

Factors that Shape Brain Health and Risk of Alzheimer's Disease in Older Adults

LISA L. BARNES, PHD

Alla V. & Solomon Jesmer Professor of Gerontology and
Geriatric Medicine

Associate Director, Rush ADRC

**Rush
Alzheimer's
Disease
Center**



Rush University Medical Center, Chicago, IL

Outline

- Introduction
- Longitudinal studies of cognitive aging at Rush
- Factors that shape brain health and risk of AD
- Highlight key prevention strategies to protect brain health

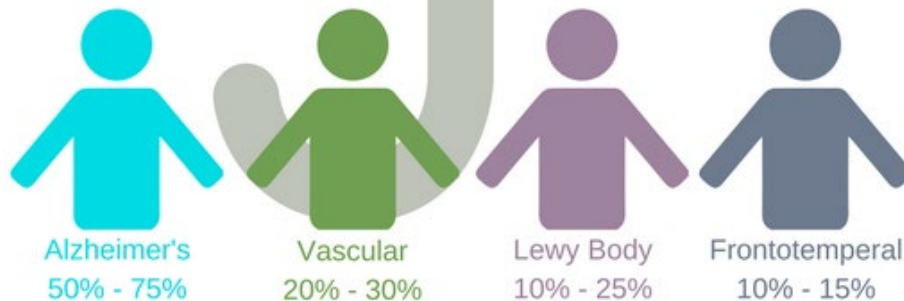
Dementia is a growing health concern for our aging population

- Today 1 in 8 older Americans (>65 years of age) are affected by Alzheimer's disease and other dementias, at an annual cost of more than \$200 billion.
- With projected population increases in the oldest age groups, ~13.5 million individuals in the USA will have Alzheimer's by the year 2050.
- Thus, prevention is a public health priority.

DEMENTIA

An "umbrella" term used to describe a range of symptoms associated with cognitive impairment.

Look Beyond
Dementia™



Alzheimer's Disease

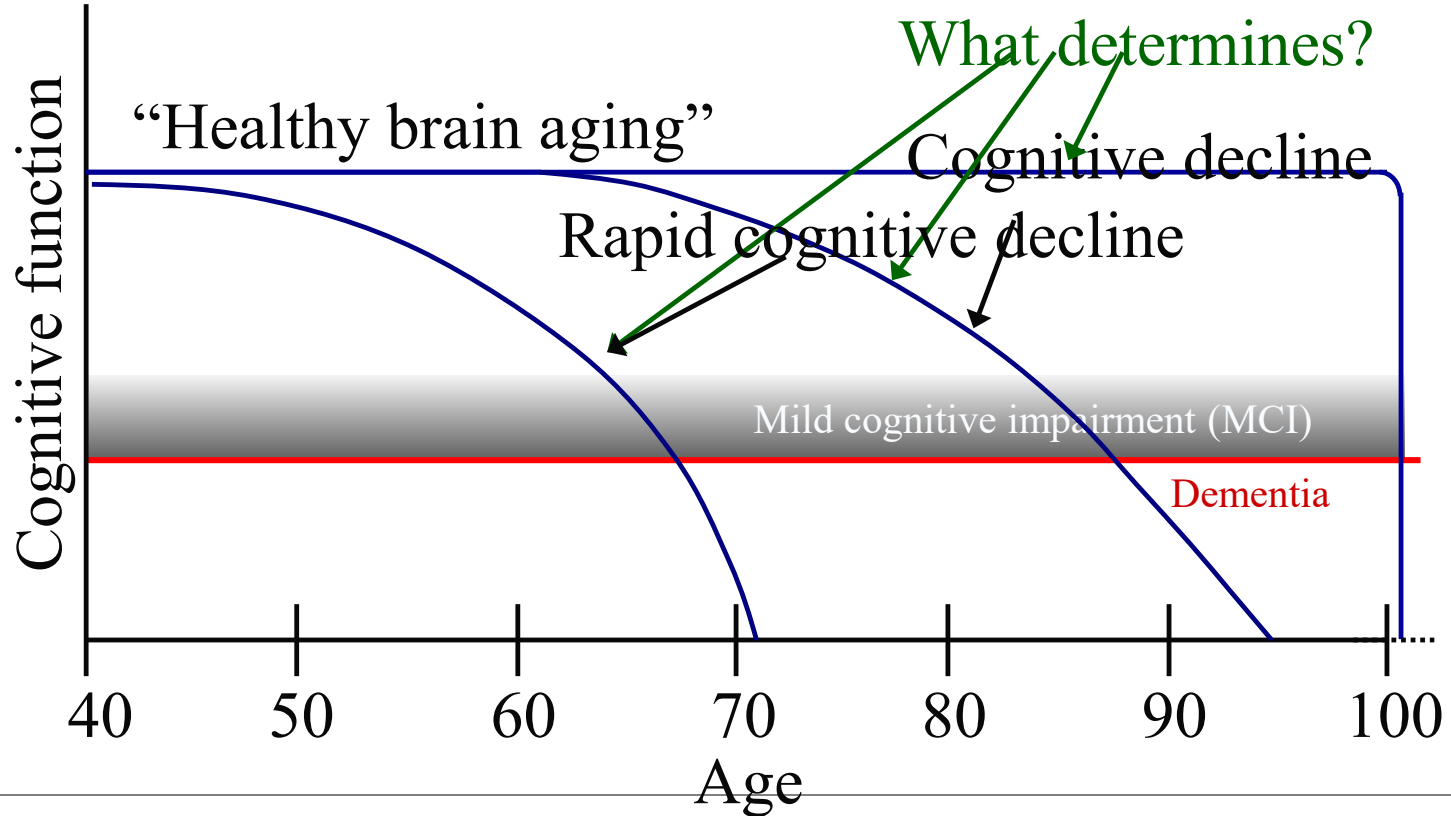
- Common and chronic disease, usually of older persons
- Most common cause of dementia
- Slow onset and gradual progression of memory problems, followed by impairment in other thinking skills
- Not a normal part of aging
- There is no cure
- If we know the factors that shape brain health, can we prevent it?

How do we prevent Alzheimer's dementia or slow cognitive decline?



- Identify risk factors (genetic/environmental)
- Determine biologic pathways linking risk factors to clinical symptoms

Age-related change in cognitive function



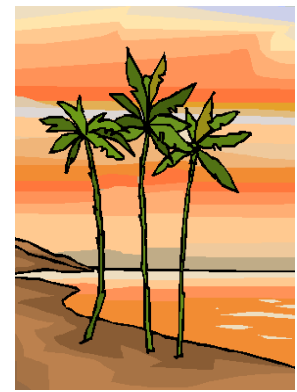
Longitudinal Cohort Studies at Rush

Religious Orders Study

Rush Memory and Aging Project

Minority Aging Research Study

The Religious Orders Study



- Began in 1994
- >1,500 older nuns, priests, and brothers
- All enroll without known dementia from across the U.S.
- All agree to annual clinical evaluation and brain donation
- 92% White, but 3 African American and 1 Latino orders
- ~30% have developed Alzheimer's dementia

Religious Orders Study: Participating Sites



The Memory and Aging Project

... because memories should last a lifetime



- Began in 1997
- >2,200 older persons
- All enroll without dementia from across northeastern Illinois
- All agree to annual clinical evaluation, annual blood donation, and donation of nerve, muscle, spinal cord, and brain
- Approximately 93% White
- ~25% have developed Alzheimer's dementia



Minority Aging Research Study (MARS)



- Began in 2004
- >800 African Americans, >65 years, enrolled without dementia
- Recruited from churches, senior buildings & organizations in Chicago
- All agree to annual in-home cognitive testing, risk factor assessment, and blood draw
- ~ 10% have developed Alzheimer's dementia
- Brain donation optional; >50% have agreed to donate their brain at the time of death

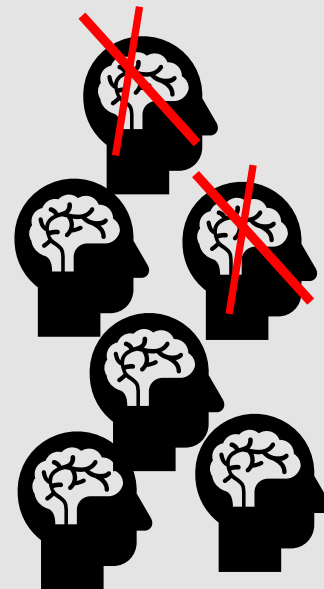
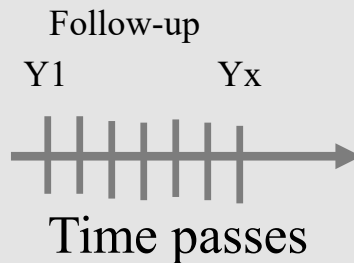


Longitudinal Cohort Design

Enroll without dementia
at baseline

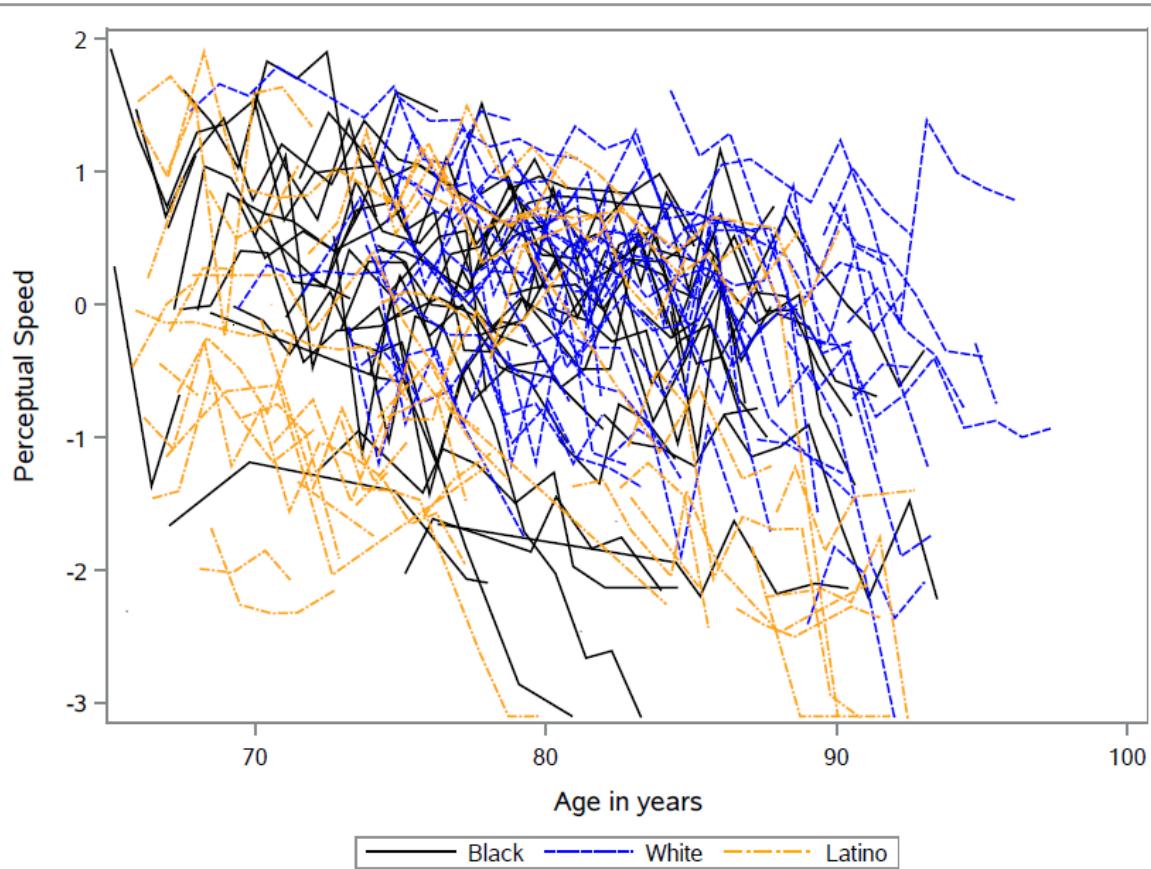


Measure
cognition



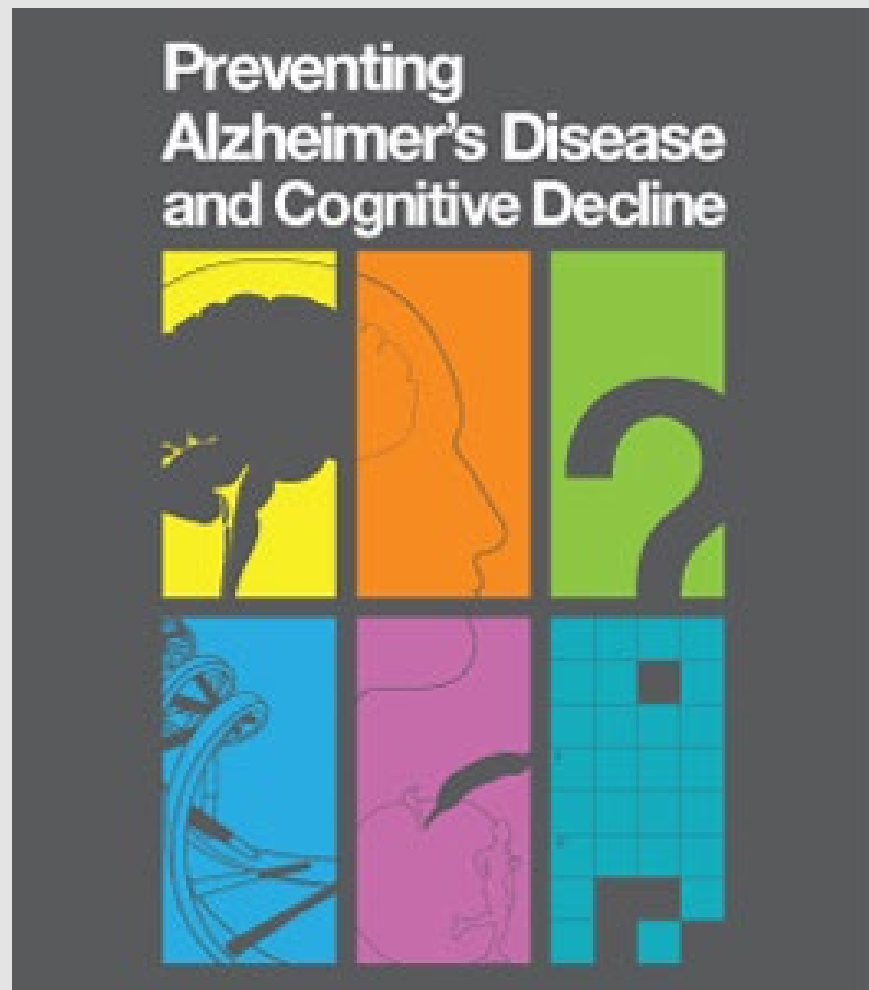
Measure risk factors

Large differences in where people start and how fast they decline



Can Alzheimer's disease be prevented?

Can we slow cognitive decline?



**Conditions in the
environment where
people are born, grow,
work, live and age**

Type of neighborhood you
live in

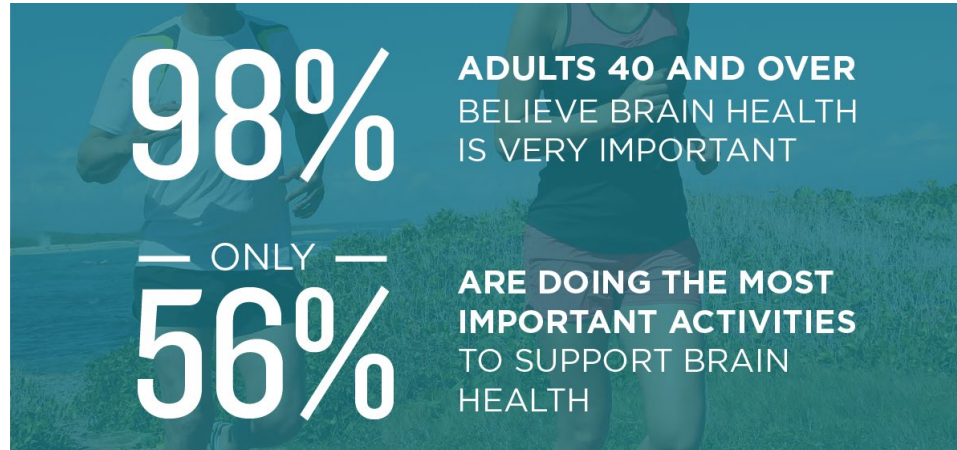
Experiences from early life

Educational experiences

How you handle stress

Access to healthcare

We Know factors across the life course can shape brain health – But what can we do???



Barriers Include:

- ⊗ Not knowing what benefits the brain
- ⊗ People Around You

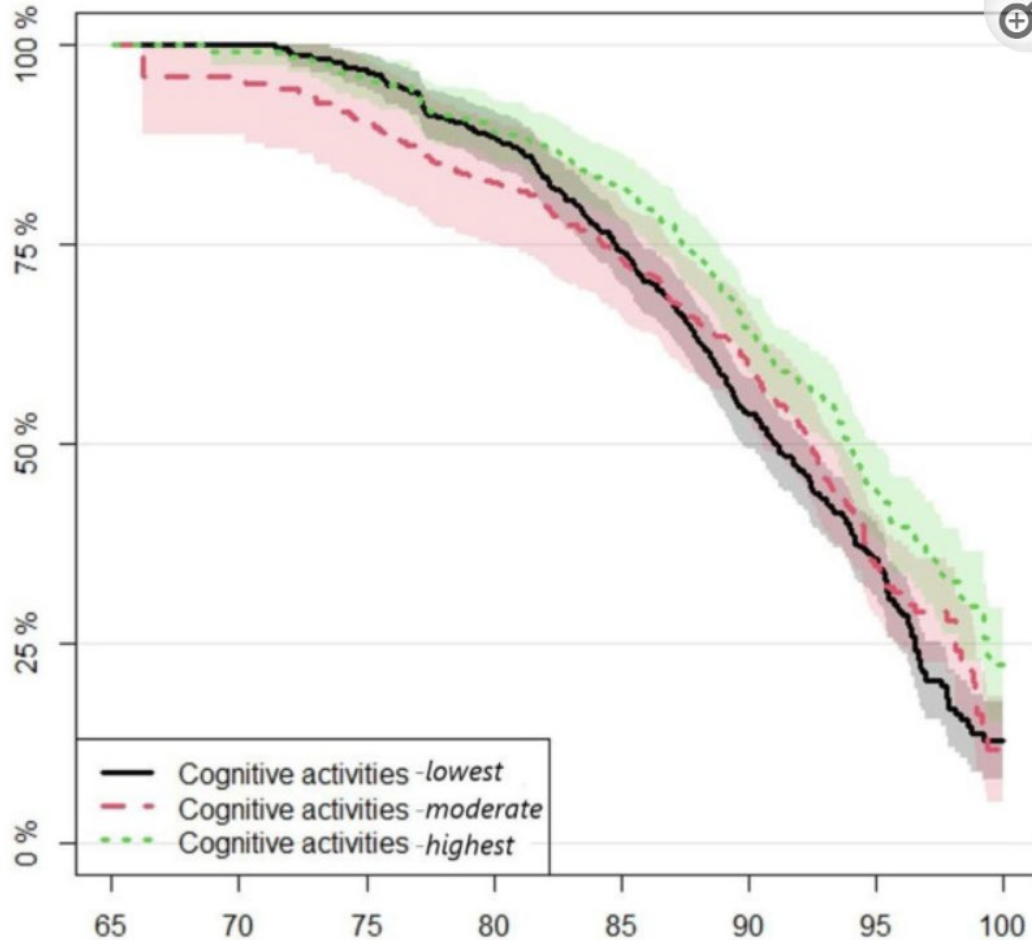
Results from our Rush studies

How often do you read books?
Magazines?
Newspapers
Play games (e.g., board games,
crosswords)

Cognitive Activity

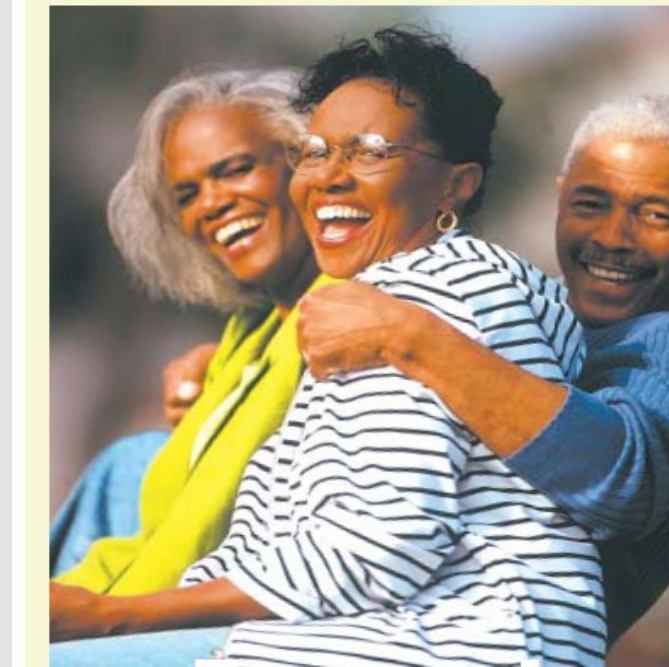
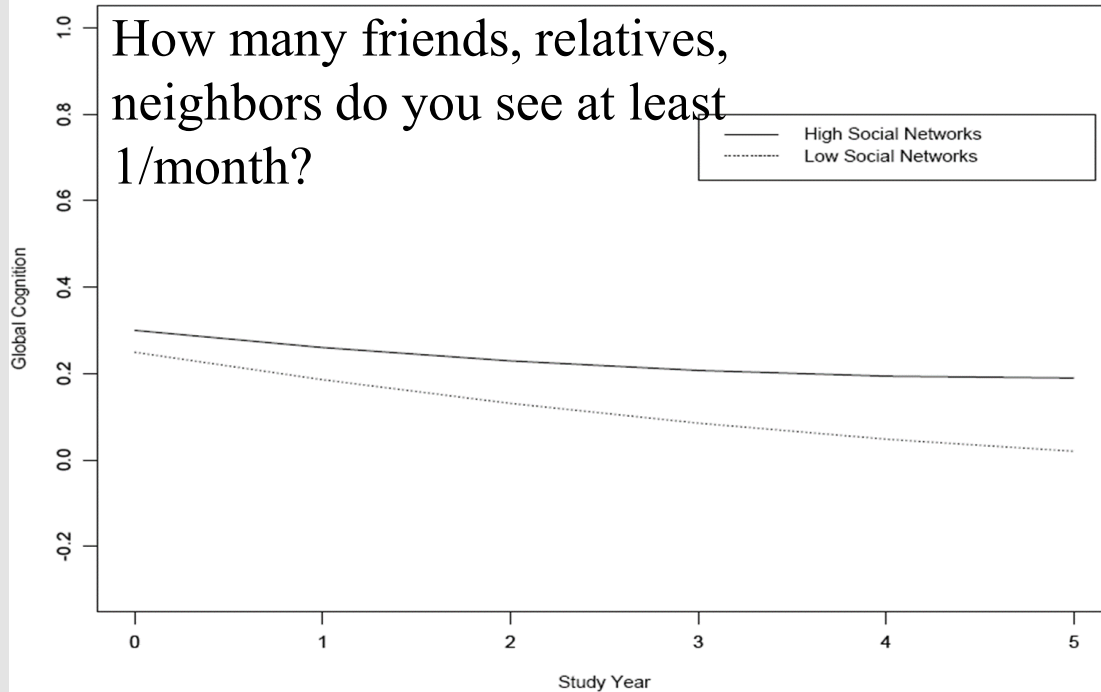


Wilson et al., 2002; Wilson et al., 2007



More frequent engagement in cognitive activities delayed dementia onset by about 4 years

Social Activity

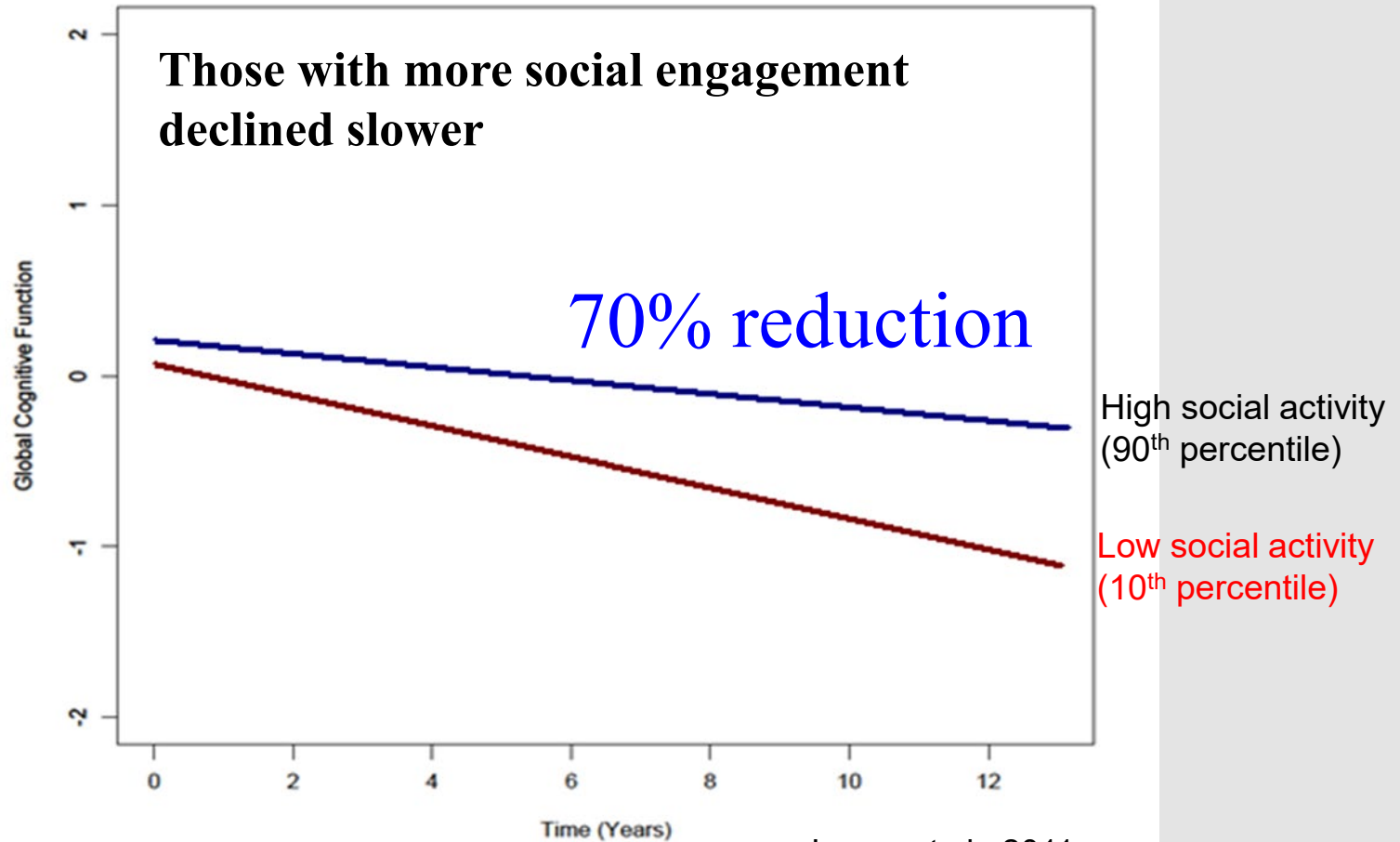


Those with more social contacts had slower rates of decline

Barnes et al., 2004

How often in the past year did you...

1. go to restaurants, sporting events, or play bingo
2. go on day trips or overnight trips
3. do unpaid community or volunteer work
4. visit relatives' or friends' houses
5. participate in groups, such as senior center, social club
6. attend church or religious services



James et al., 2011



AT LEAST 1 SERVING OF LEAFY GREENS DAILY

AT LEAST 1 OTHER COLORFUL VEGETABLE DAILY



MIND Diet

Scores range from
1 - 15

1/2 CUP BERRIES 5x/WEEK



1 OZ NUTS/SEEDS 5x/WEEK



2 TBSP EVOO EVERYDAY

FISH/SEAFOOD 1x/WEEK



POULTRY 2x/WEEK



BEANS/LEGUMES 3x/WEEK



WHOLE GRAINS 3x/DAY



RED & PROCESSED MEAT \leq 3x/WEEK



FULL FAT CHEESE \leq 2x/WEEK



FRIED FOOD
 \leq 1x/WEEK



BUTTER/MARGARINE \leq 1x/DAY



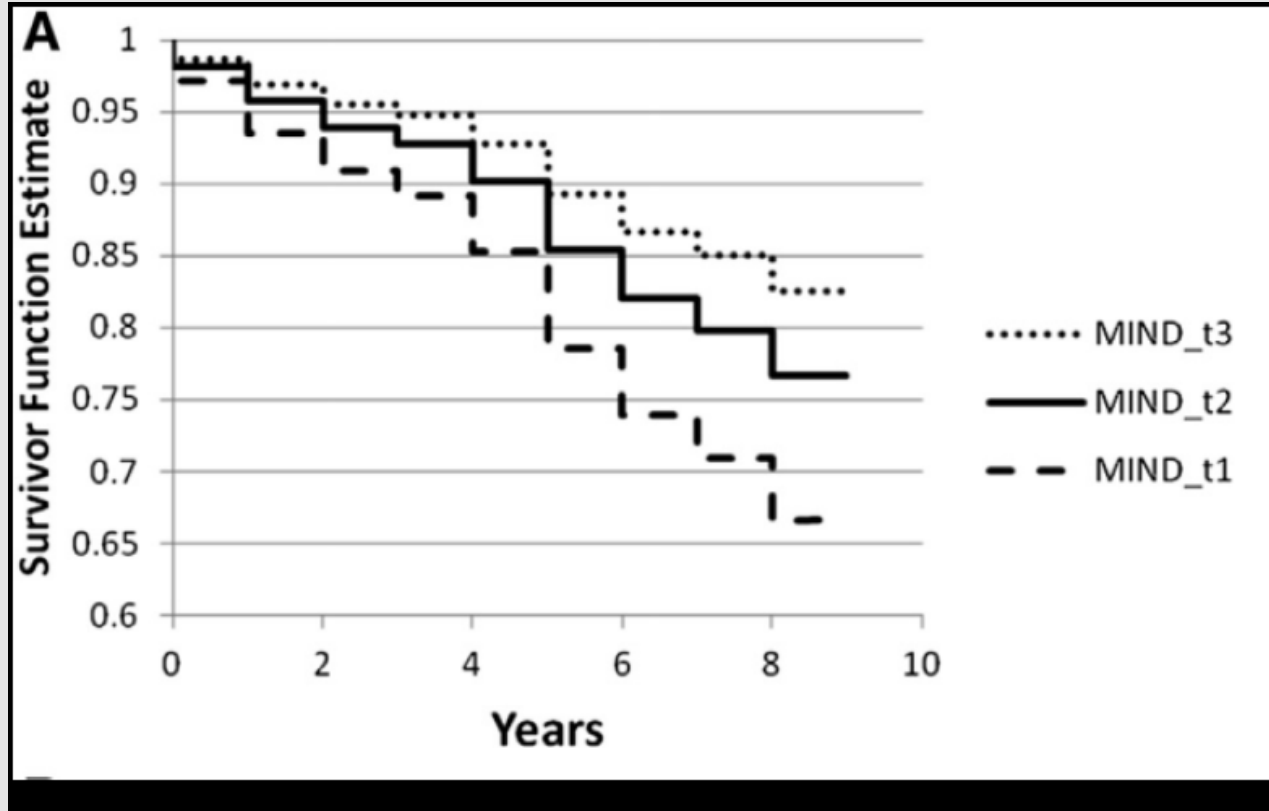
SWEETS/PASTRIES \leq 4x/WEEK



Unique Characteristics

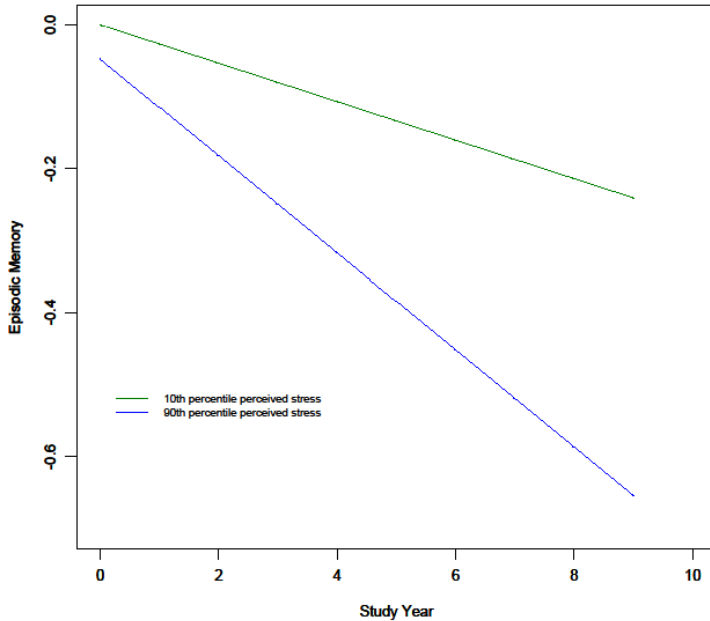
- Leafy green vegetables separate from other vegetables
- Berries only recognized fruit
- Fish 1x/week
- Dairy not emphasized

MIND Diet associated with reduced risk of Alzheimer's Disease



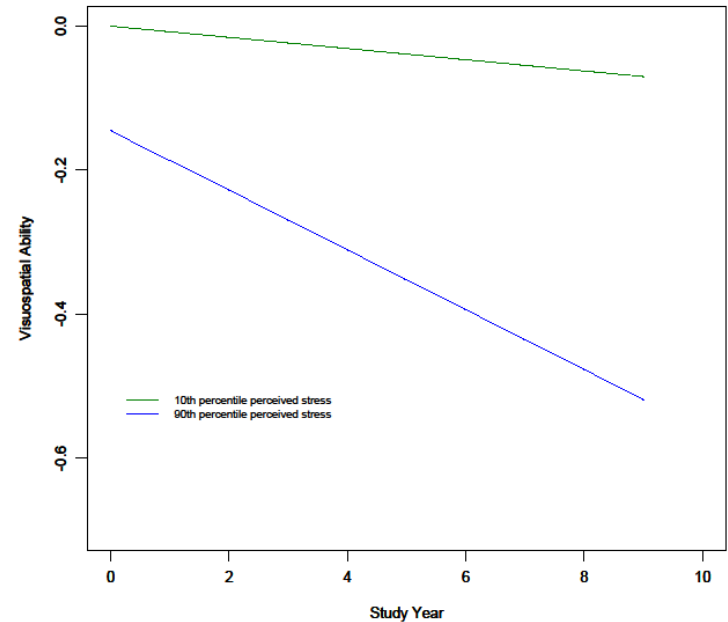
Perceived stress related to faster decline in cognition

**Degree to which one finds
their life uncontrollable,
unpredictable,
overloading**



Episodic memory

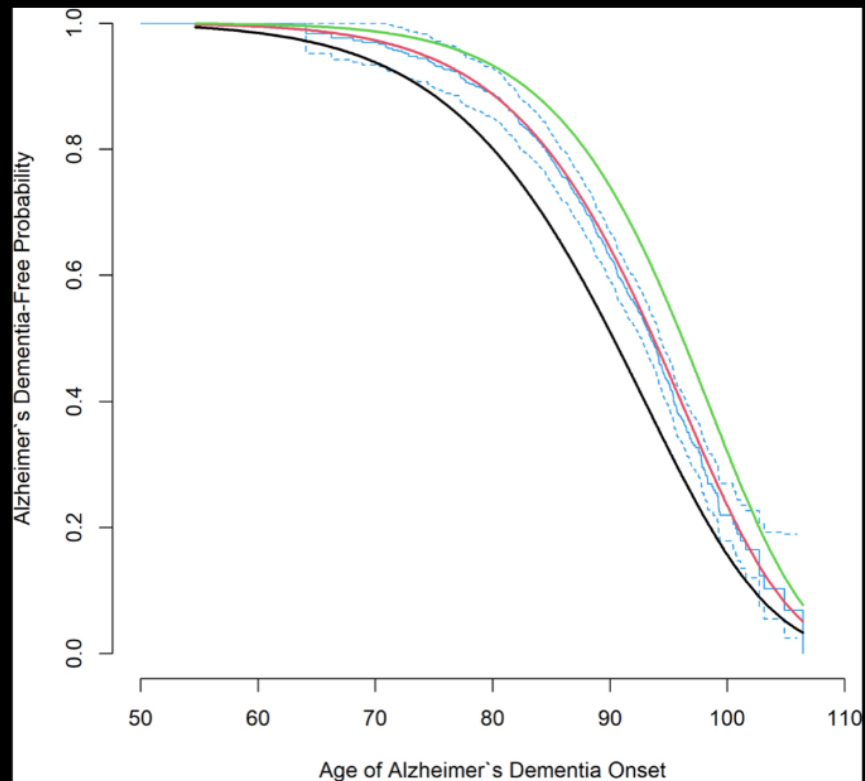
Visuospatial
Ability

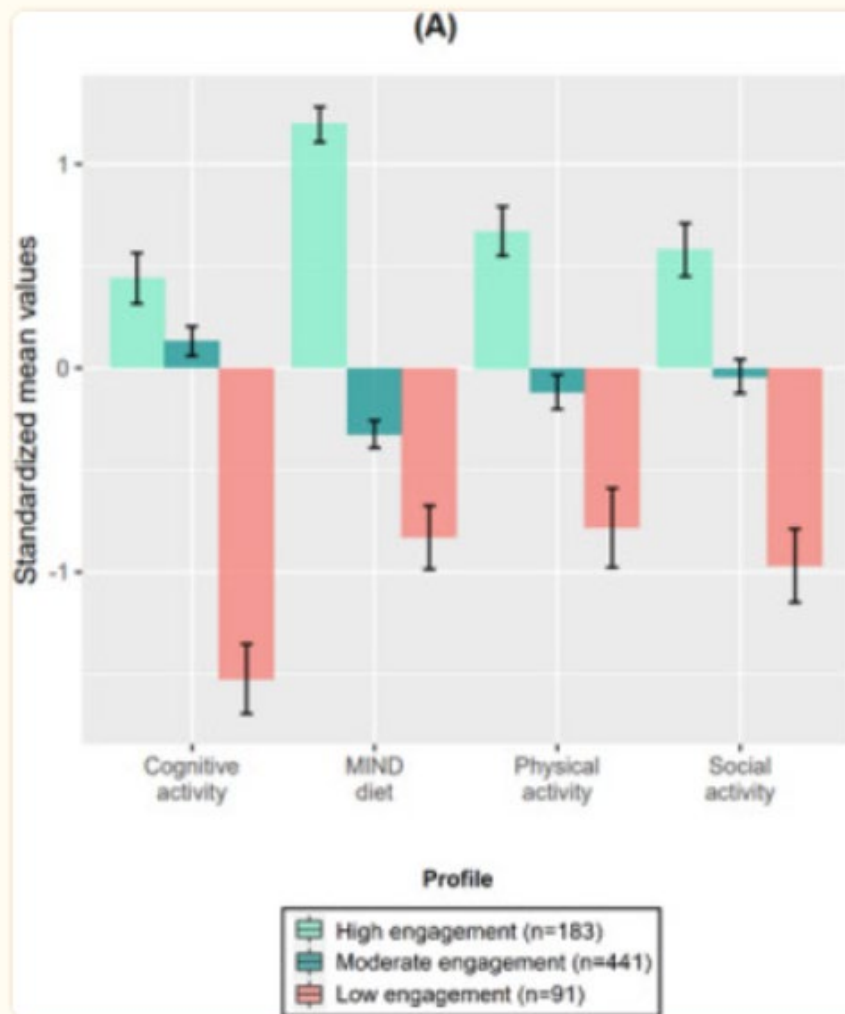


Having a higher purpose in life delays onset of Alzheimer's by ~6 years

Statement

- 1 I feel good when I think of what I have done in the past and what I hope to do in the future.
- 2 I live life 1 day at a time and do not really think about the future.
- 3 I tend to focus on the present because the future nearly always brings me problems.
- 4 I have a sense of direction and purpose in life.
- 5 My daily activities often seem trivial and unimportant to me.
- 6 I used to set goals for myself, but that now seems like a waste of time.
- 7 I enjoy making plans for the future and working them to a reality.
- 8 I am an active person in carrying out the plans I set for myself.
- 9 Some people wander aimlessly through life, but I am not one of them.
- 10 I sometimes feel as if I have done all there is to do in life.





Identified profiles of behavior patterns

-cognitive activity

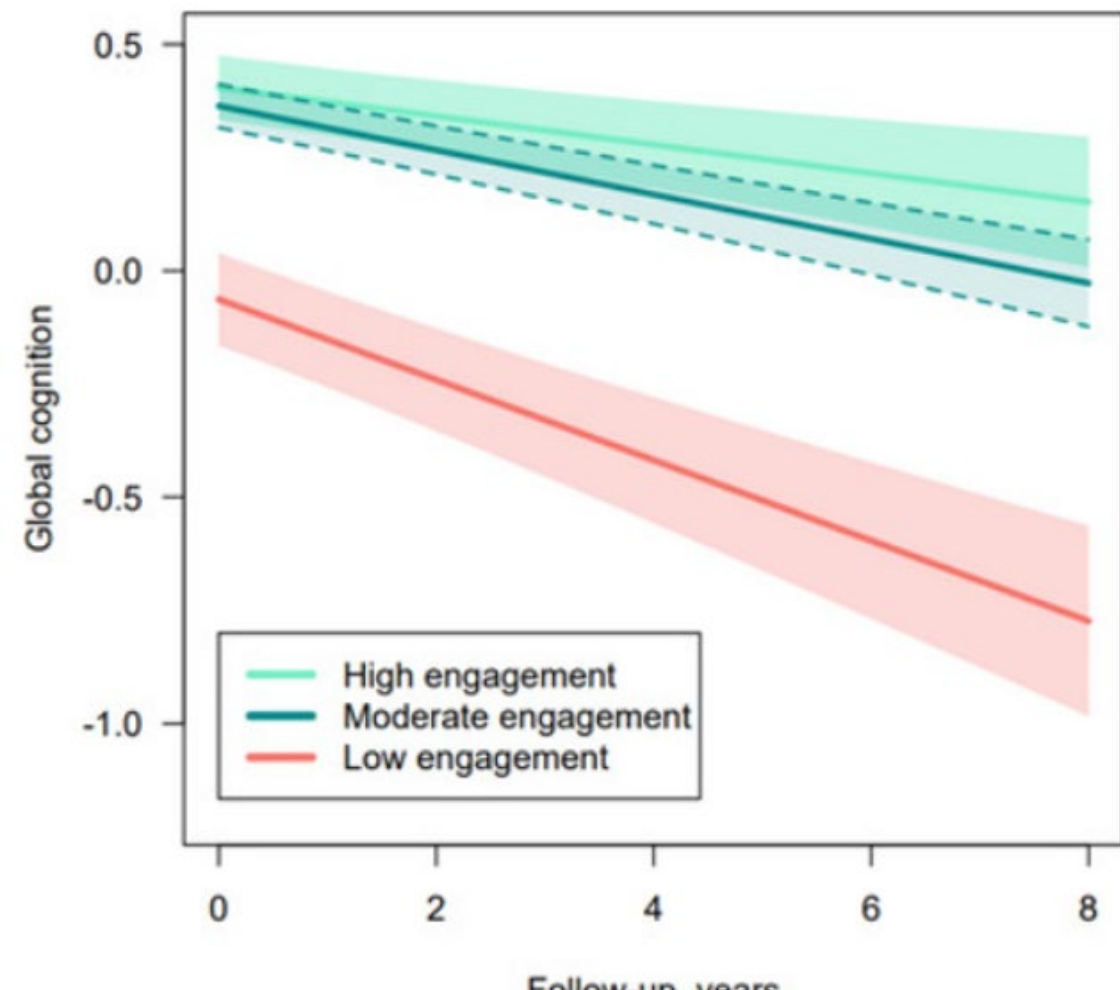
-diet

-physical activity

-social activity

Grouped people into high, moderate, & low

Halloway et al., 2023



Compared to the high engagement group, those in the low group had the fastest rates of cognitive decline (moderate group declined faster, but to a lesser degree)

Halloway et al., 2023

Take Home Message

- The number of people with Alzheimer's is increasing with our rapidly aging population
- Short of a cure, prevention is our best hope of reducing or delaying the impact on our society
- Brain health is influenced by many factors across the life course – some things we can control, others we have less control
- Adopting healthy lifestyle habits is good for brain health and may reduce our risk of Alzheimer's

Acknowledgments

National Institute on Aging
Alzheimer's Association
Illinois Department of Public Health
Alla V. and Solomon Jesmer Chair

Study Participants :

Religious Orders Study
Rush Memory and Aging Project
Minority Aging Research Study

Rush Alzheimer's Disease Center Faculty

- Puja Agarwal, PhD
- Neelum Aggarwal, MD
- Sonal Agrawal, PhD
- Konstantinos Arfanakis, PhD
- Zoe Arvanitakis, MD, MS
- Denis R. Avey, PhD
- David Bennett, MD
- Patricia Boyle, PhD
- Aron Buchman, MD
- Ana Capuano, PhD
- Siyi Chen, PhD
- Jose Farfel, MD, PhD
- Debra Fleischman, PhD
- Christopher Gaiteri, PhD
- Crystal Glover, PhD
- Francine Grodstein, ScD
- Bryan James, PhD
- Alifiya Kapasi, PhD
- Melissa Lamar, PhD
- Brittney Lange-Maia, PhD
- Sue Leurgans, PhD
- Katia Lopes, PhD
- Rupal Mehta, PhD
- Sukriti Nag, MD, PhD
- Bernard Ng, PhD
- Shahram Oveisgharan, MD
- Victoria Poole, PhD
- Julie Schneider, MD, MS
- Raj Shah, MD
- Ajay Sood, MD
- Sandra Swantek, DO
- Shinya Tasaki, PhD
- Nicola Kerns Vasco, PhD
- Ricardo Vialle, PhD
- Maude Wagner, PhD
- Tianhao Wang, PhD
- Yanling Wang, MD, PhD
- Robert Wilson, PhD
- Jishu Xu, MS
- Jingyun Yang, PhD
- Lei Yu, PhD
- Andrea Zammit, PhD

RADC Research Resource Sharing Hub



<https://www.radc.rush.edu>

lbarnes1@rush.edu



@beyoung40

