclinical AD continuum.
- Among Hispanics in the U.S., LASSI-L discriminates aMCI from cognitively normal elders
- The measurement of semantic intrusion errors is a useful measure of risk in Hispanic individuals.
- Low acculturation to mainstream culture was not associated with poorer performance.
- Expanding upon previous research about the association of the LASSI-L with multiple biomarkers of early AD pathology, Semantic intrusion errors was also associated with cortical thickness in several AD ROIs among Non-Hispanic and Hispanic persons.
- Cognitive Stress Tests such as the LASSI-L are worthy of further research, particularly among diverse cultural groups.

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