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Aging, Finances and Decision Making

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Aging, Finances and Decision Making

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Professor of Psychology, Family
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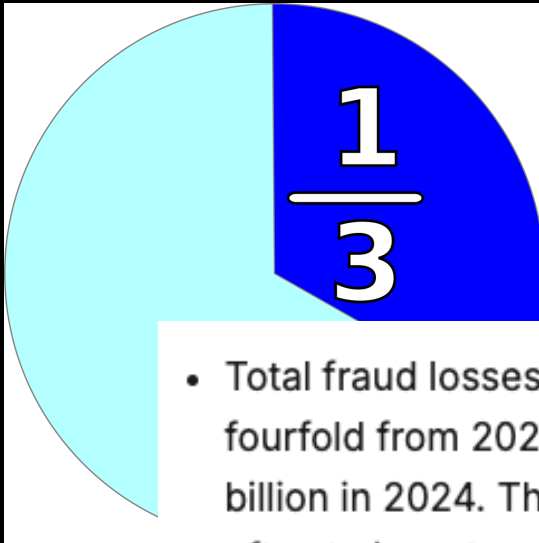


Aging, Finances, and Decision Making

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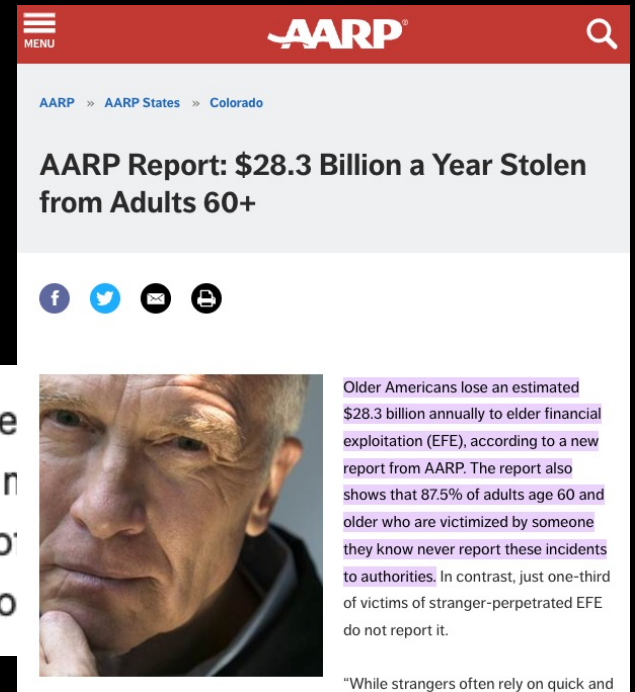
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October 12, 2026

Background



Protecting
Older
Consumers
2024–2025

- Total fraud losses reported by older adults (ages 60 and over) increased fourfold from 2020 to 2024, skyrocketing from about \$600 million in 2020 to \$2.4 billion in 2024. This increase was largely driven by reports of investment scams, romance scams, or impersonation scams.



Brain Structure Can Change With Age

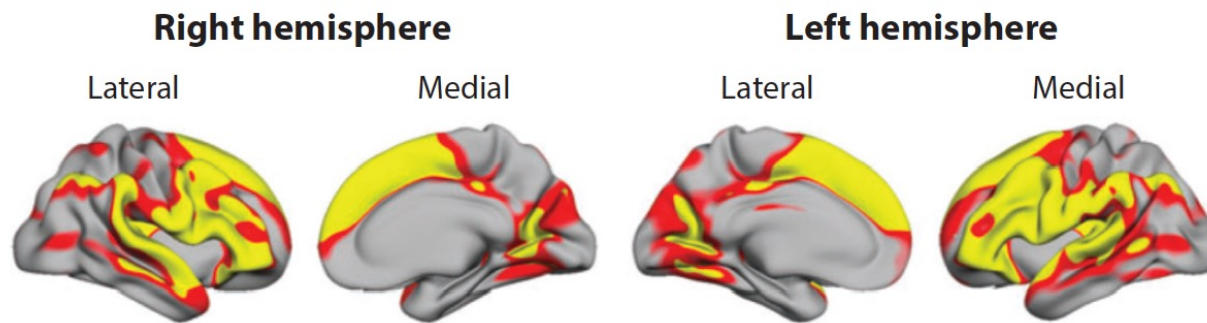
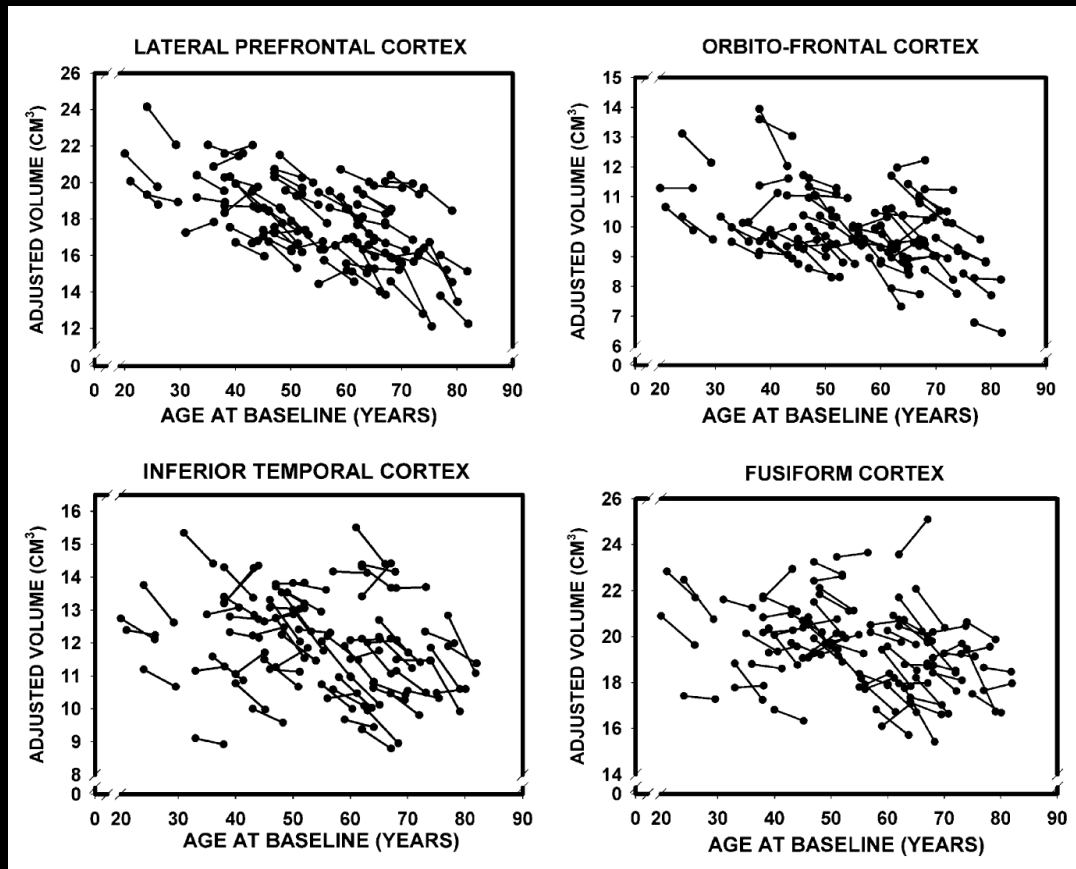
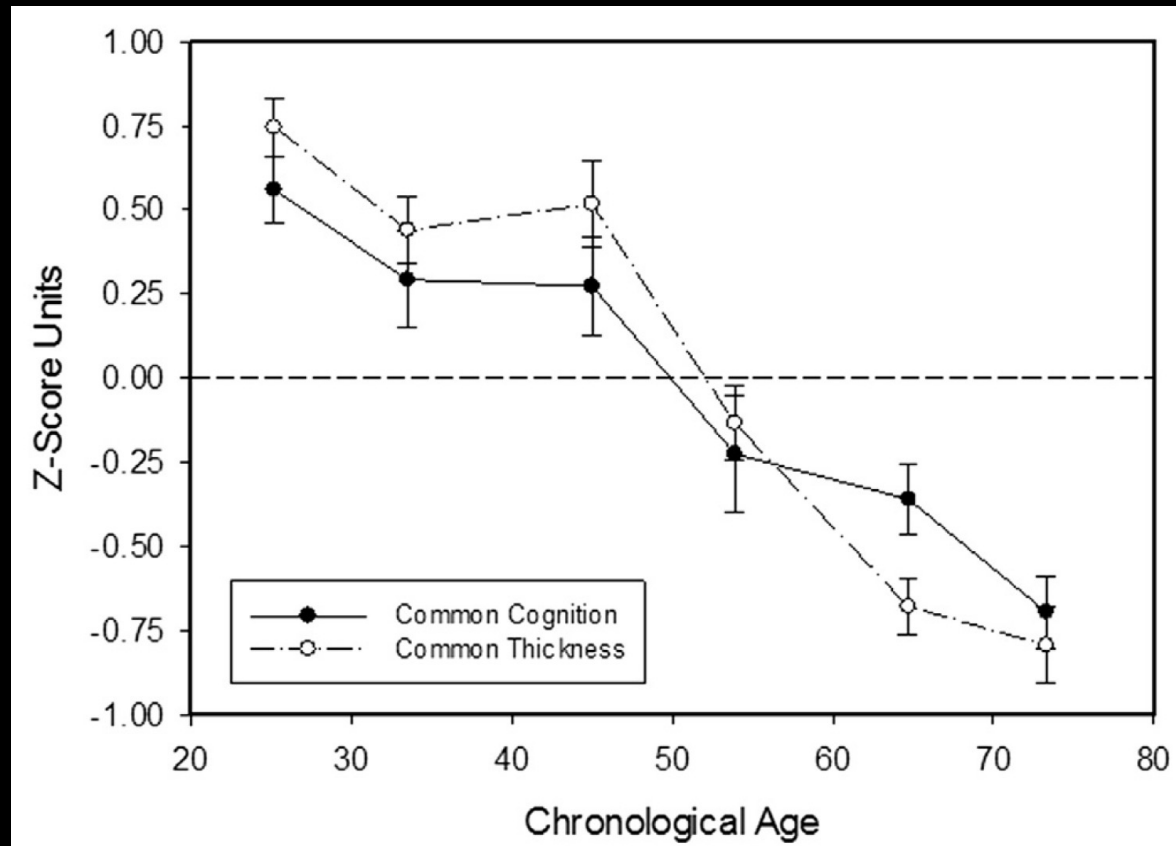


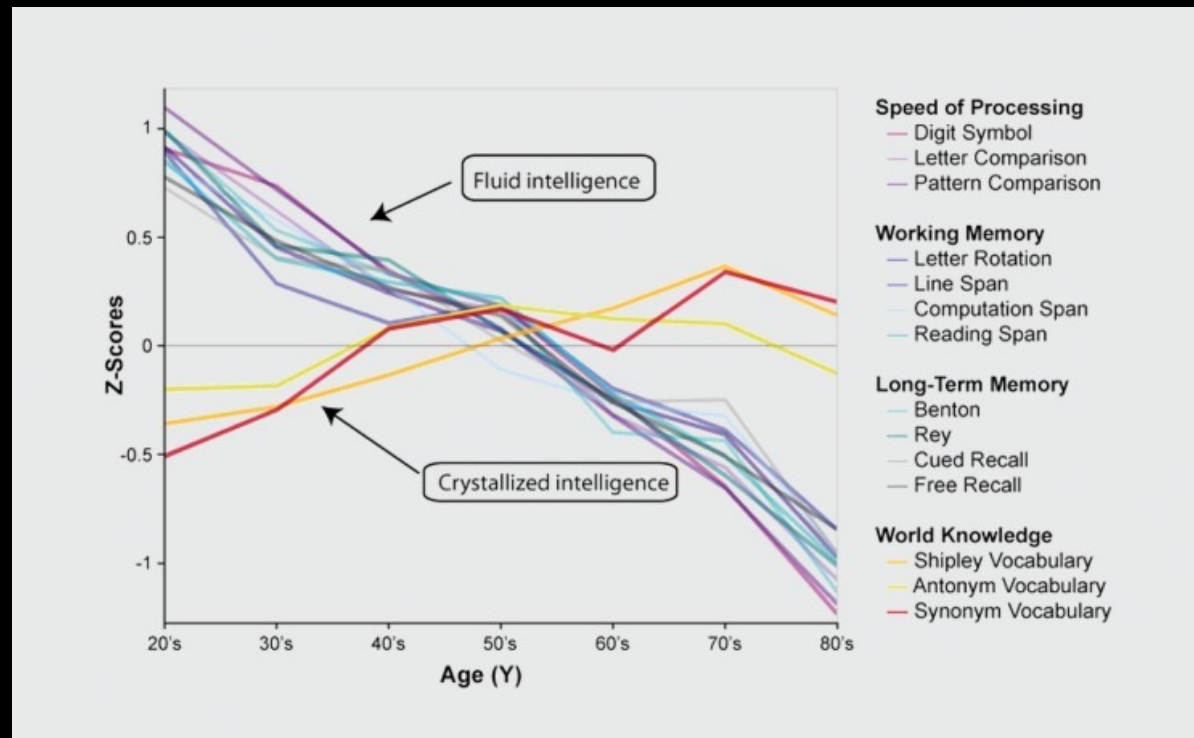
Figure 2

Brain regions shown in yellow are those that exhibited the largest decline in cortical thickness with age across a sample of 883 participants ranging in age from 18 to 94 (Fjell et al. 2009b).





Cognitive Ability Can Change With Age



Cognitive Changes Are Not Inevitable With Age

Prevalence of Alzheimer's Disease by Age:

- 5.2% -- Age 65 to 74
- 13.8% -- Age 75 to 84
- 35.8% -- Age 85-plus

Prevalence of Mild Cognitive Impairment by Age:

- 6.7% -- Age 60 to 64
- 8.4% -- Age 65 to 69
- 10.1% -- Age 70 to 74
- 14.8% -- Age 75 to 79
- 25.2% -- Age 80 to 84

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THE VANISHING MIND
Money Woes Can Be Early Clue to Alzheimer's

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As Arthur Packel's dementia grew worse, he forgot how to handle money, and his wife, Renee, could not find where it all went.
By GINA KOLATA
Published October 30, 2010

Renee Packel used to have a typical suburban life. Her husband, Arthur, was a lawyer and also sold insurance. They lived in a town house just outside Philadelphia, and Mrs. Packel took care of their home and family.

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It turned out that Mr. Packel was developing Alzheimer's disease and had forgotten how to handle money. When she tried to pay their bills, Mrs. Packel, who enlisted the help of a forensic accountant, could not find most of the couple's money.

"It just disappeared," she said.

What happened to the Packels is all too common, Alzheimer's experts say. New research shows that one of the first signs of impending dementia is an inability to understand money and credit, contracts and agreements.

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Renee Packel used to have a typical suburban life. Her husband, Arthur, was a lawyer and also sold insurance. They lived in a town house just outside Philadelphia, and Mrs. Packel took care of their home and family.

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Béatrice de Géa for The New York Times

Dr. Max Gomez, left, with his son, does not understand why he needs Medicaid: "I have money."

One day, it all came crashing down. The homeowners' association called asking for their fees. To Mrs. Packel's surprise, her husband had simply stopped paying them. Then she learned he had stopped writing checks to his creditors, too.

It turned out that Mr. Packel was developing Alzheimer's disease and had forgotten how to handle money. When she tried to pay their bills, Mrs. Packel, who enlisted the help of a forensic accountant, could not find most of the couple's money.

"It just disappeared," she said.

What happened to the Packels is all too common, Alzheimer's experts say. New research shows that one of the first signs of impending dementia is an inability to understand money and credit, contracts and agreements.

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Financial Presentation of Alzheimer Disease and Related Dementias

Lauren Hersch Nicholas, PhD, MPP; Kenneth M. Langa, MD, PhD; Julie P. W. Byrum, MD, MPH; Joanne W. Hsu, PhD

Invited Commentary page 227
Multimedia
Supplemental content

IMPORTANCE Alzheimer disease and related dementias (ADRD), currently incurable neurodegenerative diseases, can threaten patients' financial status owing to memory deficits and changes in risk perception. Deteriorating financial capabilities are among the earliest signs of cognitive decline, but the frequency and extent of adverse financial events before and after diagnosis have not been characterized.

OBJECTIVES To describe the financial presentation of ADRD using administrative credit data.

DESIGN, SETTING, AND PARTICIPANTS This retrospective secondary data analysis of consumer credit report outcomes from 1999 to 2018 linked to Medicare claims data included 81 364 Medicare beneficiaries living in single-person households.

EXPOSURES Occurrence of adverse financial events in those with vs without ADRD diagnosis and time of adverse financial event from ADRD diagnosis.

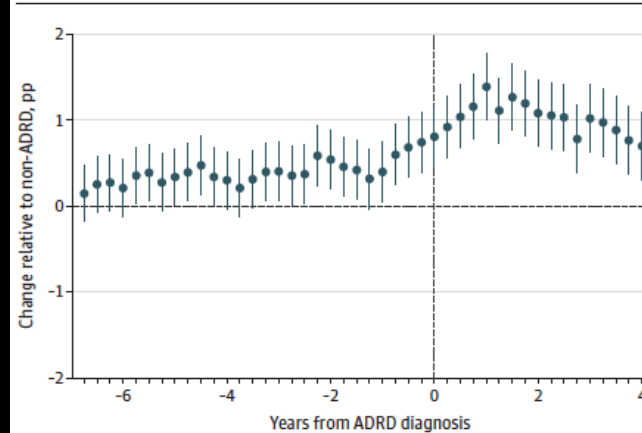
MAIN RESULTS AND MEASURES Missed payments on credit accounts (30 or more days late) and subprime credit scores.

RESULTS Overall, 54 062 (17 890 [33.1%] men; mean [SD] age, 74 [7.3] years) were never diagnosed with ADRD during the sample period and 27 302 had ADRD for at least 1 quarter of observation (8573 [31.4%] men; mean [SD] age, 79.4 [7.5] years). Single Medicare beneficiaries diagnosed with ADRD were more likely to miss payments on credit accounts as early as 6 years prior to diagnosis compared with demographically similar beneficiaries without ADRD (7.7% vs 7.3%; absolute difference, 0.4 percentage points [pp]; 95% CI, 0.07-0.70-) and to develop subprime credit scores 2.5 years prior to diagnosis (8.5% vs 8.1%; absolute difference, 0.38 pp; 95% CI, 0.04-0.72). By the quarter after diagnosis, patients with ADRD remained more likely to miss payments than similar beneficiaries who did not develop ADRD (7.9% vs 6.9%; absolute difference, 1.0 pp; 95% CI, 0.67-1.40) and more likely to have subprime credit scores than those without ADRD (8.2% vs 7.5%; absolute difference, 0.70 pp; 95% CI, 0.34-1.1). Adverse financial events were more common among patients with ADRD in lower-education census tracts. The patterns of adverse events associated with ADRD were unique compared with other medical conditions (eg, glaucoma, hip fracture).

CONCLUSIONS AND RELEVANCE Alzheimer disease and related dementias were associated with adverse financial events years prior to clinical diagnosis that become more prevalent after diagnosis and were most common in lower-education census tracts.

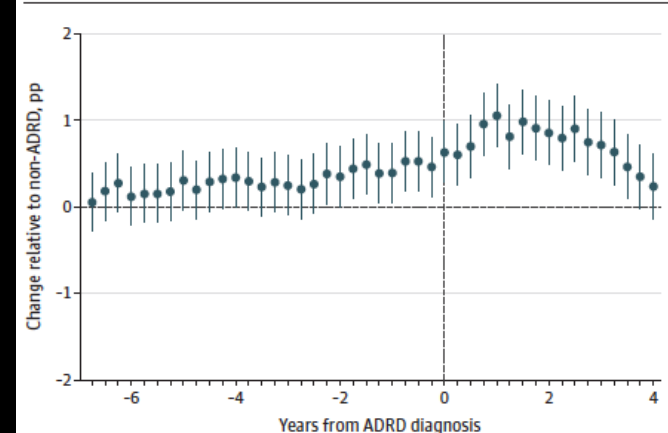
Author Affiliations: Johns Hopkins School of Public Health & School of Medicine, Institute for Social Research, Baltimore, Maryland (Nicholas); University of Colorado School of Public Health (Nicholas).

Figure 1. Change in Proportion With Missed Credit Payments Before and After Alzheimer Disease and Related Dementias (ADRD) Diagnosis Relative to Never Diagnosed, 1999 to 2018



Medicare beneficiaries who eventually developed ADRD experienced higher rates of delinquency than those who never developed ADRD, and these elevated rates were detectable years before diagnosis. Circles are regression coefficients representing the percentage point (pp) increase in payment delinquency at each time point in comparison to payment delinquency rates among Medicare beneficiaries who were never diagnosed with ADRD. The mean rate of missed payment (payment delinquency) was 7.8%. Vertical lines represent 95% CIs. Data sources: Federal Reserve Bank of New York Consumer Credit Panel/Equifax, and Medicare Beneficiary Summary File.

Figure 2. Change in Proportion With Subprime Credit Scores Before and After Alzheimer Disease and Related Dementias (ADRD) Diagnosis Relative to Never Diagnosed, 1999 to 2018



Medicare beneficiaries who eventually developed ADRD experienced higher rates of subprime credit scores (Equifax risk scores) than those who never developed ADRD, and these elevated rates were detectable roughly 2 years before diagnosis. Circles are regression coefficients representing the percentage point (pp) increase in subprime credit scores associated with each time point relative to no ADRD. The mean rate of subprime credit scores in our sample was 9.1%. Vertical lines represent 95% CIs. Data sources: Federal Reserve Bank of New York Consumer Credit Panel/Equifax, and Medicare Beneficiary Summary File.

Age-Associated Financial Vulnerability: An Emerging Public Health Issue

Mark S. Lachs, MD, MPH, and S. Duke Han, PhD



Various processes common in the aging brain may affect an older adult's ability to manage personal finances, the most recognized of which are dementing illnesses (1). These conditions can affect cognitive abilities, which may jeopardize an older adult's financial well-being over their longitudinal course. However, recent studies suggest that even cognitively intact older adults can have "functional" changes that may render them financially vulnerable. Social isolation also increases dramatically with age, which places older persons at risk for exploitation from predators. Furthermore, capitalistic enterprises can threaten the financial security of this group, which is perceived to be a large untapped market and, in an era of information overload, is often presented with a dizzying array of products and services.

We propose the concept of age-associated financial vulnerability (AAFV) and discuss aspects of its epidemiology from the vantage of a neuropsychologist (S.D.H) and geriatrician-epidemiologist (M.S.L) who are both researchers and clinicians working in the field of elder abuse. We believe that considering AAFV a clinical syndrome may be advantageous to further critical research, promote public policy work, and encourage physicians to recognize it.

need not be associated with cognitive impairment differentiates research on this condition from previous work that has focused on cognitive impairment as the driving force for financial vulnerability (3).

Age-associated financial vulnerability and financial exploitation (4, 5) can be linked—AAFV may predispose an older adult to financial exploitation—however, we perceive them as conceptually different. Age-associated financial vulnerability focuses on a potential condition that may have multiple causes and ultimately may or may not lead to exploitation. We view financial exploitation as focusing on specific mechanisms that drive a particular outcome, often consisting of intentional or forceful methods of exploitation. In this sense, persons who do not show AAFV can be victims of financial exploitation. More is known about the effects of financial exploitation; less is known about AAFV because we believe that this concept is new.

EPIDEMIOLOGY OF AAFV: PREVALENCE AND RISK FACTORS

Although a precise determination of the prevalence of AAFV would require assessment of a large population-based sample of older adults, community-

Table. Possible Factors Contributing to Age-Associated Financial Vulnerability

Domain Factor	Mechanism
Cognitive/emotional	
Executive dysfunction	Reduced ability to multitask, organize by time, and abstractly comprehend future ramifications of current financial actions
Acalculia	Inability to quickly calculate figures mentally to verify numbers or to perform numerical calculations
Frontal disinhibition	Reduced ability not to commit to financial courses of action with potentially negative consequences
Anxiety	May increase pressure to take bad financial risks or not pursue appropriate financial safeguards
Reduced ability to discern trustworthy persons	Results in having less information by which to discern good financial opportunities from bad financial risks
Medical and functional	
Serious progressive illness	Serious underlying medical illness unresponsive to traditional therapy may motivate patients to seek expensive and unproven treatments, creating susceptibility to fraud
Impaired mobility	Reduced ability to extricate themselves from an environment in which they are being pressured to make financial decisions
Vision and hearing loss	Decreased likelihood that complex financial transactions and/or documents are fully comprehended before execution
Polypharmacy	May contribute to delirium, directly influencing vulnerability; expense of medication may also lead to inadvisable risk-taking
Psychosocial	
Depression	Associated with executive dysfunction (7); shame and guilt may also preclude older persons from revealing their predicament to trusted friends and family who could extricate them from exploited role
Social isolation	No beneficent person within the older person's social network to recognize, mitigate, or report financial exploitation
Loneliness	Patients may engage potential exploiters as a mechanism of fostering social connectedness
Environmental/societal	
Wealth concentration	High concentration of wealth in older populations makes them targets of potential exploiters
Information overload	Complex offering of products and services may paradoxically reduce sound decision making in the aging brain
Sophisticated marketing	The aging brain may be more susceptible to increasing use of behavioral economics and cognitive neuroscience to sway consumers

The Finance, Cognition, and Health in Elders Study: Toward Preventing Financial Exploitation of Older Adults

by Gali H. Weissberger and S. Duke Han

February 28, 2018



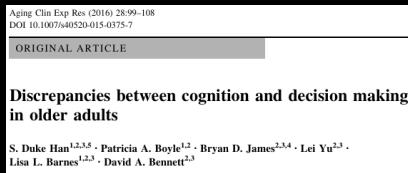
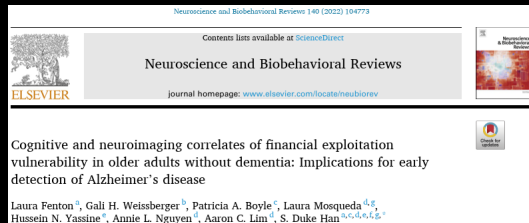
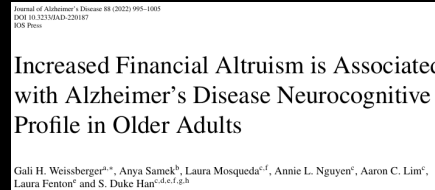
Health in Elders Study (FINCHES) being carried out through USC's Department of Family Medicine.

Why is financial exploitation so common in the elderly population? Why do some older adults fare better than others when making financial decisions? What factors protect or place one at greater risk of being financially exploited? These are just some of the questions that a multidisciplinary team of investigators hope to answer through the Finance, Cognition, and

Finance, Cognition, and Default Network in Aging (FCDNA)



Cognitive Work to Date



Mild Cognitive Impairment Is Associated with Poorer Decision-Making in Community-Based Older Persons

S. Duke Han, PhD, *†‡§ Patricia A. Boyle, PhD, *† Bryan D. James, PhD, *|| Lei Yu, PhD, *‡ and David A. Bennett, MD *‡

JAGS 63:676–683, 2015

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Table 2. Relationship Between Mild Cognitive Impairment (MCI) and Decision-Making, Adjusted for Age, Education, and Sex

	Model 1		Model 2	
Model Term	Estimate (Standard Error)		P-Value	
Total decision-making				
Age	−0.11 (0.01)	<.001	−0.10 (0.01)	<.001
Education	0.28 (0.03)	<.001	0.28 (0.03)	<.001
Male	0.82 (0.22)	<.001	0.89 (0.21)	<.001
MCI			−1.35 (0.23)	<.001
Financial decision-making				
Age	−0.06 (0.01)	<.001	−0.05 (0.01)	<.001
Education	0.11 (0.02)	<.001	0.12 (0.02)	<.001
Male	0.52 (0.12)	<.001	0.55 (0.11)	<.001
MCI			−0.61 (0.12)	<.001
Healthcare decision-making				
Age	−0.06 (0.01)	<.001	−0.05 (0.01)	<.001
Education	0.16 (0.02)	<.001	0.16 (0.02)	<.001
Male	0.30 (0.13)	.02	0.34 (0.13)	.007
MCI			−0.74 (0.13)	<.001

N=730; MCI=144

Table 4. Relationship Between Individual Cognitive Function Measures and Decision-Making in Individuals with Mild Cognitive Impairment

Cognitive System	Estimate (Standard Error)	P-Value	R ² Change
Total decision-making			
Global cognition	3.20 (0.47)	<.001	0.16
Episodic memory	0.70 (0.32)	.03	0.02
Semantic memory	1.34 (0.33)	<.001	0.13
Working memory	0.65 (0.31)	.04	0.02
Perceptual speed	1.87 (0.22)	<.001	0.26
Visuospatial ability	0.60 (0.23)	.01	0.09
Financial decision-making			
Global cognition	1.61 (0.25)	<.001	0.14
Episodic memory	0.30 (0.17)	.08	0.01
Semantic memory	0.69 (0.18)	<.001	0.12
Working memory	0.49 (0.16)	.003	0.04
Perceptual speed	0.95 (0.12)	<.001	0.25
Visuospatial ability	0.24 (0.13)	.06	0.05
Healthcare decision-making			
Global cognition	1.59 (0.30)	.003	0.12
Episodic memory	0.39 (0.20)	.05	0.02
Semantic memory	0.65 (0.21)	.003	0.09
Working memory	0.16 (0.20)	.41	0.00
Perceptual speed	0.91 (0.15)	<.001	0.17
Visuospatial ability	0.36 (0.15)	.02	0.06

Mild Cognitive Impairment and Susceptibility to Scams in Old Age

S. Duke Han^{a,b,c,e,*}, Patricia A. Boyle^{a,b}, Bryan D. James^{a,d}, Lei Yu^{a,c} and David A. Bennett^{a,c}

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^bDepartment of Behavioral Sciences, Rush University Medical Center, Chicago, IL, USA

^cDepartment of Neurological Sciences, Rush University Medical Center, Chicago, IL, USA

^dDepartment of Internal Medicine, Rush University Medical Center, Chicago, IL, USA

^eMental Health Care Group, VA Long Beach Healthcare System, Long Beach, CA, USA

Table 2
Relation of MCI to susceptibility to scams

Variable	Model Term	Estimate (Standard Error, <i>p</i> Value)	
		Model 1	Model 2
Susceptibility to scams	age	0.027 (0.003,<0.001)	0.026 (0.003,<0.001)
	education	−0.022 (0.008, 0.007)	−0.023 (0.008, 0.005)
	male	0.067 (0.059, 0.249)	0.061 (0.059, 0.300)
	MCI		0.125 (0.063, 0.047)

Model 1 indicates a linear regression model of the terms age in years, years of education, and gender (male coded as 1, female coded as 0) with the outcome of susceptibility to scams. Model indicates a linear regression model of the terms age in years, years of education, gender (male coded as 1, female coded as 0), and MCI status (MCI coded as 1 and non-cognitive impaired coded as 0).

Table 3
Relation of specific cognitive function measures to susceptibility to scams among individuals with MCI

Factor	Cognitive System	Estimate	Standard Error	<i>p</i> Value	R ² Change
Susceptibility to scams	Global cognition	−0.341	0.152	0.026	0.020
	Episodic memory	−0.199	0.093	0.034	0.017
	Semantic memory	−0.173	0.107	0.107	–
	Working memory	0.022	0.091	0.812	–
	Perceptual speed	−0.163	0.081	0.047	0.013
	Visuospatial ability	−0.002	0.077	0.985	–

Estimated from separate linear regression models adjusted for age, gender, and education.

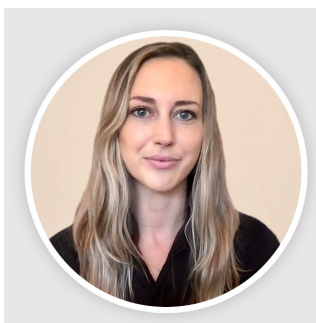
Mild Cognitive Impairment Is Associated with Poorer Everyday Decision Making

Laura Fenton^a, S. Duke Han^{a,b,c,d,e,f,*}, Carolyn G. DiGuiseppi^g, Nicole R. Fowler^h, Linda Hillⁱ, Rachel L. Johnson^j, Ryan A. Peterson^j, Christopher E. Knoepke^{k,l}, Daniel D. Matlock^{k,m,n}, Ryan Moranⁱ, Jason Karlawish^o and Marian E. Betz^{p,q}

^aDepartment of Psychology, USC Dornsife College of Letters, Arts, and Sciences, Los Angeles, CA, USA

^bRush Alzheimer's Disease Center, Rush University Medical Center, Chicago, IL, USA

^cDepartment of Family Medicine, Keck School of Medicine of USC, Alhambra, CA, USA

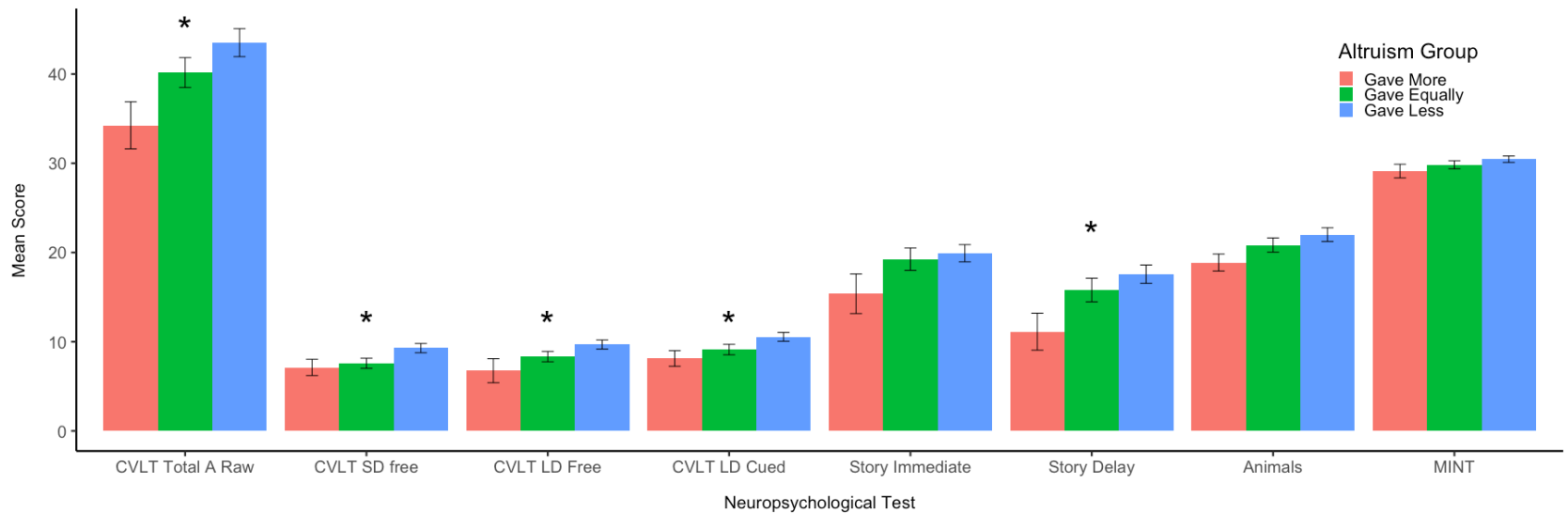


N=301; MCI=28

Predictor variable	Points missed on SPACED score	
	Mean ratio (95% CI)	<i>p</i>
Age (z-score)	1.34 (1.04, 1.73)	0.025
Education (ref: high school or less)		0.034*
Some college/vocational/tech	0.67 (0.27, 1.64)	0.379
College graduate	0.97 (0.40, 2.35)	0.952
Any post-graduate work	0.38 (0.16, 0.93)	0.034
Gender (ref: female)		
Male	1.34 (0.79, 2.29)	0.277
Randomization group (ref: control)		
DDA	0.70 (0.41, 1.18)	0.18
MCI type (ref: BTACT)		
RBANS	1.02 (0.53, 1.98)	0.956
Site (ref: CU)		0.003*
IU	2.92 (1.52, 5.60)	0.001
UCSD	1.35 (0.65, 2.79)	0.416
Cognitive status (ref: CN)		
MCI	2.17 (1.02, 4.61)	0.044

Significant differences ($p < 0.05$) are bolded. SPACED, the Short Portable Assessment of Capacity for Everyday Decision making; CN, cognitively normal; MCI, mild cognitive impairment; DDA, driving decision aid; BTACT, the Brief Test of Adult Cognition by Telephone; RBANS, the Repeatable Battery for the Assessment of Neuropsychological Status. CU, Colorado University; IU, Indiana University; UCSD, University of California San Diego. Asterisks (*) refer to a joint likelihood ratio test for categorical variables.

Blind Giving and Alzheimer's Disease Neurocognitive Profile



Not Just About Cognitive Ability

Aging Clin Exp Res

DOI 10.1007/s40520-015-0375-7

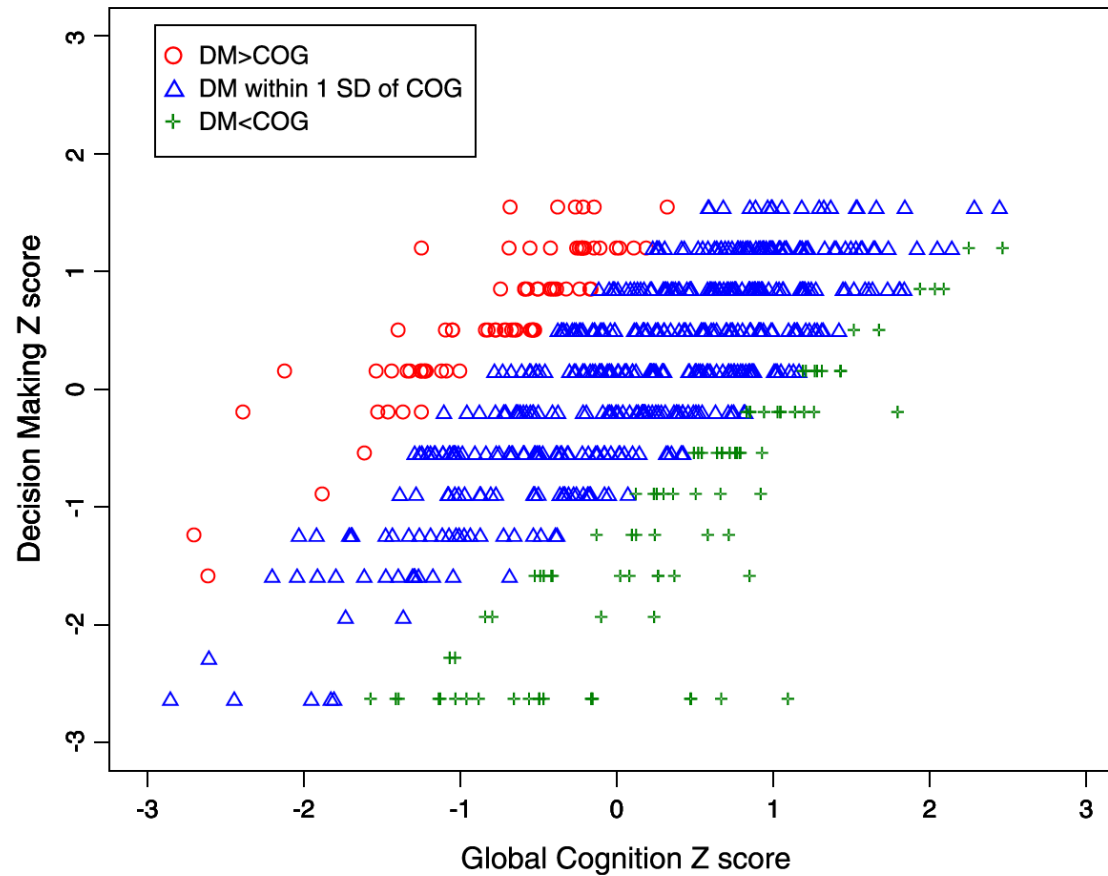
ORIGINAL ARTICLE

Discrepancies between cognition and decision making in older adults

S. Duke Han^{1,2,3,5} · Patricia A. Boyle^{1,2} · Bryan D. James^{2,3,4} · Lei Yu^{2,3} ·
Lisa L. Barnes^{1,2,3} · David A. Bennett^{2,3}

- N=648 older adults without dementia
- Mean age=81.8, s.d.=7.6; mean number of years of education=15.2, s.d=3.1; 76.8% female

Global Cognition and Decision Making Z-scores by Discrepancy Group



What is Happening?

If an older adult shows poorer financial decision making or becomes a victim of a scam, the burden is not only experienced by the older adult, but is often displaced upon family members, caregivers, or society.

Reduced scam awareness and poor financial decision making may be early signs of Alzheimer's Disease (Boyle et al., 2019; Stewart et al., 2019; Nicholas et al., 2021), but can occur without cognitive impairment.

➤ *How can we understand this?*

Neurobiology of Disease

Changes in Brain Function Occur Years before the Onset of Cognitive Impairment

Lori L. Beason-Held,¹ Joshua O. Goh,^{1,2} Yang An,¹ Michael A. Kraut,³ Richard J. O'Brien,⁴ Luigi Ferrucci,¹ and Susan M. Resnick¹

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Importance of Age-Associated Neuropathology

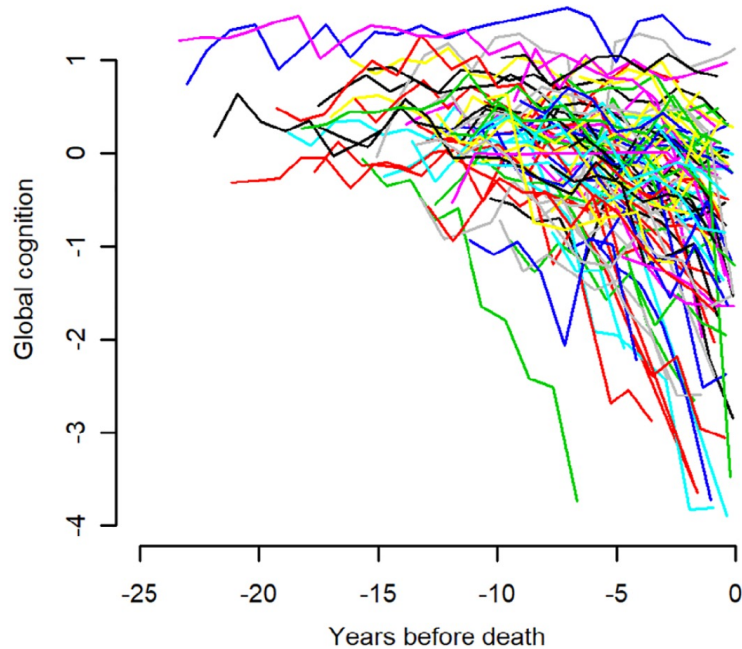
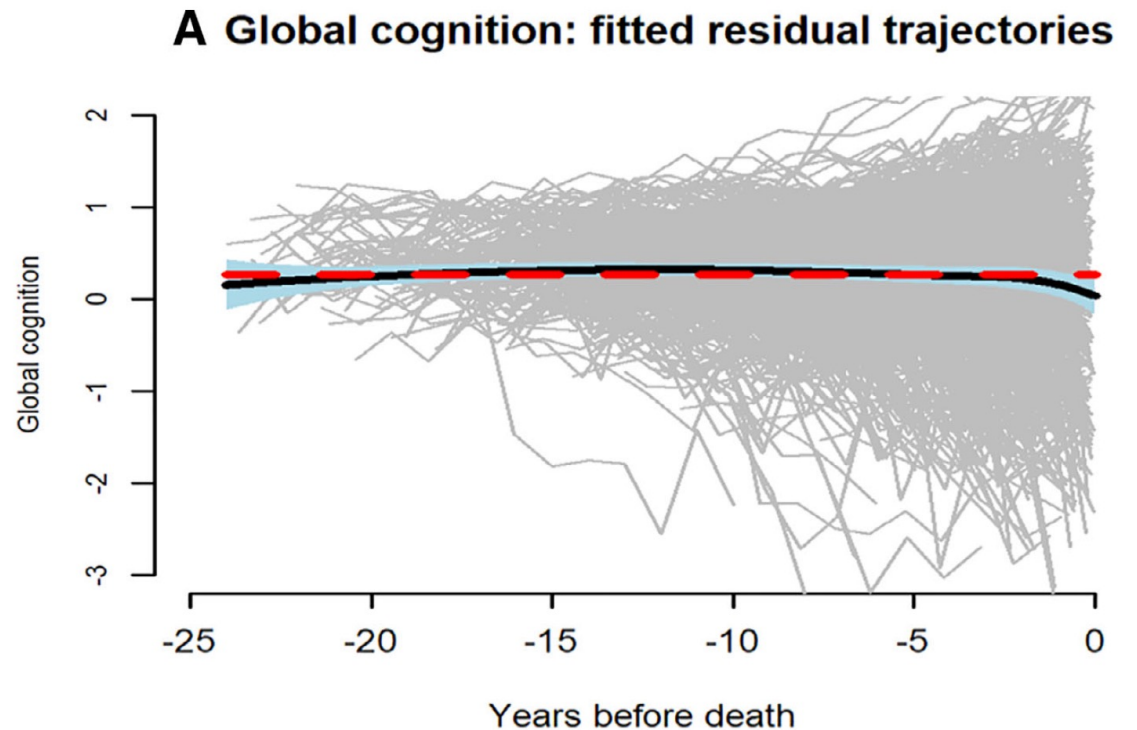


FIGURE 1: Crude trajectories of change in global cognition in 100 randomly selected participants.



Normative Cognitive Decline in Old Age

Robert S. Wilson, PhD ^{1,2,3} Tianhao Wang, PhD,^{1,2} Lei Yu, PhD ^{1,2}
David A. Bennett, MD,^{1,2} and Patricia A. Boyle, PhD^{1,3}

Objective: To characterize trajectories of normative cognitive aging.

Methods: Older persons without dementia at study enrollment (n = 1,010) had annual cognitive testing for up to 24 years (mean = 9.9 years, standard deviation = 5.0), died, and underwent a neuropathologic examination to quantify 9 postmortem markers of common neurodegenerative and cerebrovascular conditions. To accommodate the heterogeneity in cognitive trajectories, we used functional mixed effects models, which allow individuals to have different patterns of cognitive decline under a unified model structure.

Results: In a functional mixed effects model, postmortem markers (Alzheimer disease pathology, Lewy bodies, transactive response DNA-binding protein 43 pathology, hippocampal sclerosis, atherosclerosis, gross infarcts) were associated with global cognitive decline. Residual global cognitive decline after adjustment for neuropathologic burden was weakly related to age at death; it occurred in only about one-third of participants, mostly proximate to death. Results were comparable after eliminating the initial cognitive assessments to minimize retest learning or controlling for frailty proximate to death. Analyses were also conducted with composite measures of episodic memory and perceptual speed. Residual decline not attributable to neuropathologic burden was confined to a subset for each outcome and was most evident proximate to death. Age at death was unrelated to residual decline in episodic memory but was related to residual decline in perceptual speed.

Interpretation: Late life cognitive loss mainly reflects non-normative pathologic and mortality-related processes rather than normative age-related processes.

ANN NEUROL 2020;87:816–829

Interpretation: Late life cognitive loss mainly reflects non-normative pathologic and mortality-related processes rather than normative age-related processes.

Neuropsychological decline up to 20 years before incident mild cognitive impairment

Richard J. Caselli¹ | Blake T. Langlais² | Amylou C. Dueck² | Yinghua Chen³ | Yi Su³ |
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Funding information

National Institute on Aging, Grant/Award Numbers: P30AG019610, R01AG031581

Abstract

Introduction: Some Alzheimer's disease biomarker studies found amyloid changes 20 years or more in advance of expected symptoms, while cognitive changes lagged for more than a decade, but this apparent lag might reflect the sensitivities of the biomarker and cognitive assays used. How far in advance of incident amnesic mild cognitive impairment (MCI) does cognition begin to decline?

Methods: Longitudinal neuropsychological study of an apolipoprotein E ε4 enriched cohort of cognitively normal individuals at entry. Linear mixed models for MCI converters (n = 65) and nonconverters (n = 719) fitted for each neuropsychological measure; annual changes compared between groups before and after linear model intersections (inflection points).

Results: 34 of 35 cognitive measures and 9 of 18 behavioral measures declined faster post-inflection in the MCI converters; the earliest cognitive inflection point was nearly 20 years in advance of MCI diagnosis.

Discussion: The preclinical duration of cognitive and behavioral changes approaches the earliest reported biomarker changes.

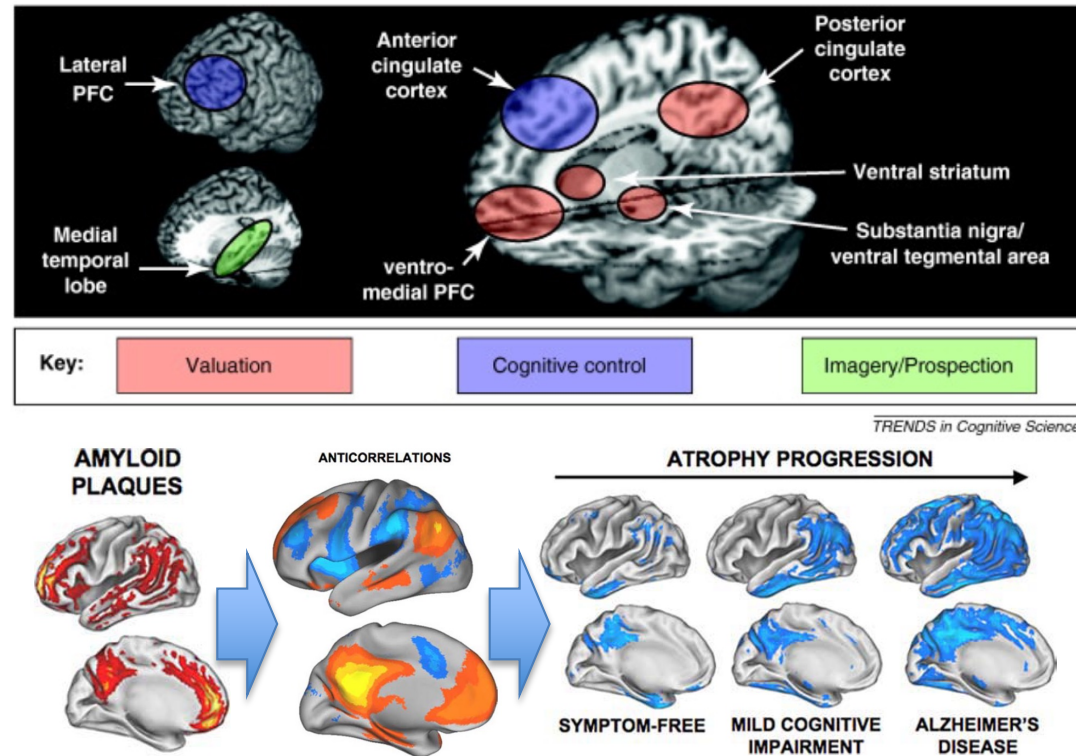
KEYWORDS

Age-related cognitive decline, Cognitive aging, Pre-MCI, Preclinical Alzheimer's disease, Preclinical memory decline

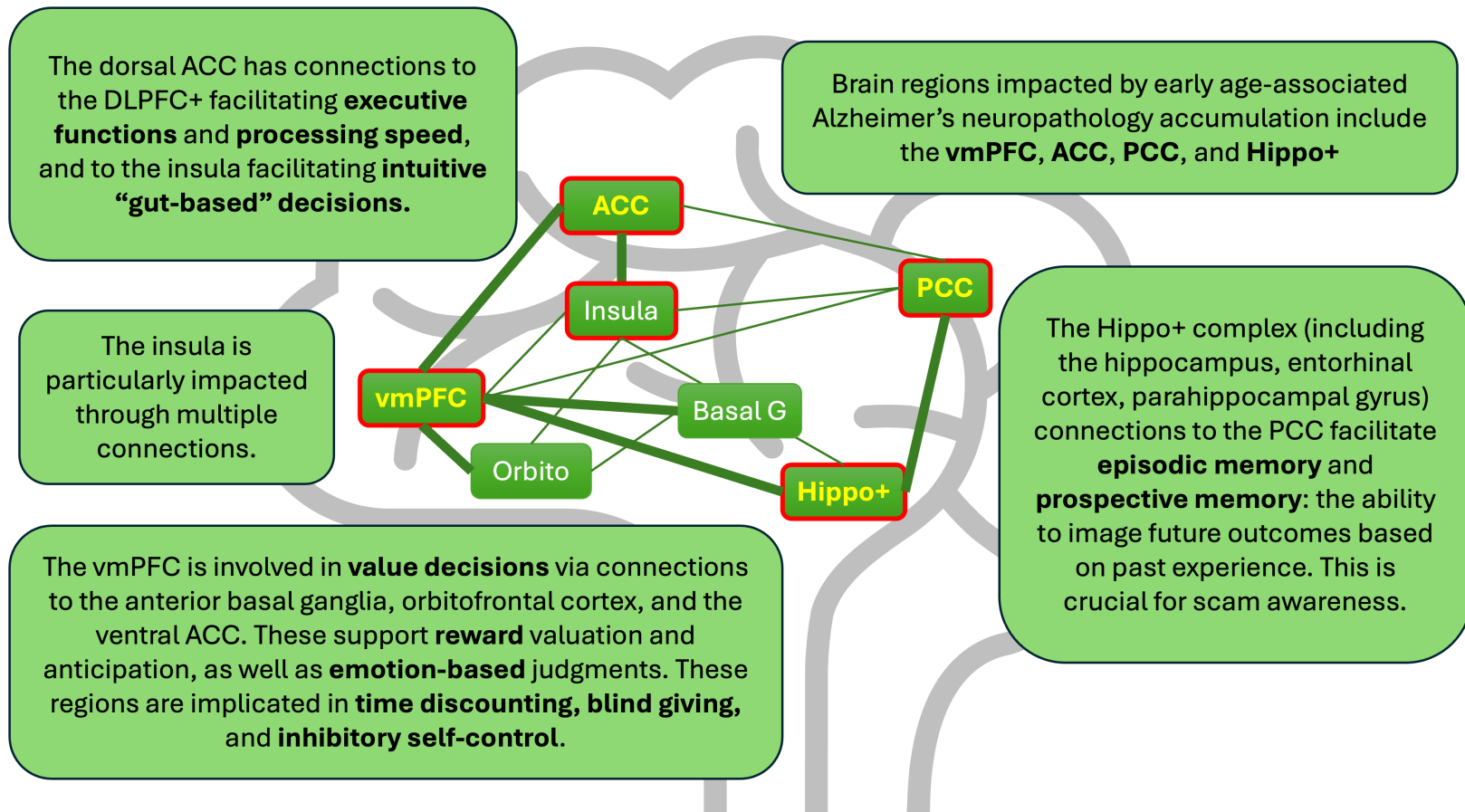
Peters and Buchel, 2011

+ Age-Associated Alzheimer's Neuropathology

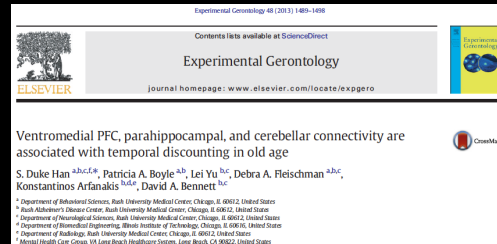
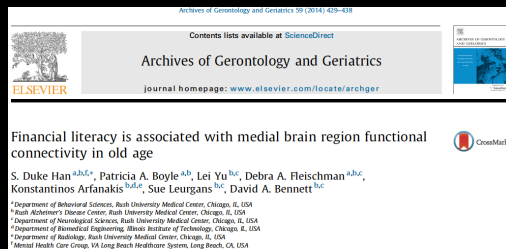
Brain regions
implicated in
intertemporal
choice decision
making:



Significant
overlap between
decision making
brain regions and
brain regions
known to be
susceptible to
age-associated
Alzheimer's
neuropathology
accumulation



Neuroimaging Work to Date

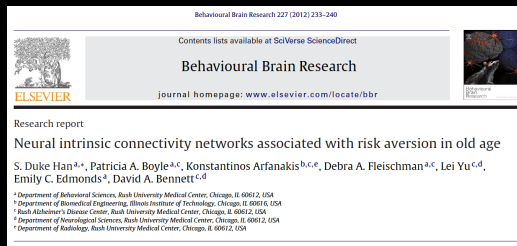


Brain Imaging and Behavior (2016) 10:524–532
DOI 10.1007/s11682-015-9422-4

ORIGINAL RESEARCH

Grey matter correlates of susceptibility to scams in community-dwelling older adults

S. Duke Han^{1,2,3,4} · Patricia A. Boyle^{1,2} · Lei Yu^{1,3} · Konstantinos Arfanakis^{6,7} · Bryan D. James^{1,5} · Debra A. Fleischman^{1,2,3} · David A. Bennett^{1,3}



Brain Structure and Function
https://doi.org/10.1007/s00429-018-1712-3

ORIGINAL ARTICLE

White matter correlates of temporal discounting in older adults

S. Duke Han^{1,2,3,4,10} · Konstantinos Arfanakis^{5,6,7} · Debra A. Fleischman^{6,8,9} · Lei Yu^{6,9} · David A. Bennett^{6,9} · Patricia A. Boyle^{6,8}

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Brain Imaging and Behavior
https://doi.org/10.1007/s11682-019-00079-7

ORIGINAL RESEARCH

White matter correlates of scam susceptibility in community-dwelling older adults

Melissa Lamar^{1,2} · Konstantinos Arfanakis^{1,3,4} · Lei Yu^{1,5} · Shengwei Zhang¹ · S. Duke Han^{1,2,5,6,7,8,9} · Debra A. Fleischman^{1,2,5} · David A. Bennett^{1,5} · Patricia A. Boyle^{1,2}

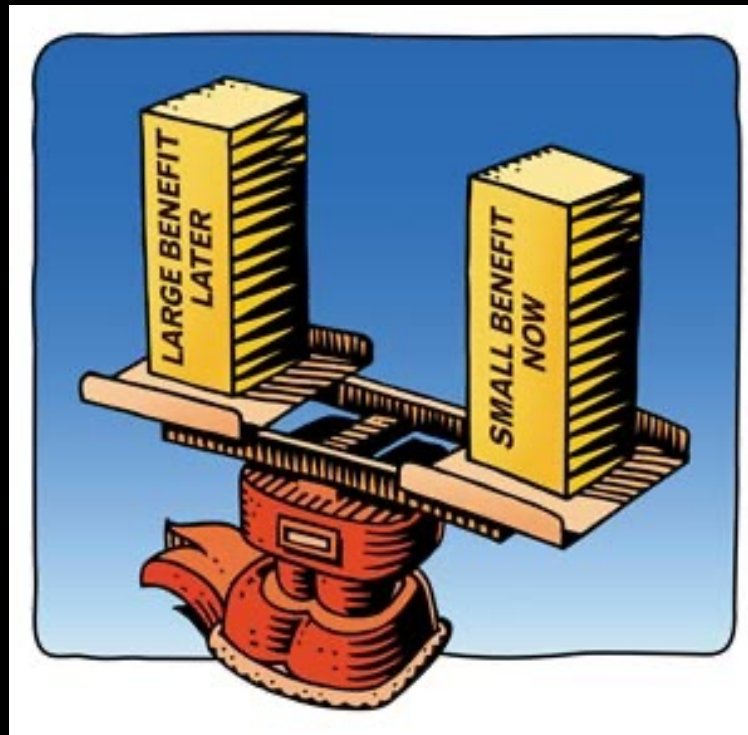
frontiers
in Aging Neuroscience

ORIGINAL RESEARCH
published: 12 November 2020
doi: 10.3389/fnagi.2020.583438

Functional Connectivity Correlates of Perceived Financial Exploitation in Older Adults

Gall H. Weissberger^{1,2}, Laura Mosqueda^{1,3}, Annie L. Nguyen¹, Jenna Axelrod¹, Caroline P. Nguyen¹, Patricia A. Boyle^{4,5}, Nathan Spreng^{6,7,8} and S. Duke Han^{1,3,4,5,8,10}*

Time Discounting



Time Discounting

Experimental Gerontology 48 (2013) 1489–1498

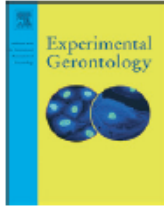


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Experimental Gerontology

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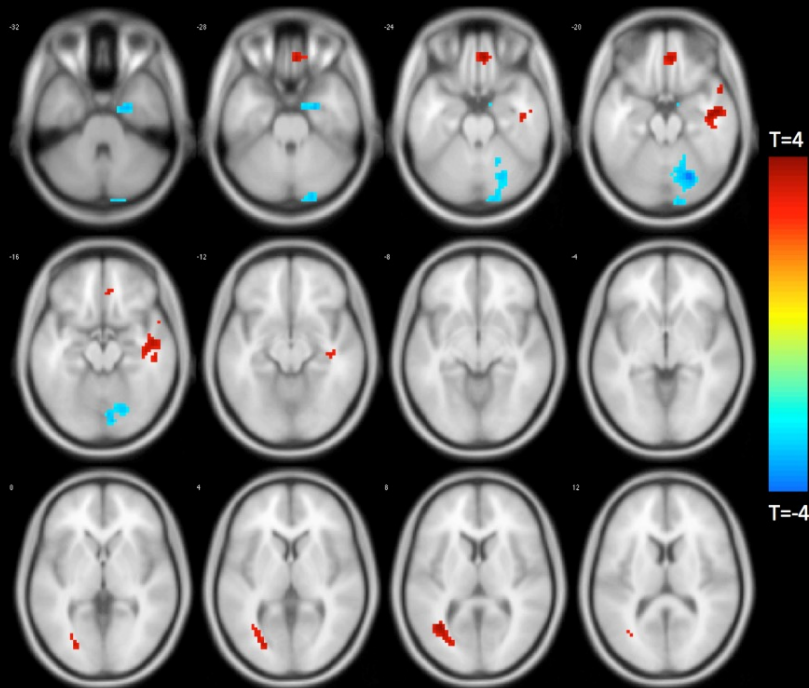
Ventromedial PFC, parahippocampal, and cerebellar connectivity are associated with temporal discounting in old age

S. Duke Han^{a,b,c,f,*}, Patricia A. Boyle^{a,b}, Lei Yu^{b,c}, Debra A. Fleischman^{a,b,c}, Konstantinos Arfanakis^{b,d,e}, David A. Bennett^{b,c}

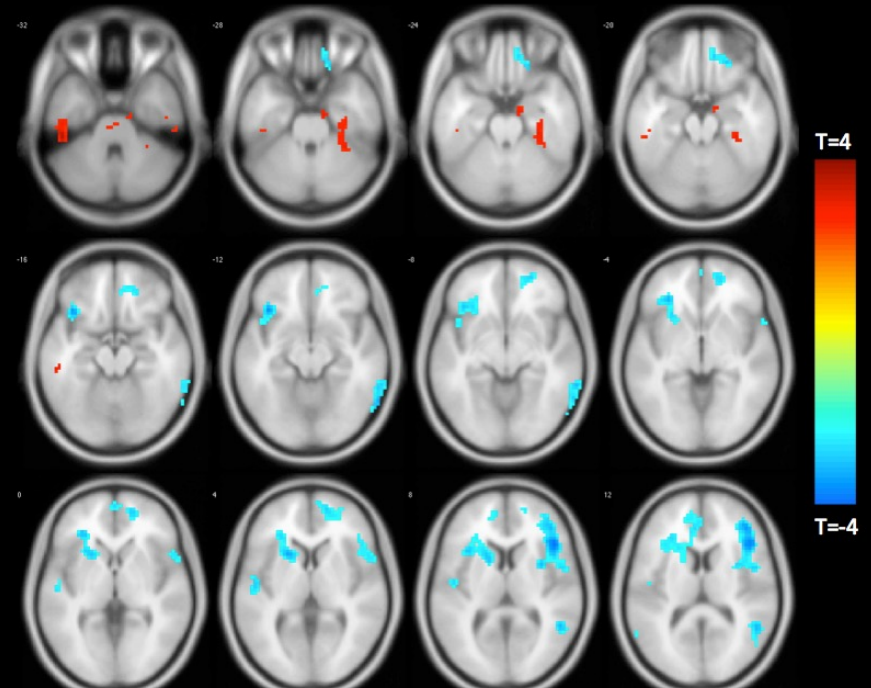
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^b Rush Alzheimer's Disease Center, Rush University Medical Center, Chicago, IL 60612, United States
^c Department of Neurological Sciences, Rush University Medical Center, Chicago, IL 60612, United States
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Time Discounting



HIGH->LOW Temporal Discounting



FC of R Parahippocampal Seed ROI

Time Discounting

Brain Structure and Function

<https://doi.org/10.1007/s00429-018-1712-3>

ORIGINAL ARTICLE



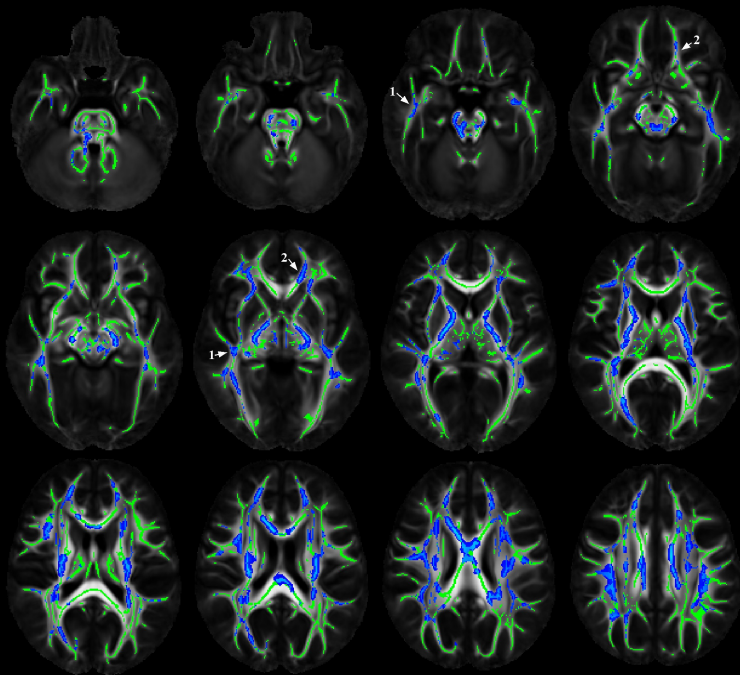
White matter correlates of temporal discounting in older adults

S. Duke Han^{1,2,3,4,10} · Konstantinos Arfanakis^{5,6,7} · Debra A. Fleischman^{6,8,9} · Lei Yu^{6,9} · David A. Bennett^{6,9} · Patricia A. Boyle^{6,8}

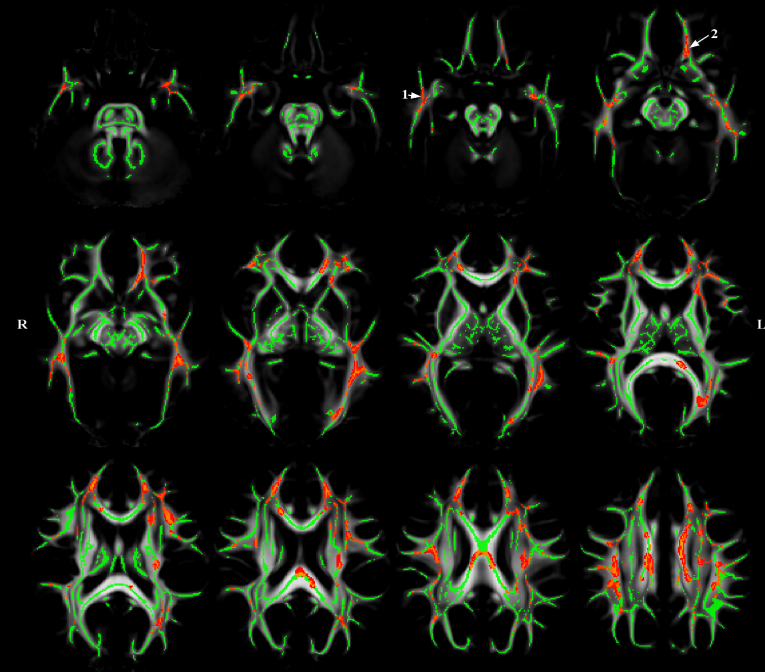
Received: 16 December 2017 / Accepted: 4 July 2018

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Time Discounting



FA



Trace

Susceptibility to Scams

Brain Imaging and Behavior
DOI 10.1007/s11682-015-9422-4

ORIGINAL RESEARCH

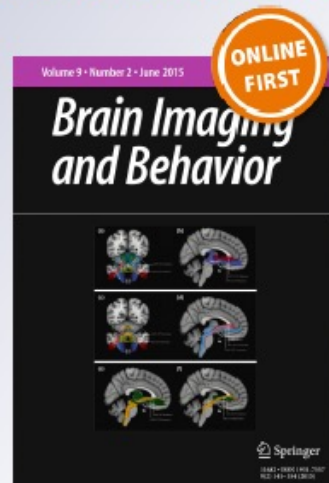
Grey matter correlates of susceptibility to scams in community-dwelling older adults

S. Duke Han^{1,2,3,4} • Patricia A. Boyle^{1,2} • Lei Yu^{1,3} • Konstantinos Arfanakis^{6,7} •
Bryan D. James^{1,5} • Debra Fleischman^{1,2,3} • David A. Bennett^{1,3}

*Grey matter correlates of susceptibility to
scams in community-dwelling older adults*

**S. Duke Han, Patricia A. Boyle, Lei Yu,
Konstantinos Arfanakis, Bryan D. James,
Debra A. Fleischman & David A. Bennett**

Brain Imaging and Behavior
ISSN 1931-7557
Brain Imaging and Behavior
DOI 10.1007/s11682-015-9422-4



 Springer

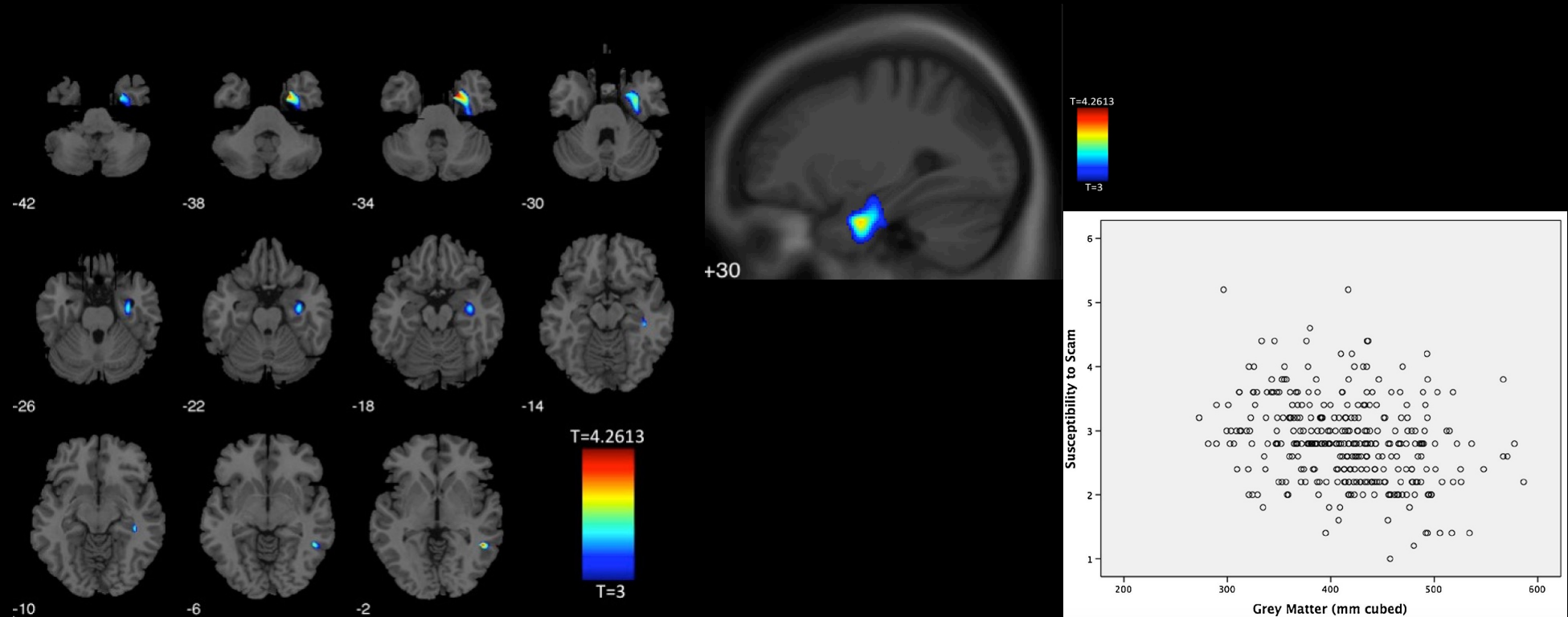
Assessment of susceptibility to scams

The susceptibility to scams scale is a five-item self-report measure in which participants rated their agreement to a statement according to a 7-point Likert scale (strongly agree to strongly disagree). The five statements included in the measure have been previously reported (James et al. 2014) and address topics such as telemarketing behaviors, older adults being targeted by con-artists, and suspiciousness of claims that seem too good to be true. The statements are:

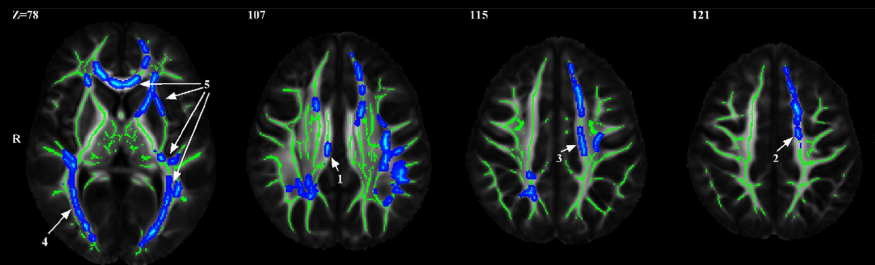
1. I answer the phone whenever it rings, even if I do not know who is calling.
2. I have difficulty ending a phone call, even if the caller is a telemarketer, someone I do not know, or someone I did not wish to call me.
3. If something sounds too good to be true, it usually is.
4. Persons over the age of 65 are often targeted by con-artists.
5. If a telemarketer calls me, I usually listen to what they have to say.

Each question corresponds to a Likert scale and has a total possible range of 1 to 7 (1 = strongly agree, 2 = agree, 3 = slightly agree, 4 = neither agree or disagree, 5 = slightly disagree, 6 = disagree, 7 = strongly disagree). The total score for susceptibility to scams was calculated by averaging the five items (with items 1, 2, and 5 reverse coded). The state-

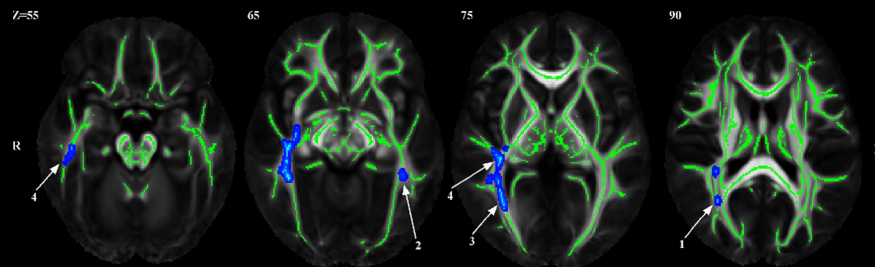
Susceptibility to Scams – Grey Matter Density



Susceptibility to Scams – White Matter Integrity

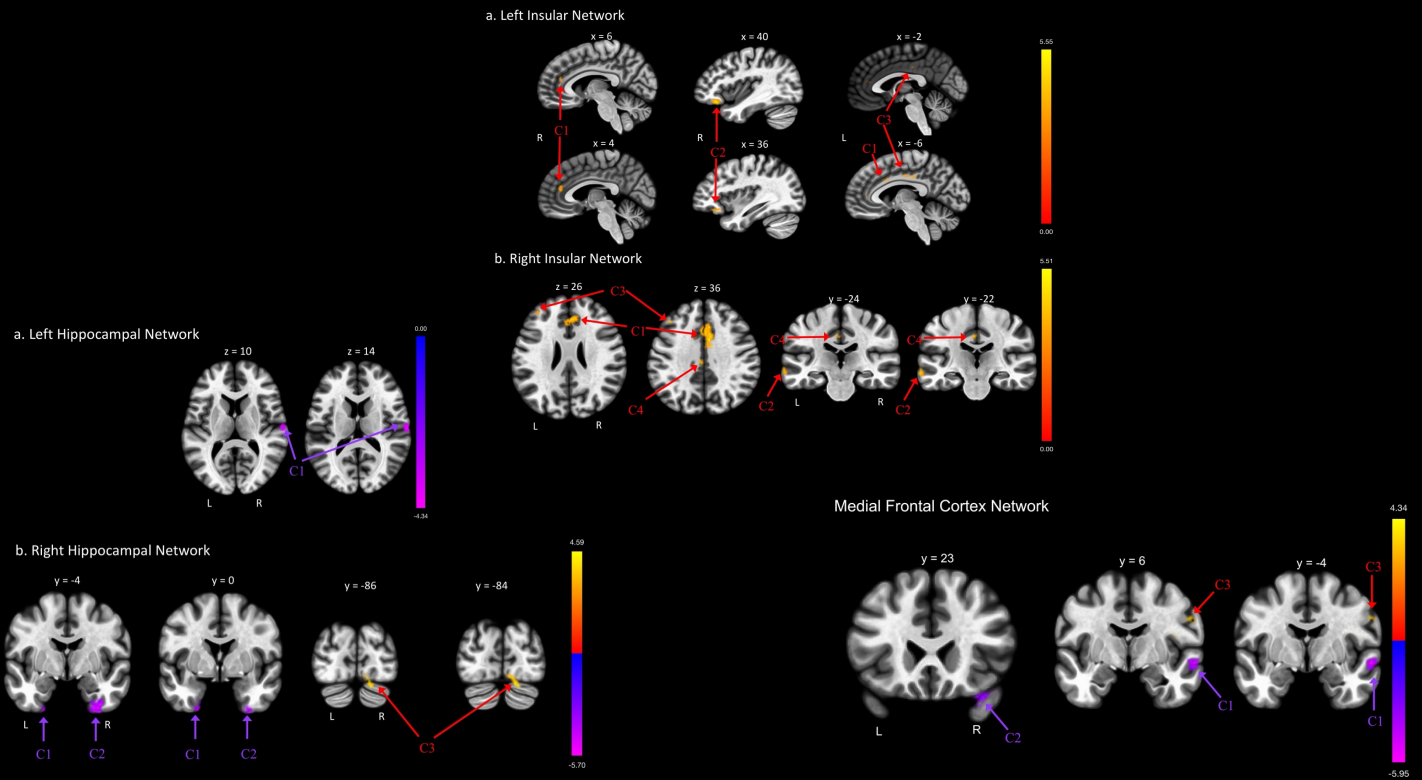


FA (age, education, sex)



FA (age, education, sex, global cognition)

Brain Connectivity and Reported Financial Exploitation in Older Adults



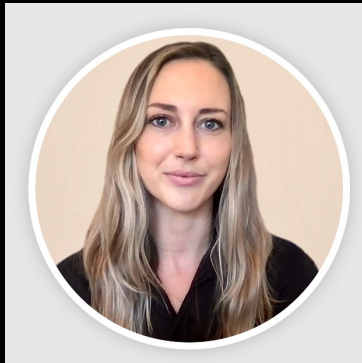


Cerebral Cortex, 2024, 34, bhae360

<https://doi.org/10.1093/cercor/bhae360>

Advance access publication date 3 September 2024

Original Article



Lower entorhinal cortex thickness is associated with greater financial exploitation vulnerability in cognitively unimpaired older adults

Laura Fenton ¹, Lauren E. Salminen², Aaron C. Lim¹, Gali H. Weissberger³, Annie L. Nguyen⁴, Jenna Axelrod¹, Daisy Noriega-Makarskyy¹, Hussein Yassine⁵, Laura Mosqueda⁶, S. Duke Han^{1,*}

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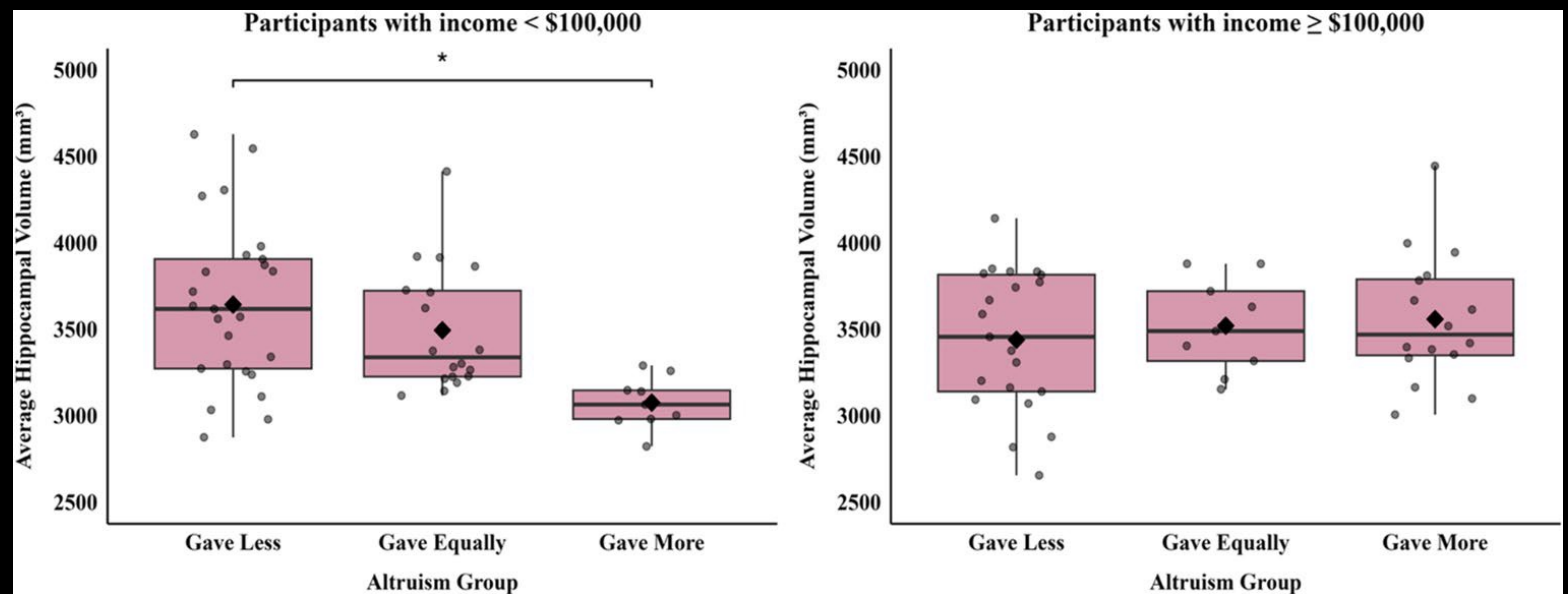
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Brain Macrostructure Correlates of Blind Giving in Older Adults without Dementia

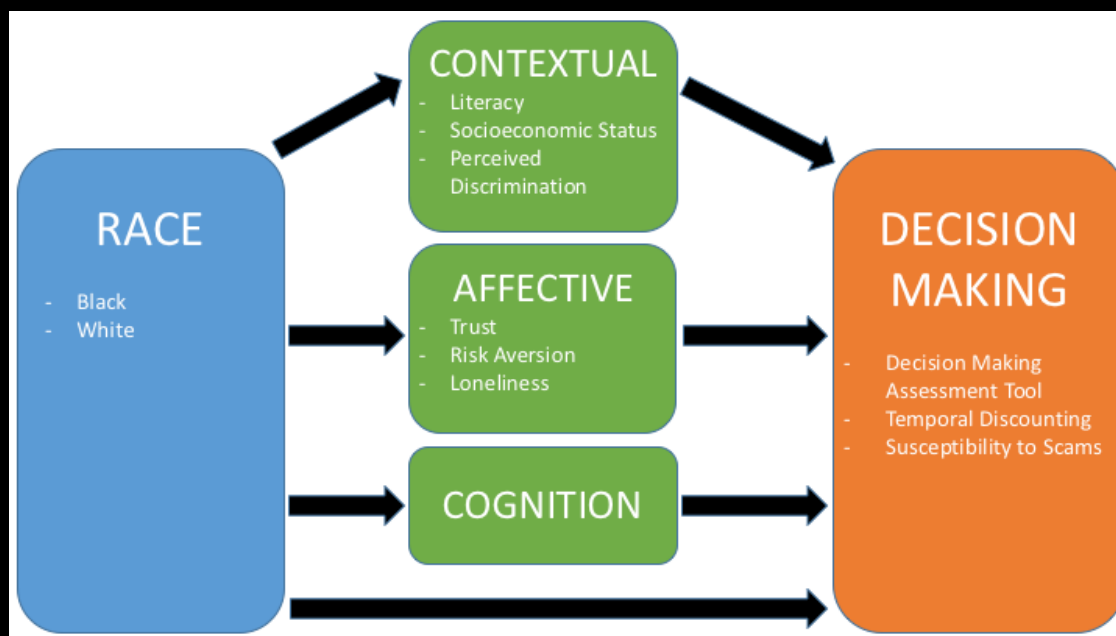


Some Thoughts...

- Very few behavioral economic or neuroimaging decision making studies have a diverse representation of participants.
 - Racial differences in cognitive and affective factors have been suggested.
 - Racial differences in decision making are suggested by a limited number of studies in financial planning and healthcare treatment options.
- However, whether (or the extent to which) decision making abilities, specifically, may vary by race is largely unknown.
- **Contextual factors (e.g., literacy, socioeconomic status) may explain a significant portion of any racial differences observed due to historically documented institutionalized racism and unequal access to supportive resources.**

Racial Differences in Decision Making among Older Adults

(R01AG055430; PI: Han along with Co-I: Barnes)



CLINICAL INVESTIGATION

Literacy Mediates Racial Differences in Financial and Healthcare Decision Making in Older Adults

S. Duke Han, PhD,^{*†‡§¶||**}  Lisa L. Barnes, PhD,^{¶||**} Sue Leurgans, PhD,^{||**} Lei Yu, PhD,^{||**} David A. Bennett, MD,^{||**} and Patricia A. Boyle, PhD^{¶||}

Table 1. Demographic, Cognitive, and Other Descriptive Data

Variable	Black (N = 138)		White (N = 138)		t, Z, or χ^2	P Value
	Mean	SD	Mean	SD		
Age, y	76.85	6.07	77.30	6.38	0.60	.55
Education, y	14.91	3.12	14.99	2.98	−0.32	.75
Sex (male:female ratio)	27:111		27:111		0	1
Global cognition	0.11	0.53	0.15	0.50	0.59	.56
Total decision making	6.89	2.52	7.75	2.58	−2.99	<.01
Financial decision making	3.20	1.23	3.58	1.38	−2.53	.01
Healthcare decision making	3.70	1.67	4.17	1.51	−2.45	.01
Total literacy	60.37	13.52	68.97	14.01	5.18	<.01

Note. Global cognition is a mean of z-scores. Literacy is percentage correct, and decision making is total score correct. For age, global cognition, and literacy, t-values are reported. For sex, χ^2 is reported. For education and decision making, Wilcoxon Z-values are reported.

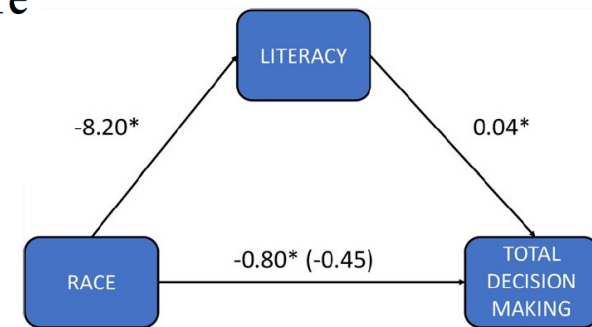


Figure 1. Mediation of race association with total decision making by literacy. Standardized regression coefficients for the association between race and literacy (−8.20) and literacy and total decision making (0.04), after multiplication, estimate the indirect effect of race on total decision making through literacy. The direct effect of race on total decision making is estimated by standardized regression coefficient for the association between race and total decision making after controlling for literacy (−0.45). Regression models were adjusted for age, education, sex, and global cognition. * $P < .05$.

Susceptibility to Scams in Older Black and White Adults

S. Duke Han^{1,2,3,4,5,6,7*}, Lisa L. Barnes^{5,6,7}, Sue Leurgans^{6,7}, Lei Yu^{6,7}, Christopher C. Stewart⁸, Melissa Lamar^{5,6}, Crystal M. Glover^{5,6,7}, David A. Bennett^{6,7} and Patricia A. Boyle^{5,6}

TABLE 1 | Demographic, cognitive, and other descriptive data.

	Black (N = 296)		White (N = 296)		t, Z	p
	Mean	SD	Mean	SD		
Age	77.903	6.614	78.190	6.703	t = 0.52	0.6014
Education	15.128	3.236	15.149	3.054	Z = 0.3932	0.6942
Global cognition	0.061	0.541	0.120	0.511	Z = 1.2219	0.2217
Susceptibility to scams	2.386	0.965	2.616	0.797	Z = 4.0428	<0.0001
Self-reported discrimination	1.881	2.152	0.739	1.257	Z = 6.9496	<0.0001
Socioeconomic status	6.144	2.700	6.981	2.450	Z = 3.6025	0.0003
Financial and health literacy	60.608	12.825	67.918	13.055	t = 6.8600	<0.0001
Trust	20.836	4.061	24.054	3.465	Z = 8.6692	<0.0001
Risk aversion	0.438	0.313	0.292	0.299	Z = -8.0460	<0.0001
Loneliness	2.022	0.631	2.160	0.607	Z = -2.6904	0.0071

Age and education are presented in years. Global cognition is a mean of z-scores. Susceptibility to scams is total score. For age and financial and health literacy, t-values are reported. For education, global cognition, susceptibility to scams, self-reported discrimination, socioeconomic status, trust, risk aversion, and loneliness, Wilcoxon Z-values are reported.

TABLE 2 | Association of race with susceptibility to scams.

	Model 1	Model 2	Model 3
Estimate (standard error, p-value)			
Age	0.0263 (0.0051, <0.0001)	0.0164 (0.0053, 0.0020)	0.0155 (0.0052, 0.0031)
Sex (male = 1, female = 0)	0.1462 (0.0877, 0.0959)	0.0901 (0.0865, 0.2976)	0.0878 (0.0855, 0.3045)
Education	-0.0363 (0.0107, 0.0007)	-0.0158 (0.0112, 0.1560)	-0.0149 (0.0110, 0.1783)
Global cognition		-0.3698 (0.0705, <0.0001)	-0.3891 (0.0699, <0.0001)
Race (Black = 1, White = 0)			-0.2496 (0.0649, 0.0001)

Dependent variable is susceptibility to scams total score. For sex, male is coded as 1 and female is coded as 0. For race, Black is coded as 1 and White is coded as 0.

TABLE 3 | Susceptibility to scams item response by race.

	Black (N = 296)		White (N = 296)		Z	p
	Mean	SD	Mean	SD		
Item 1: I feel I have to answer the phone whenever it rings, even if I do not know who is calling.	3.490	2.055	4.676	2.062	6.8043	<0.0001
Item 2: I have difficulty ending a phone call, even if the caller is a telemarketer, someone I do not know, or someone I did not wish to call me.	2.135	1.455	2.182	1.438	0.5724	0.5670
Item 3: I am sometimes tempted to give out my personal information to a telemarketer.	2.000	1.083	1.882	0.885	-1.0539	0.2919
Item 4: Persons over the age of 65 are often targeted by con-artists.	1.747	0.689	1.909	0.695	3.3736	0.0007
Item 5: If a telemarketer calls me, I usually listen to what they have to say.	2.557	1.672	2.432	1.512	-0.3073	0.7586

Wilcoxon Z-values are reported. Items 1, 2, and 5 are flipped scoring statements, meaning that higher scores indicate higher agreement. Items 3 and 4 are non-flipped scoring statements, meaning that lower scores indicate higher agreement.



**“Of course we’ll make a decision ...
once we have considered the 5243 factors.”**

Physical and mental health correlates of perceived financial exploitation in older adults: Preliminary findings from the Finance, Cognition, and Health in Elders Study (FINCHES)

Gali H. Weissberger^a, Laura Mosqueda^a, Annie L. Nguyen^a, Anya Samek^b, Patricia A. Boyle^{c,d}, Caroline P. Nguyen^a and S. Duke Han^{a,c,e,f,g}

^aDepartment of Family Medicine, USC Keck School of Medicine, Alhambra, CA, USA; ^bCenter for Economic and Social Research, University of Southern California, Los Angeles, CA, USA; ^cRush Alzheimer's Disease Center, Rush University Medical Center, Chicago, IL, USA; ^dDepartment of Behavioral Sciences, Rush University Medical Center, Chicago, IL, USA; ^eDepartment of Psychology, USC Dornsife College of Letters, Arts, and Sciences, Los Angeles, CA, USA; ^fUSC School of Gerontology, Los Angeles, CA, USA; ^gDepartment of Neurology, USC Keck School of Medicine, Los Angeles, CA, USA

ABSTRACT

Objectives: Financial exploitation (FE) in old age is poorly understood, particularly among those without significant cognitive impairment. The Finance, Cognition, and Health in Elders Study (FINCHES) aims to identify factors associated with FE among cognitively-healthy older adults. Preliminary findings regarding physical and mental health correlates in the pilot phase of FINCHES are reported.

Method: Sixteen older adults who self-reported FE were demographically-matched on age, education, sex, and race/ethnicity to eighteen older adults who did not report past FE.

Results: Those who believed they were exploited endorsed significantly greater symptoms of depression ($p = 0.014$) and marginally greater symptoms of anxiety ($p = 0.062$). Participants trended towards lower perceived successful aging ($p = 0.094$). Perceived FE participants also endorsed greater medical conditions ($p = 0.047$), but follow-up individual item analyses suggest that this was driven by problems with sleep ($p = 0.030$).

Conclusions: These preliminary findings from the pilot phase of FINCHES highlight negative mental health factors associated with perceived FE among cognitively-intact older adults.

ARTICLE HISTORY

Received 26 October 2018
Accepted 2 January 2019

KEYWORDS

Financial exploitation;
aging; mental health;
physical health; sleep



Physical Frailty and Reported Financial Exploitation in Older Adults

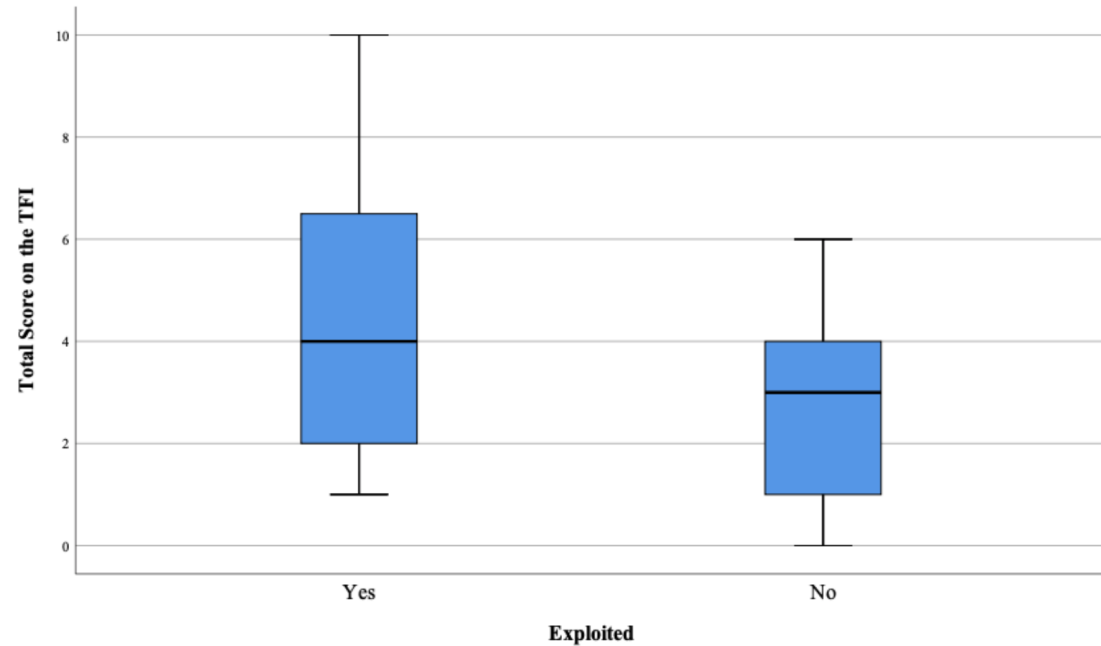


Figure 1. Boxplot display of total scores on the 15-item Tilburg Frailty Inventory (TFI) for perceived financially exploited ($n = 24$) and non-exploited ($n = 13$) older adults.

Qualitative Interviews of Financial Exploitation in Older Adults



Journals of Gerontology: Social Sciences
cite as: *J Gerontol B Psychol Sci Soc Sci*, 2021, Vol. XX, No. XX, 1–9
doi:10.1093/geronb/gbab010
Advance Access publication January 10, 2021

OXFORD



Research Article

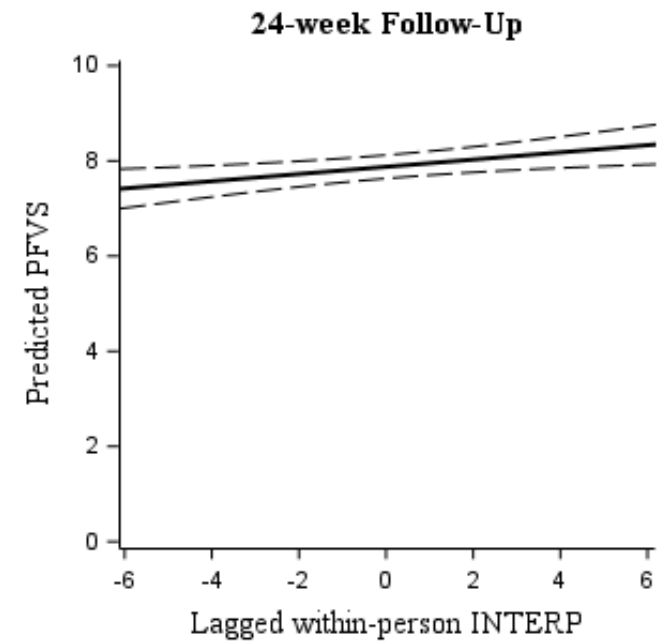
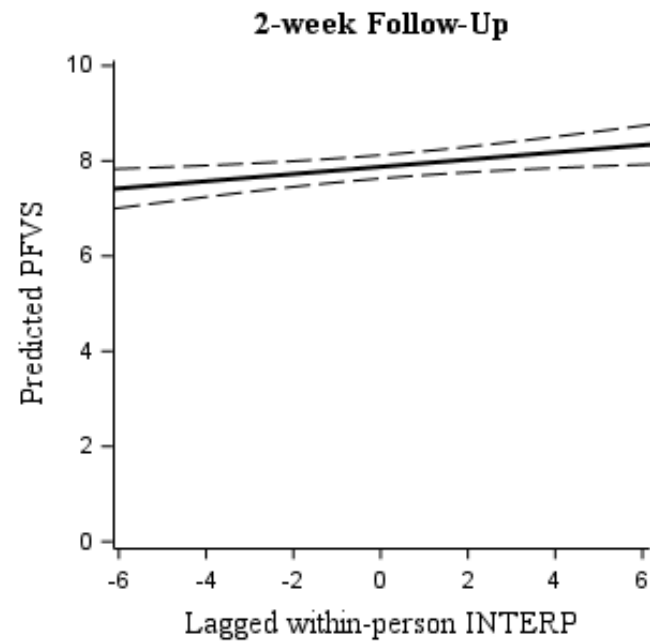
Perceived Types, Causes, and Consequences of Financial Exploitation: Narratives From Older Adults

Annie L. Nguyen, PhD, MPH,^{1,*} Laura Mosqueda, MD,¹ Nikki Windisch, MSG,¹ Gali Weissberger, PhD,² Jenna Axelrod, PhD,¹ and S. Duke Han, PhD¹

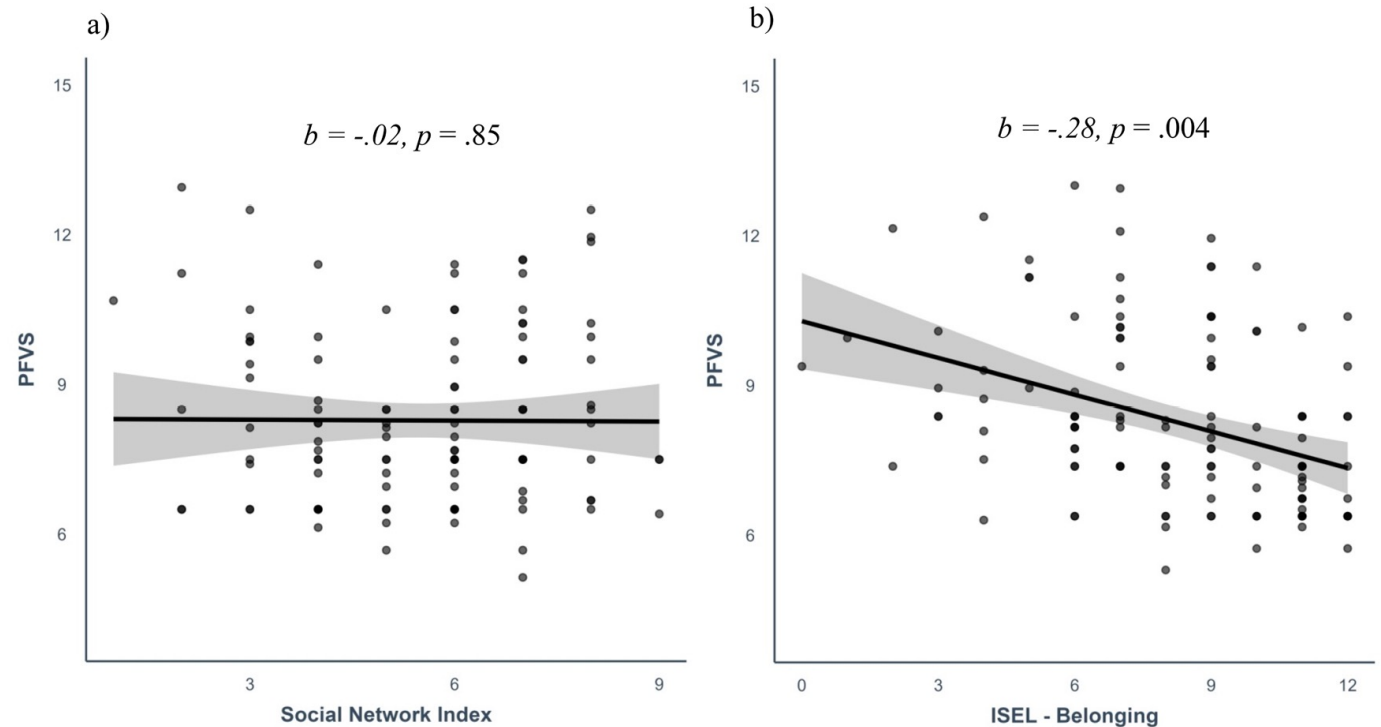
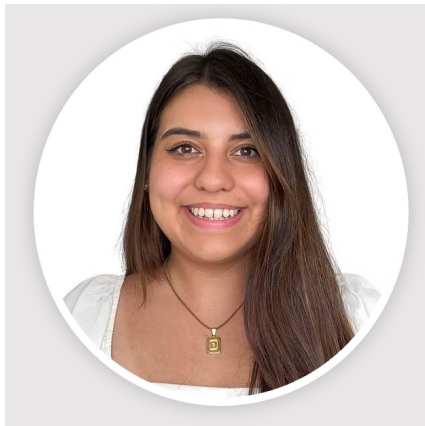
¹Department of Family Medicine, University of Southern California, Keck School of Medicine, Alhambra, USA. ²The Interdisciplinary Department of Social Sciences, Bar-Ilan University, Ramat Gan, Israel.

*Address correspondence to: Annie L. Nguyen, PhD, MPH, Department of Family Medicine, University of Southern California, Keck School of Medicine, 1000 South Fremont Avenue, Unit 22, Alhambra, CA 91803, USA. E-mail: annie.nguyen@med.usc.edu

Interpersonal Relationships Predict Financial Exploitation Vulnerability in Older Adults



Social Connectedness and Financial Vulnerability in Older Age



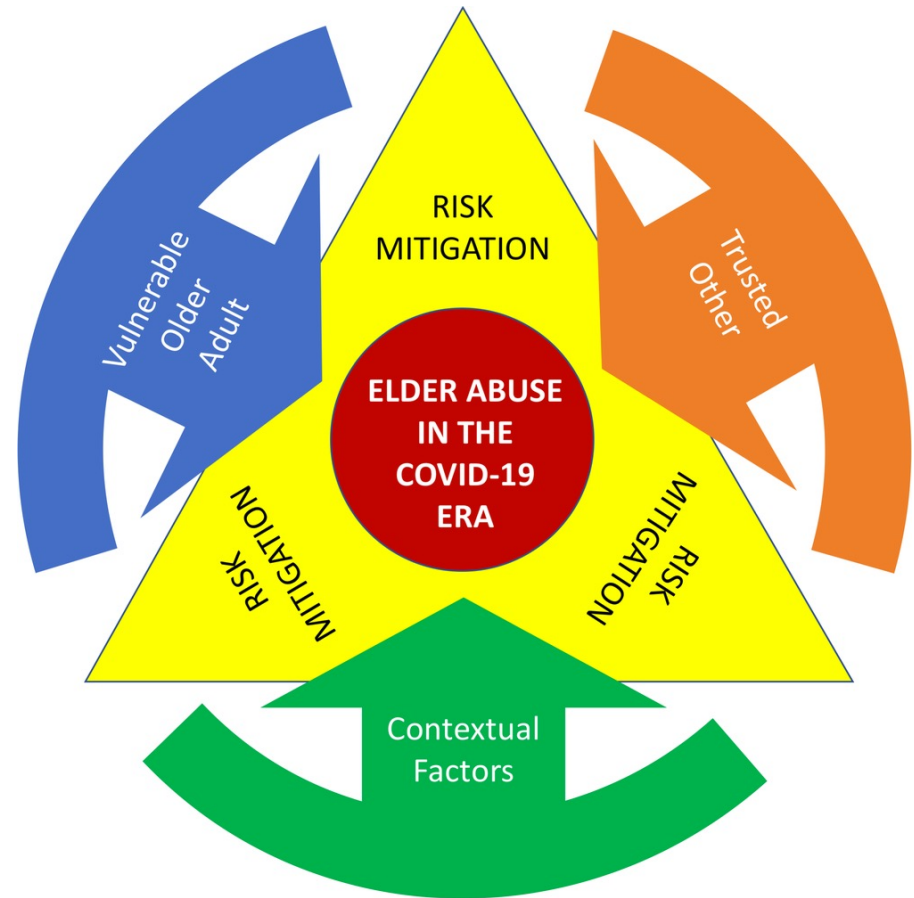
Elder Abuse in the COVID-19 Era

S. Duke Han PhD ✉ Laura Mosqueda MD

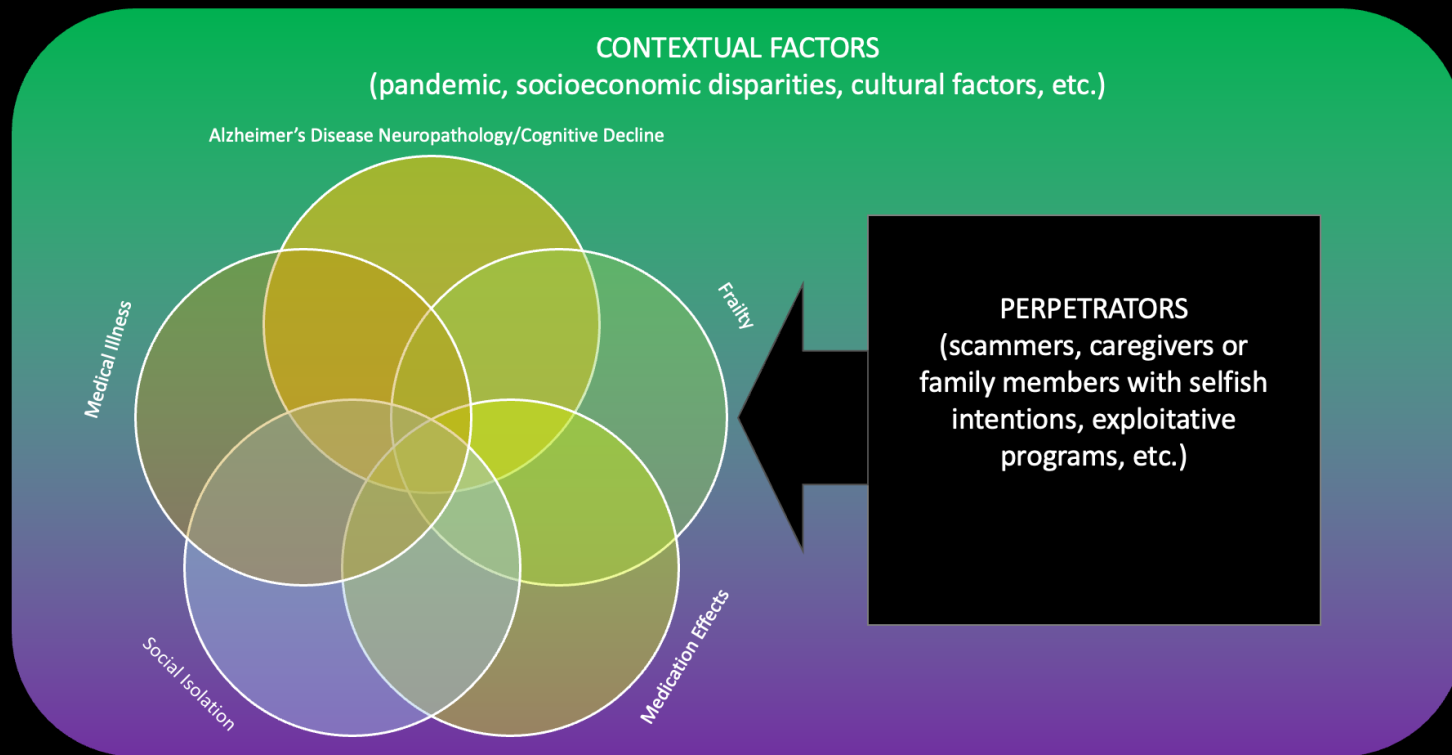
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Abuse Invention/Prevention Model (AIM). AIM describes three core intersecting considerations in elder abuse: (1) the vulnerable older adult, (2) the trusted other, and (3) the context in which the abuse occurs. Tailored approaches that consider each of these can be developed to mitigate risks for elder abuse in the coronavirus disease 2019 (COVID-19) era.



INTERSECTIONAL MODEL



Main Points

- Age-related cognitive decline could make an older adult more susceptible to scams and impact decision making.
- Although poor cognition is associated with poor decision making, poor decision making may not be solely due to poor cognition.
- A complex network of brain regions susceptible to age-related AD neuropathology may be involved in suboptimal decision making in older age.
- Health, social dynamics, and other factors play a role in decisions.
- More research needs to be done with diverse samples and to better understand the contextual factors surrounding decisions.

Practical Take-Aways for Policy, Prevention, and Practice

- Treat changes in an older customer's financial behavior as a potential vulnerability signal and respond with supportive, autonomy-preserving safeguards.
 - Going beyond age and cognition considerations
 - Introducing pauses or slowdowns for large, urgent, or unusual transactions
 - Training employees to recognize signs of cognitive decline, coercion, or poor decisions
 - Designating a trusted-other and agreeing to alerting systems when first becoming a customer
 - Developing escalation processes that may involve healthcare professionals
 - Preserve autonomy of the customer: assessment and support

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Using AI to Get Ahead of Fraud Threats



Using AI to Get Ahead of Fraud Threats

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Tips from the 'Tinder Swindler' survivor: How to talk to customers being scammed



Tips from the 'Tinder Swindler' survivor: How to talk to customers being scammed

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Tips from the 'Tinder Swindler' survivor: How to talk to customers being scammed

- Understand resistance to scam warnings
- Preserve trust during intervention
- Explore engagement beyond the first



Table Discussion

14 minutes total: 10-minute discussion | Selected tables should be prepared for a 2-minute report-out

SCENARIO: A client does not accept the banker's concerns and proceeds. The client may not return to the same location or speak with the same employee.

GOAL: Explore how FIs might build on existing approaches when one conversation may not be enough.

DISCUSS:

1. **Continue the engagement:** What should happen after the first conversation?
2. **Create the next opportunity:** How could another appropriate conversation occur if the client does not return?
3. **Handoff:** What does the next person need to continue the engagement?
4. **Coordination:** Who or what function could coordinate the next steps across employees, locations or areas of the bank?
5. **Different bank sizes:** What could work at any bank? What may need to change based on size and resources?



Table Response

INSTRUCTIONS: During the 10-minute discussion, select one note-taker to capture the table's key ideas. Be prepared for a 2-minute report-out.

- **After the first conversation, our institution could support continued engagement by:**
- **Who or what function could coordinate the next steps?**
- **How could this adapt for different bank sizes?**



Trauma-informed Strategies To Help Customers Recover After A Scam

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Trauma-informed Strategies To Help Customers Recover After A Scam

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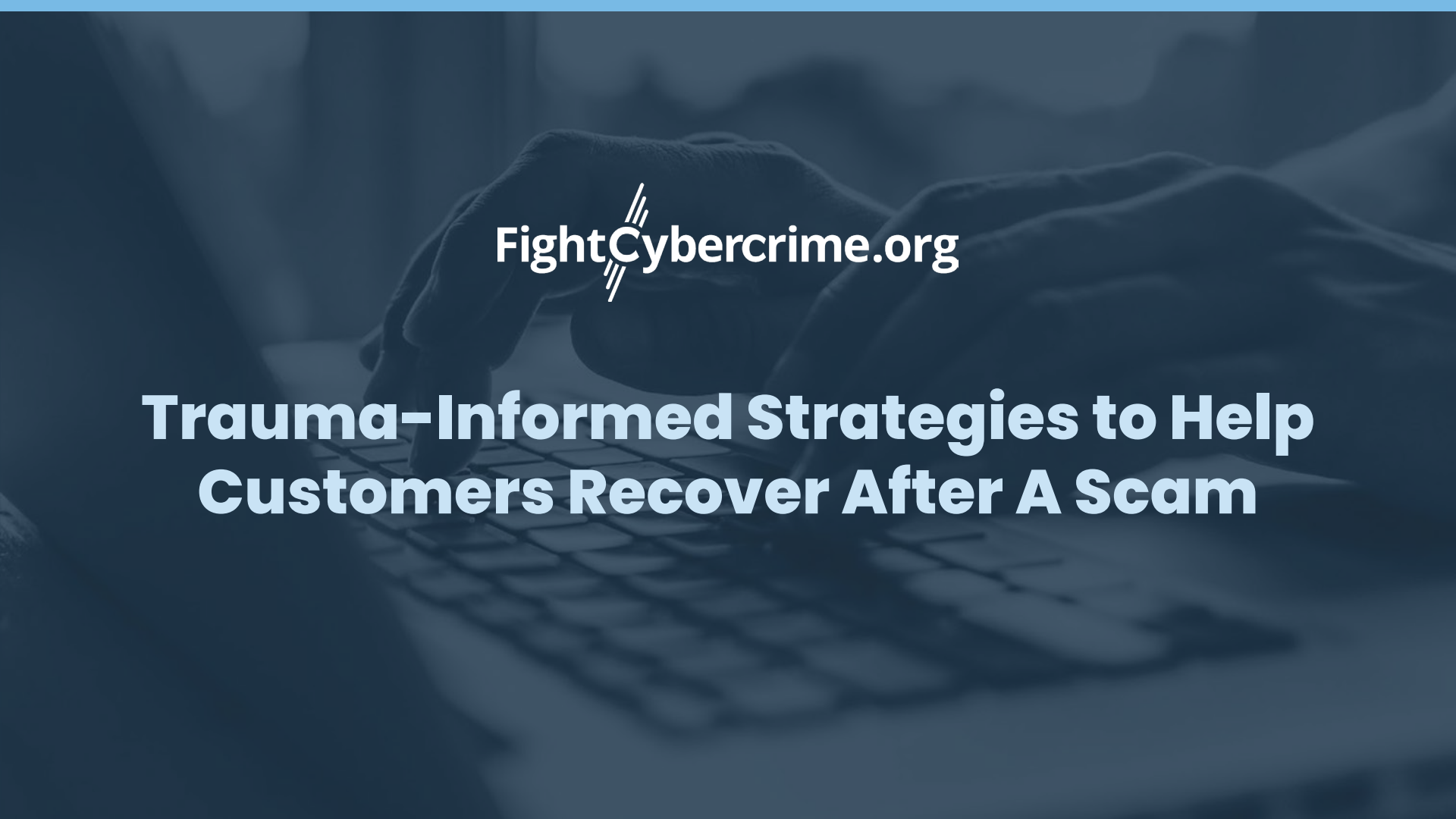
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FightCybercrime.org

Trauma-Informed Strategies to Help Customers Recover After A Scam

Our Mission: Empower individuals to recognize, report and recover from cybercrime.



Recognize.



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Recover.

Cybercrime Support Groups



This **FREE** program provides:

- Romance and crypto investment fraud assistance
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- Education on cybercrime and online safety
- Closed, monitored group communications
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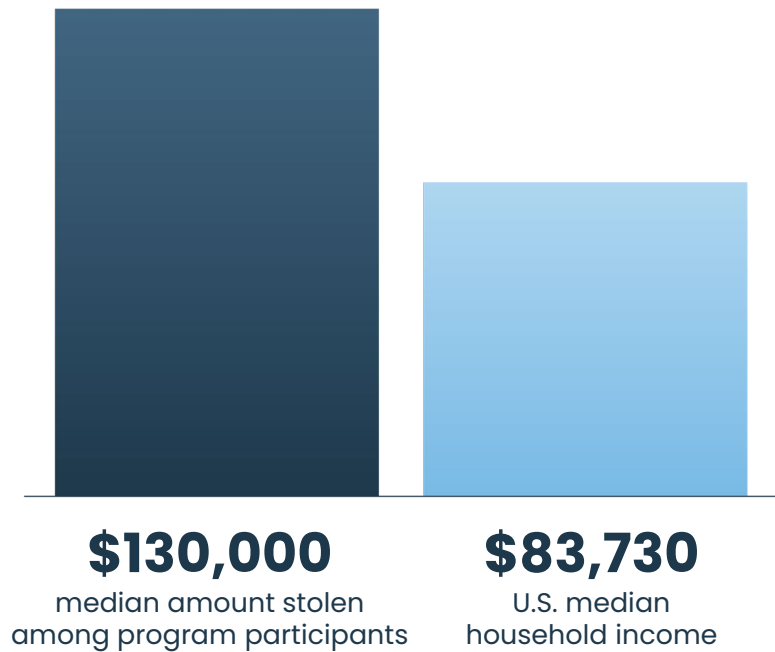
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Our Participants



Life-Changing Financial Impact

Financial impact of severe online crime is life-changing.

Compounding Harm

Financial harm compounds through tax penalties, debt, home equity loss, and more.

Complex & Costly Recovery

Recovery from severe online crime is complex, time-consuming, and costly.

Our Participants: Cryptocurrency Investment Fraud



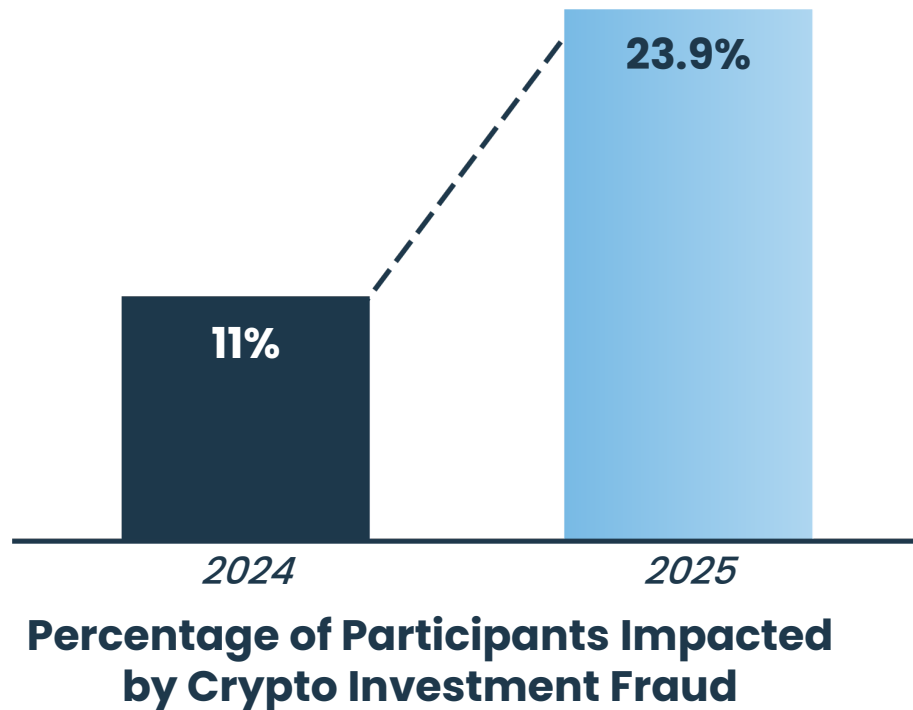
Rising Exposure

Impacted participants more than doubled, increasing from 11% in 2024 to 23.9% in 2025.

Fast-Moving, High Amounts

Quick escalation with individuals investing large sums over a short period of time

\$230,000 Median Loss



Factors Present Prior to Fraud

01

Loneliness

Emotional vulnerability and isolation prior to exposure.

02

Boredom / Social Isolation

Lack of regular social interactions and meaningful engagement.

03

Lack of Awareness of Scam Sophistication

Unaware of complex social engineering techniques.



The Fraud is Only the Beginning

Repeat Targeting

Repeat targeting by criminals is common

Impaired Decision-Making

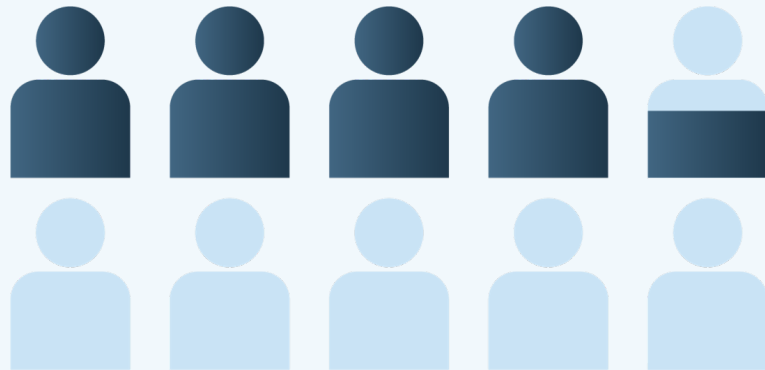
Emotional distress impairs cognitive processing

Shame & Reduced Reporting

Stigma/fear prevent victims from seeking help

Cascading Losses

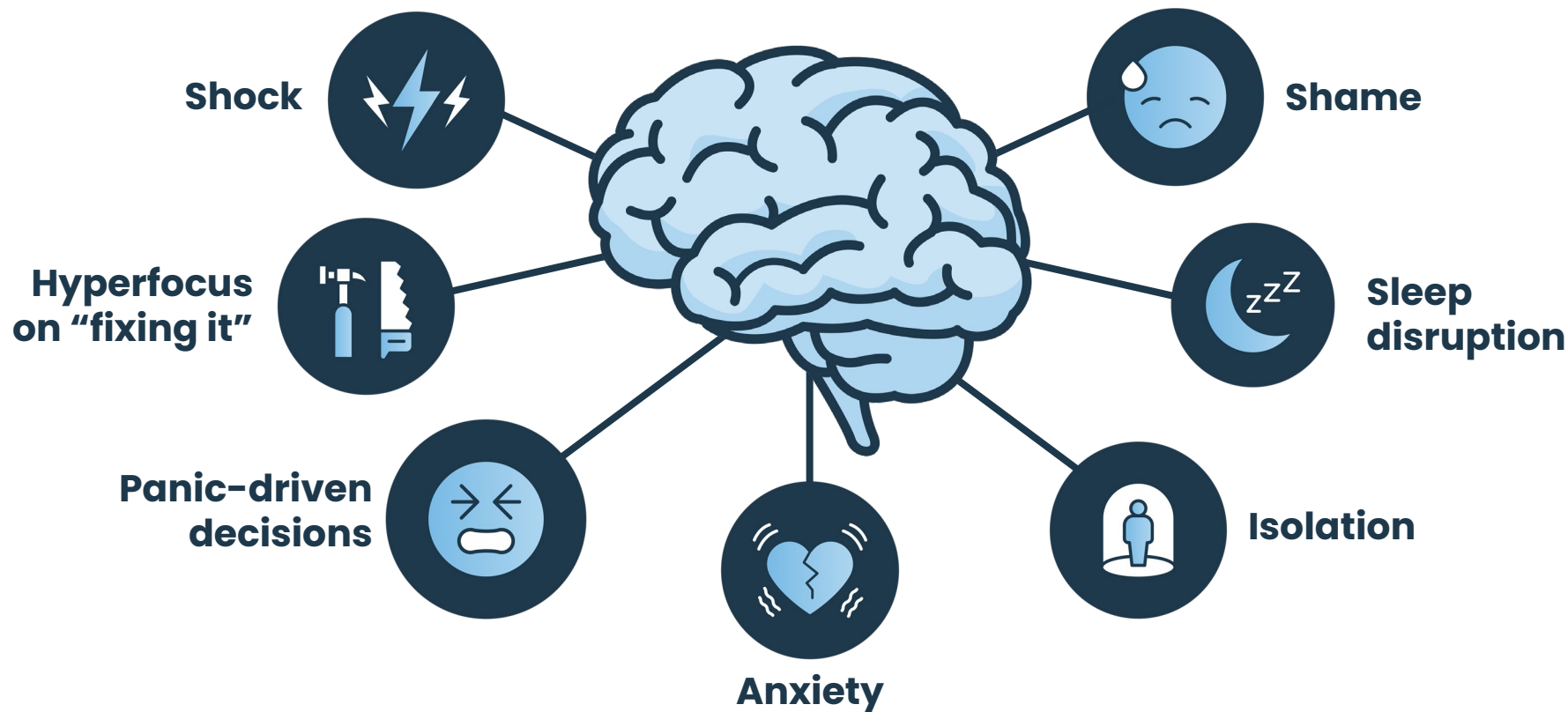
Ongoing financial repercussions and instability



43.9%

of participants indicated they had interactions with **two or more** cybercriminals prior to recovery

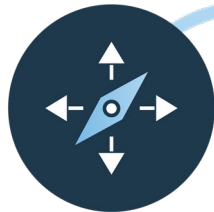
The Brain After Online Crime



Recovery Isn't Linear



**Recovery is
personal**



**There's no
"right way"**



**This is trauma;
ups and downs
will happen**

Shame: The Barrier to Fraud Disruption

01

Shame reduces reporting

Victims remain silent and isolated due to stigma and fear of judgment.



02

Limits actionable intelligence

Critical details stay hidden; victims continue to blame themselves.



03

Weakens crime disruption

Law enforcement can't dismantle networks; victims delay help-seeking.

When victims stay silent, criminals win.

Language Matters

I don't
understand how
people get
tricked like this.

How did
you **fall**
for that?

You **lost** how
much money?!?!

You really
thought that
was true?

How much
money did you
give them?

Helping Individuals Take the First Step

01 Acknowledge the emotional reality

02 Provide a path forward

03 Connect them to specialized support

04 Keep the door open



What Survivors Need to Rebuild

Avoid Isolation



Build a Trusted Network



Seek Support



Recovery: Inside Our Support Program



01

Self-Compassion

Participants learn to replace self-blame with self-kindness.

02

Understanding the Manipulation

Breaking down the social engineering tactics scammers use, including how those tactics affect brain chemistry, so participants can recognize them going forward.

03

Locking Down Digital Life

Practical cyber safety steps: tightening social media privacy, freezing credit, enabling MFA, and strengthening passwords so criminals can't access accounts.

04

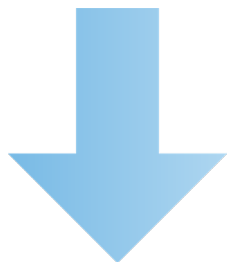
Building Resilience

Recovery is possible!

Trauma-Informed Recovery Strengthens Protection



Reduces Revictimization



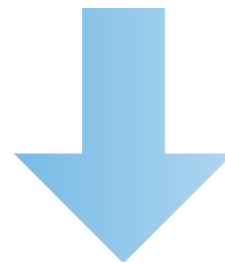
91% of participants avoided scams following recovery.

Increases Fraud Awareness



Participants reported feeling more capable of recognizing scams after recovery.

Reduces Shame



Participants reported feeling less shame after recovery.

Key Takeaways

01 Community is a part of healing

Facing recovery alone is daunting. Connection with others who understand reduces shame and rebuilds the trust that fraud destroyed.

02 A path forward matters

When someone feels lost, hopeless, or stuck, the smallest next step (a referral, a warm hand-off, or a phone number) can be the thing that keeps them moving instead of giving up.

03 Recovery is prevention

How you treat someone after a fraud doesn't just affect that moment. It affects whether they're affected by a follow-on fraud.

Thank You

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Prosecuting Elder Fraud: What Makes or Breaks a Case



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Smarter Messaging To Help Customers Stay Scam-smart

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Smarter messaging to help customers stay scam-smart

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Training to Empower Bankers

It's essential for bank personnel to identify elder financial exploitation (EFE). Learn how to prevent EFE, support victims of financial crimes, file Suspicious Activity Reports (SARs) and more.

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Educate consumers so they can safeguard their financial assets and identities. Engage with your community using free programs like Safe Banking for Seniors.

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Bankers don't have to fight elder financial exploitation alone. We have resources to help you foster relationships with law enforcement and adult protective services to protect older customers.



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