Experiences of Discrimination, Feelings of Purpose in Life, & Brain Health in the MIDUS Affective Neuroscience Project

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Today's roadmap

1. Introduction to the Midlife in the U.S. study
2. MIDUS Affective Neuroscience goals
3. Emotional reactivity & recovery
4. Brain health & aging
5. Discrimination experiences vs. purpose in life
6. The future potential

- Begun in 1995
- Aged 25-74
- More samples added including Black Americans from Milwaukee
- Now 35 - 100+
- Data publicly available www.midus.wisc.edu

Advancing Knowledge of Factors That Promote Positive Health and Resilience

MID-LIFE IN THE UNITED STATES

A National Study of Health and Well-Being

Unique Strengths of the MIDUS Study

In-depth multidisciplinary content *achieved via 5 separate data collection projects*

Wide age range (25–74) *facilitates focus on life course transitions*

MIDUS (Midlife in the U.S.) is a national longitudinal study of how many factors (behavioral, social, psychological, biological, neurological) come together to influence health and well-being as people age from early adulthood into midlife and old age. It was conceived by a multidisciplinary team of scholars interested in understanding aging as an integrative process.

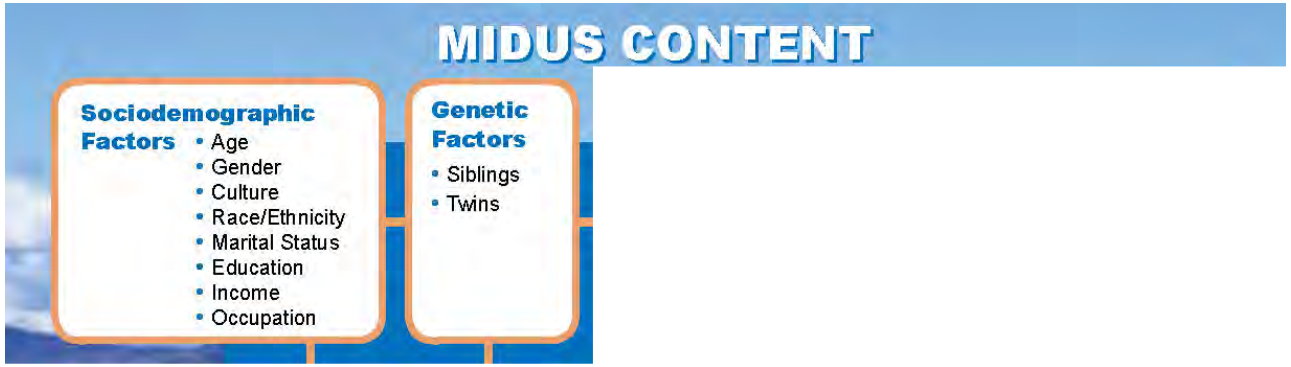
MIDUS Samples

In 1995, MIDUS survey data were collected from a total of 7,108 participants. The baseline sample was comprised of individuals from four subsamples: (1) a national RDD (random digit dialing) sample (n=3,487); (2) oversamples from

In addition, the twin subsample was administered a short screener to assess zygosity and other twin-specific information.

With funding provided by the National Institute on Aging, a longitudinal fol-

Multidisciplinary content with huge breadth.



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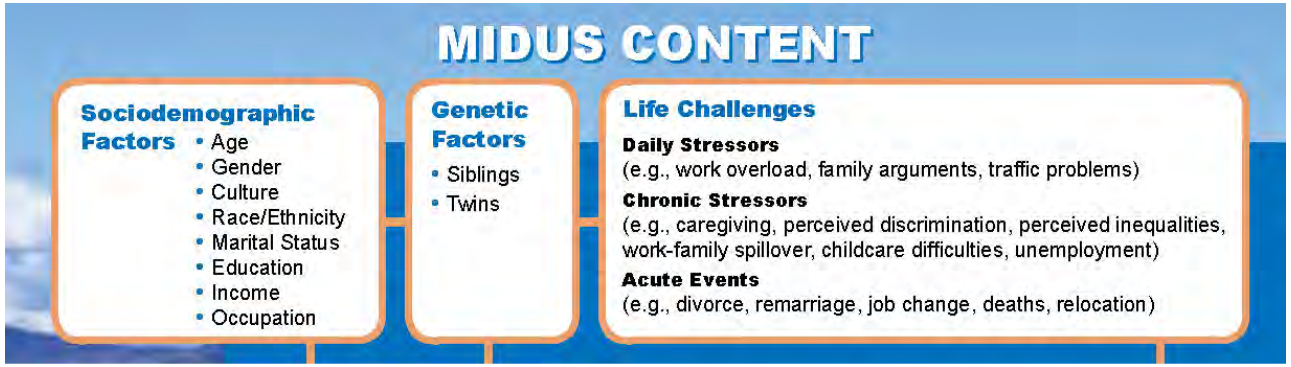

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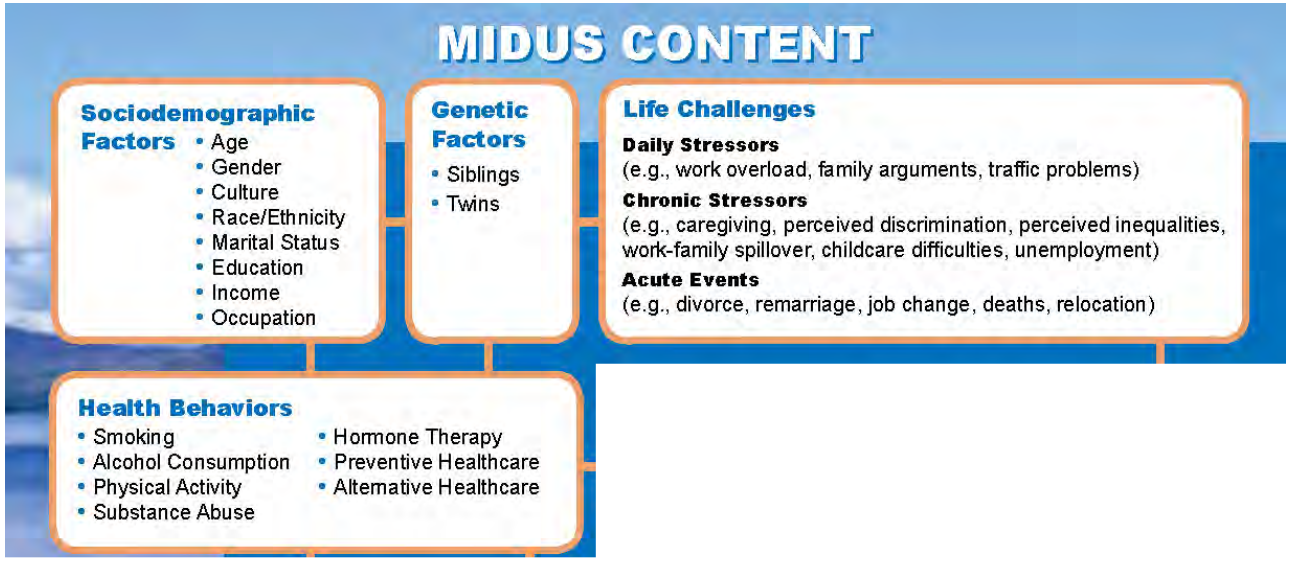

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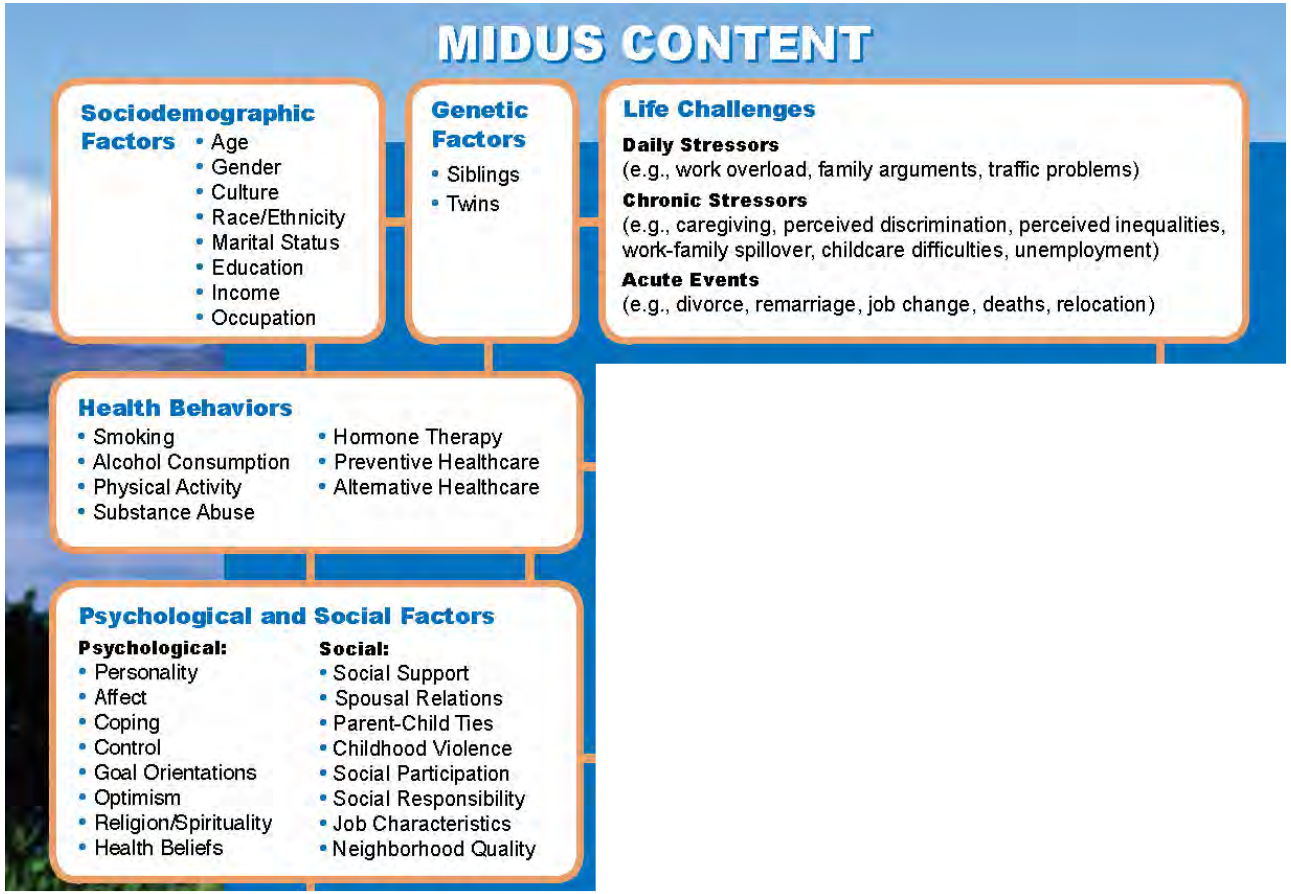

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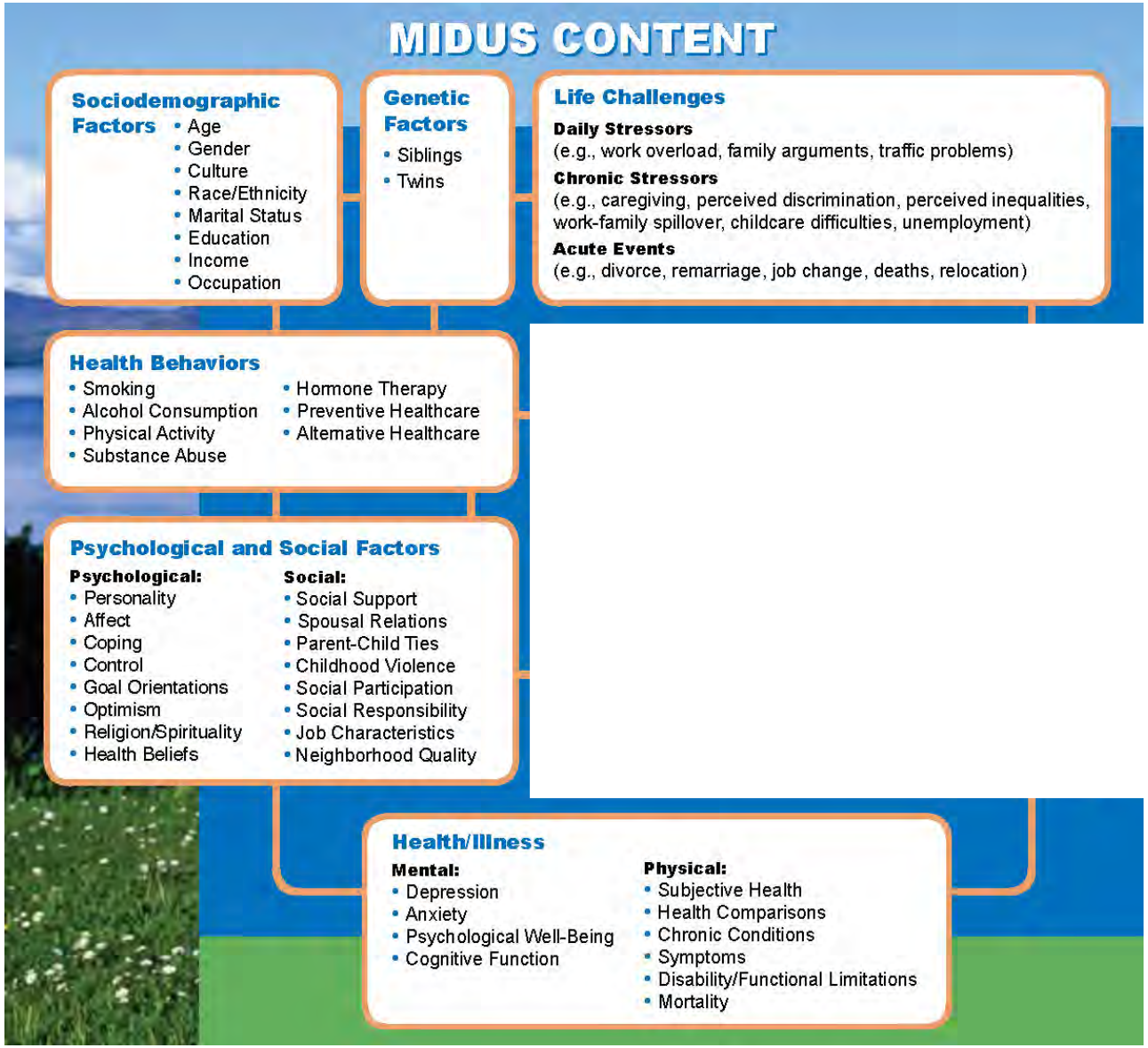

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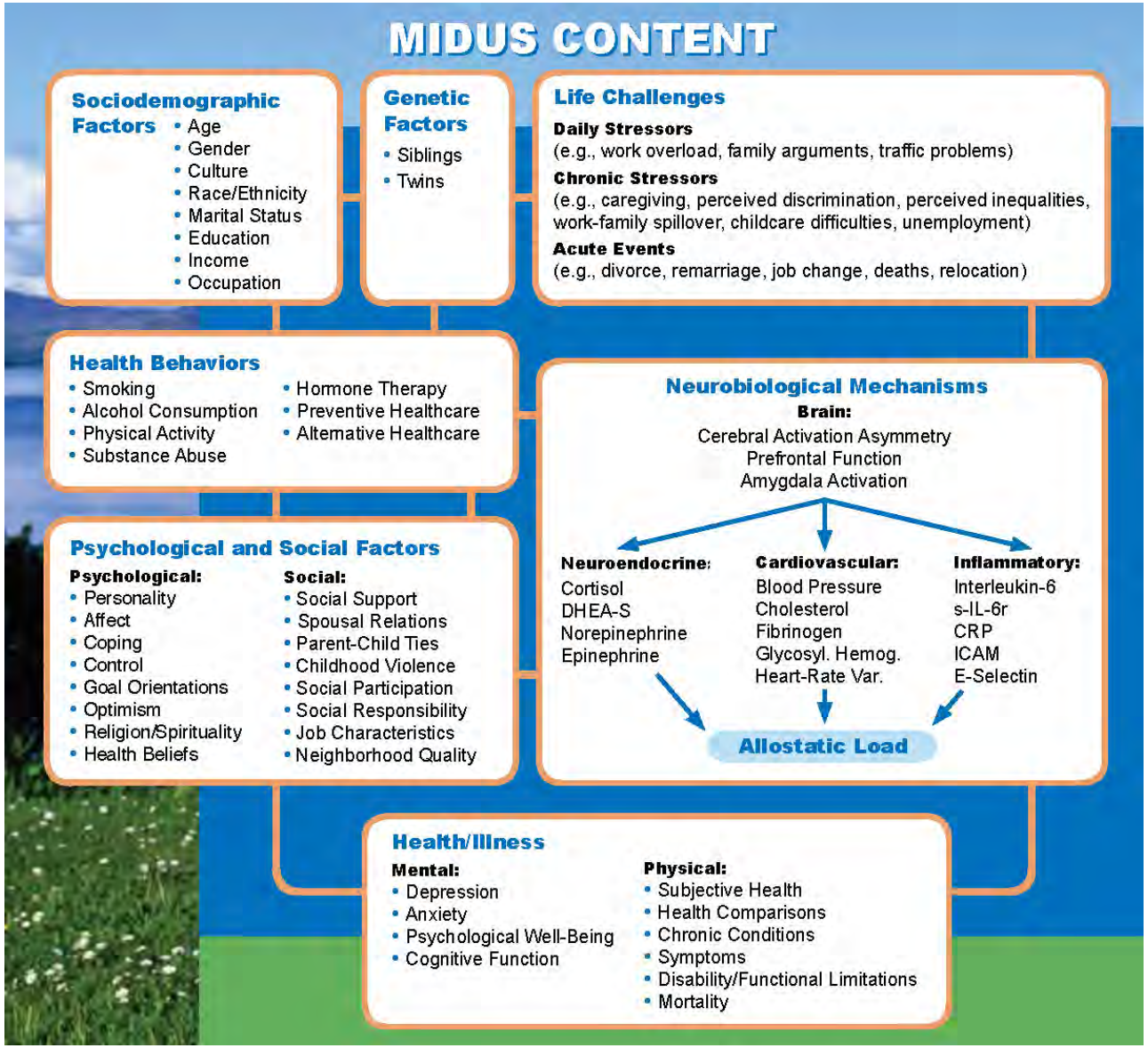
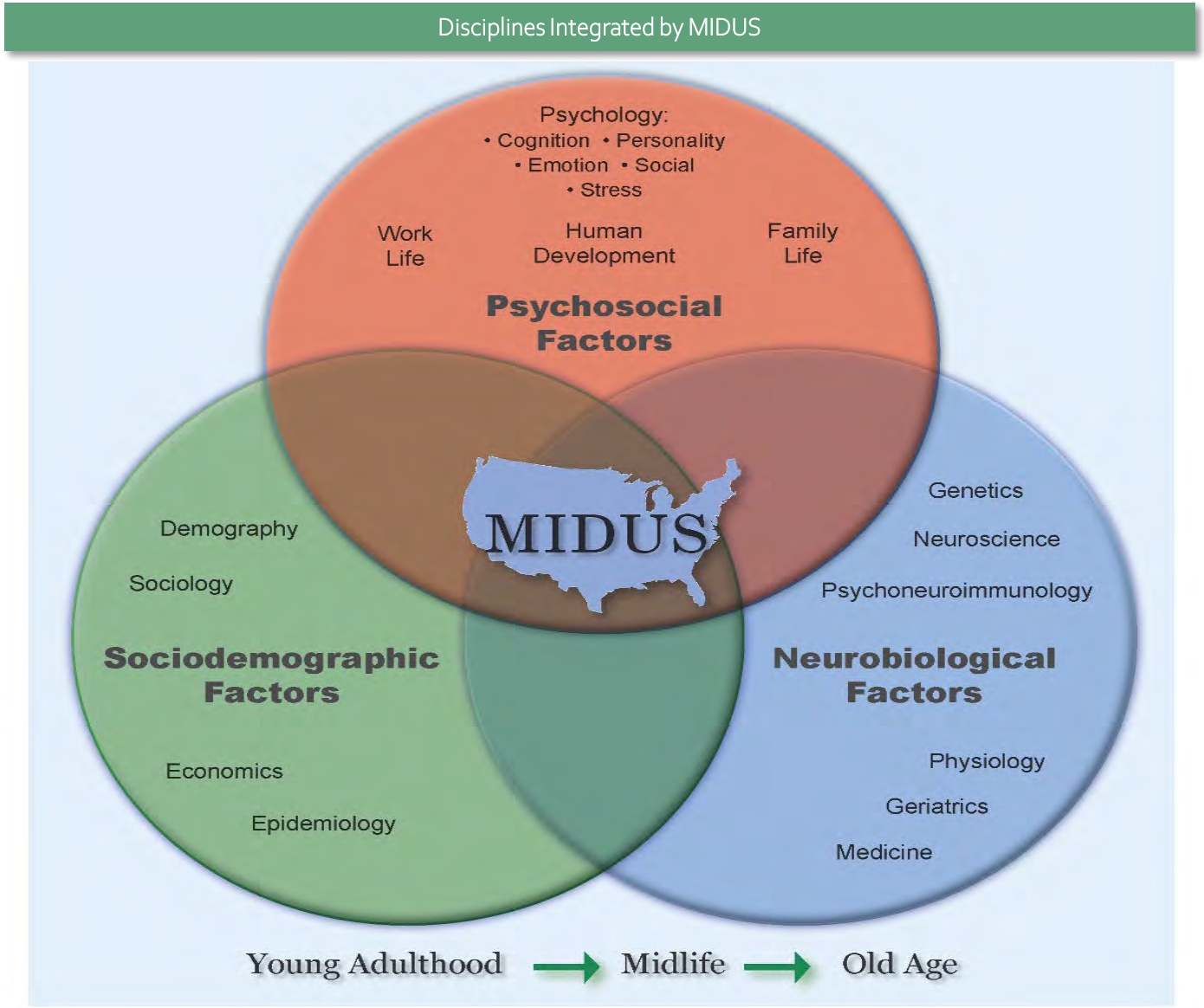
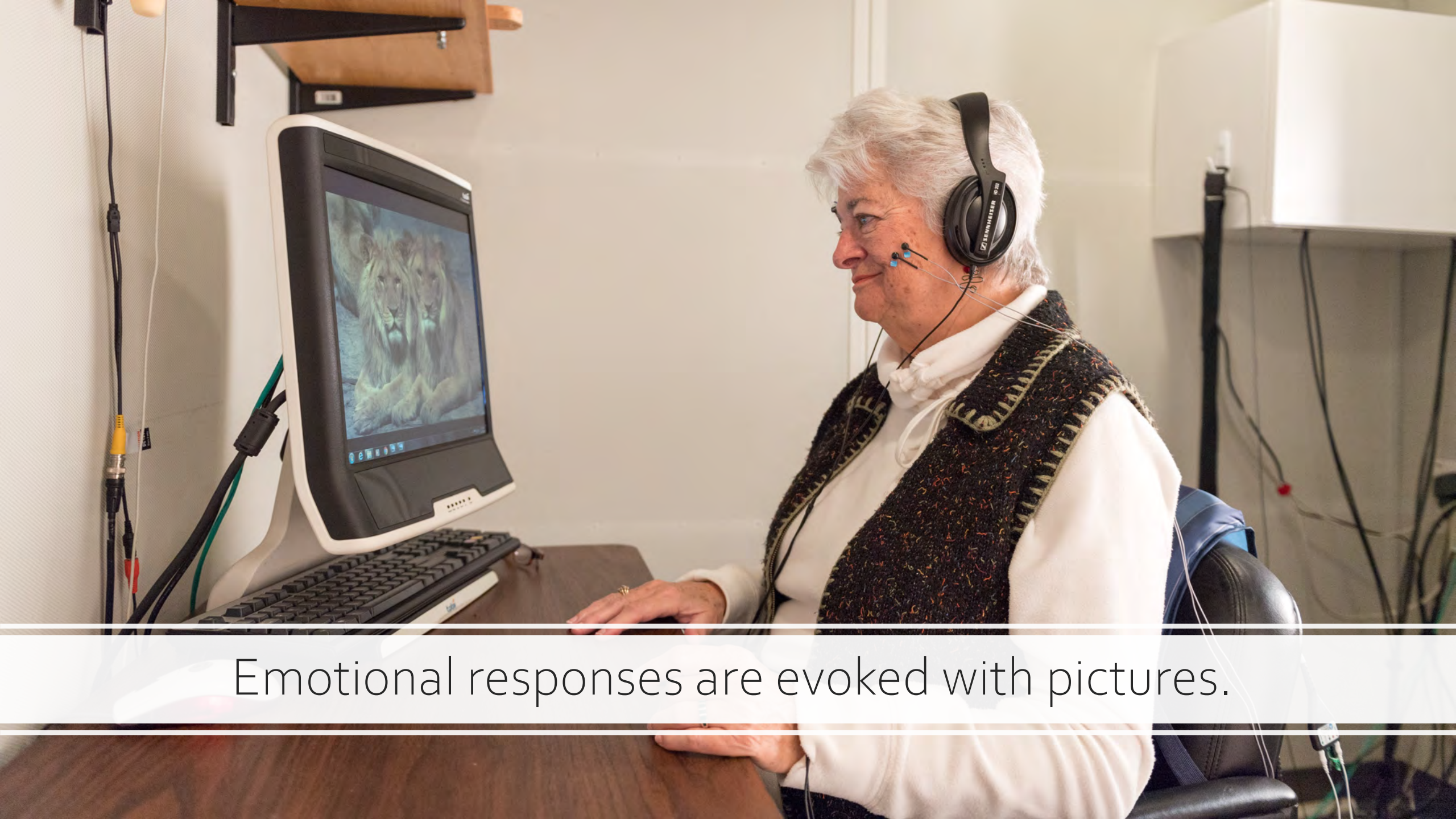


Multidisciplinary *integration:* investigating the factors influencing health & wellbeing throughout adulthood & aging



MIDUS Affective Neuroscience Project goals are to identify

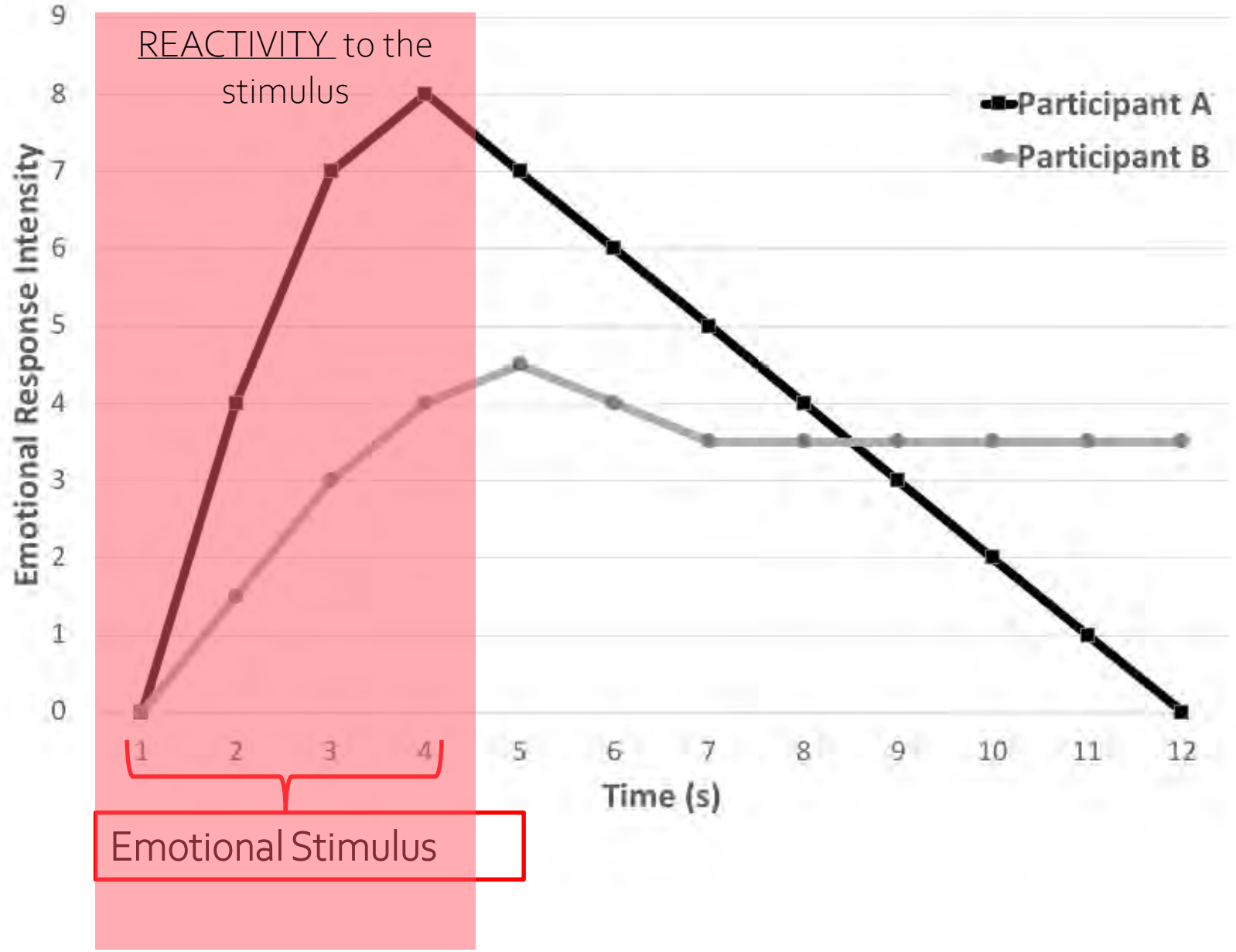
- *Linkages* between emotions, health, wellbeing, & the brain
- *Factors (*sociodemographic, psychosocial, lifestyle, experiential, environmental) moderating the linkages
- *Age-related changes* in these processes & linkages.

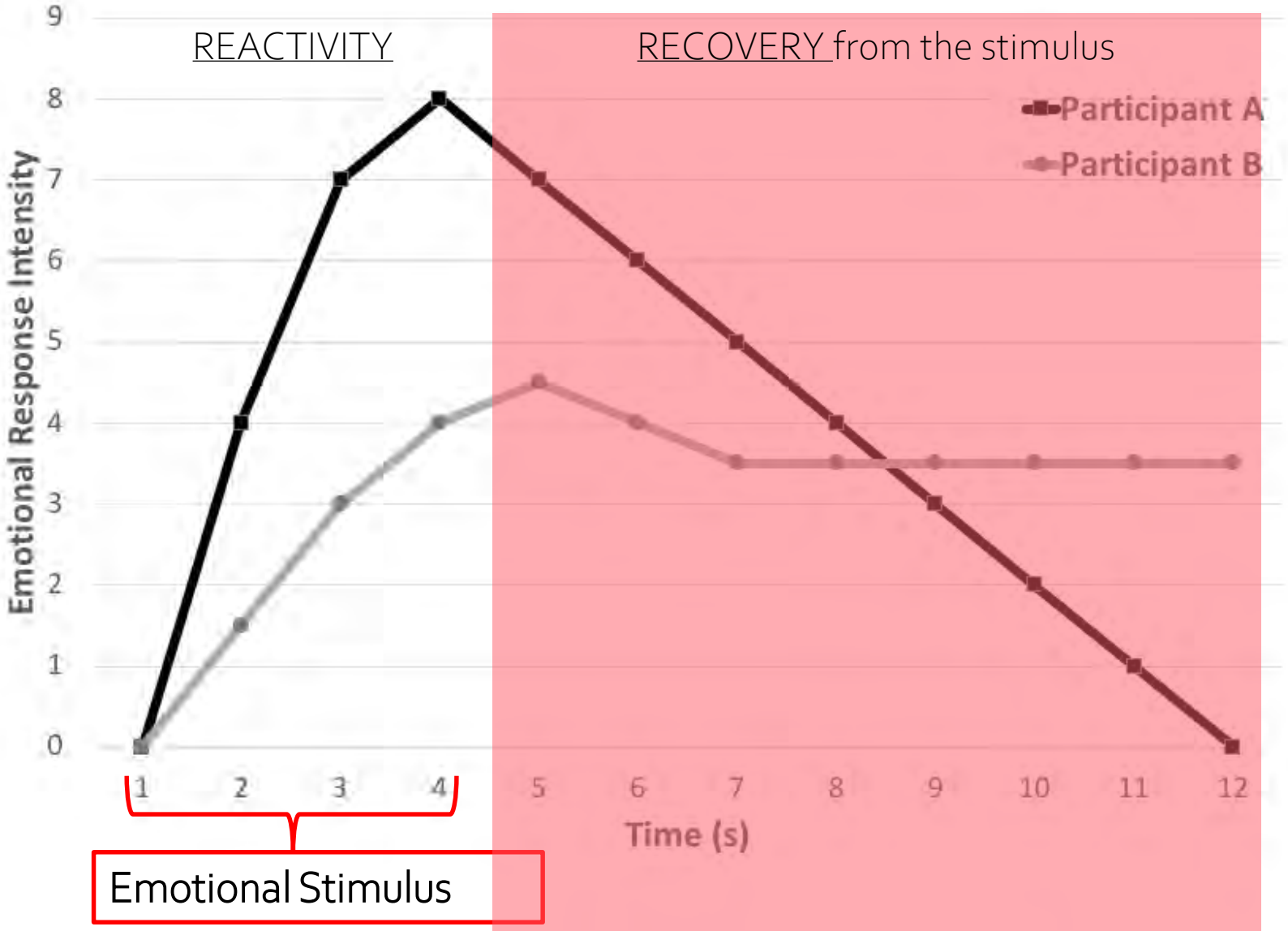


Emotional responses are evoked with pictures.

Measured with facial electromyography (EMG) and functional magnetic resonance imaging (fMRI).

Multimodal MRI provides brain structure, function, & connectivity information.


REACTIVITY to the stimulus
Participant A
Participant B
Emotional Response Intensity
0
1
2
3
4
5
6
7
8
9
1
2
3
4
5
6
7
8
9
10
11
12
Time (s)
Emotional Stimulus


REACTIVITY
RECOVERY from the stimulus
Participant A
Participant B
Emotional Response Intensity
0
1
2
3
4
5
6
7
8
9
1
2
3
4
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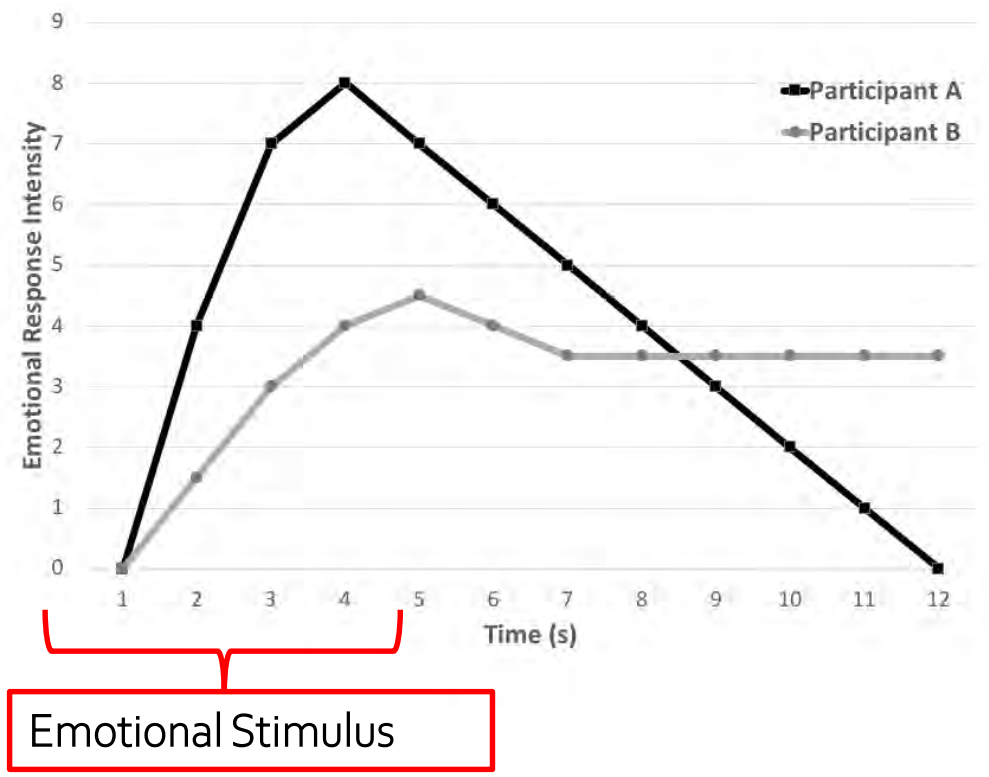
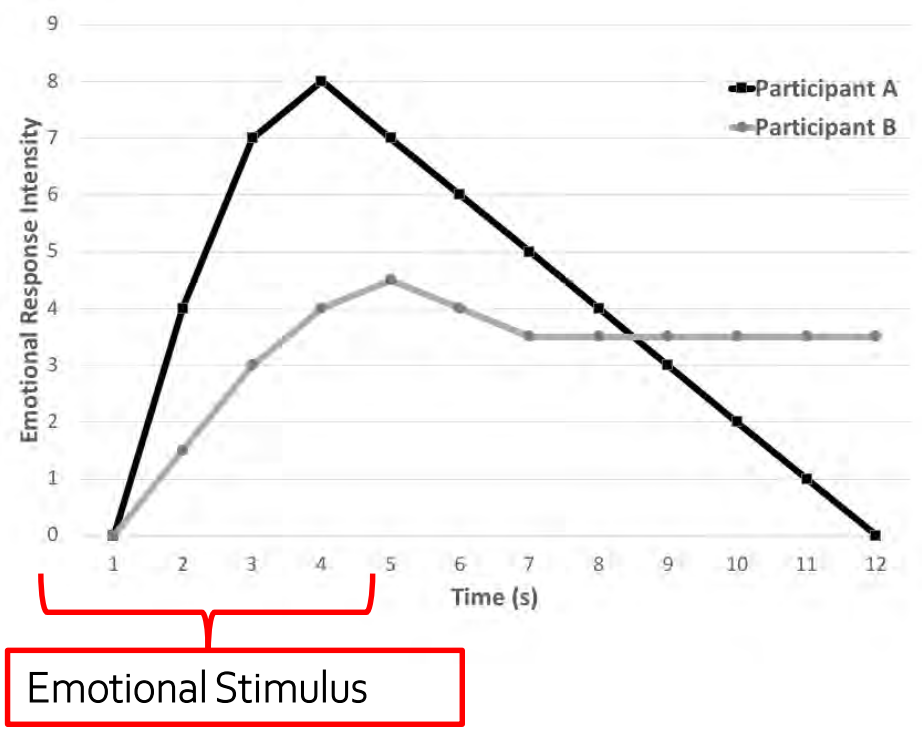
6
7
8
9
10
11
12
Time (s)
Emotional Stimulus

Differences in emotional responses are associated *with indices of health and aging*:



- *Physical and mental health*
- *Inflammation*
- *Glucose regulation (diabetes)*
- *Cognitive and brain aging*
- *Mortality*

Differences in emotional responses are associated *with psychosocial factors*:

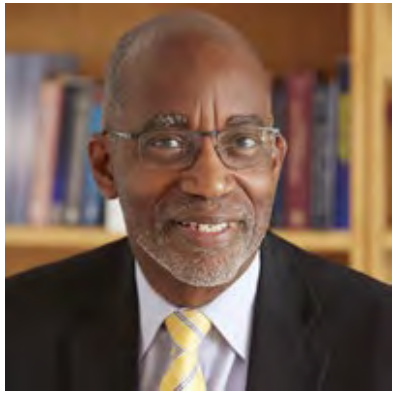


- *Wellbeing Factors* purpose & meaning in life
- *Personality* conscientiousness & self-control
- *Coping and regulatory strategies*
- *Social relationships* marital support vs. strain

https://midus.wisc.edu/findings/pubtopics.php?topic=Neuroscience for publications

MIDUS includes psychosocial stress information such as *discrimination,* both lifetime and daily measures.

Dr. Williams' questions assessing Perceived Daily Discrimination



- You are treated with less courtesy than other people.
- You are treated with less respect than other people.
- You receive poorer service than other people at restaurants or stores.
- People act as if they think you are not smart.
- People act as if they are afraid of you.
- People act as if they think you are dishonest.
- People act as if they think you are not as good as they are.
- You are called names or insulted.
- You are threatened or harassed.

Items are rated as *often*, *sometimes*, *rarely*, or *never.*

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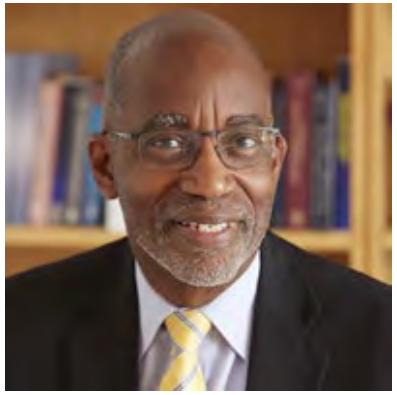

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60.9% reported daily discrimination

(Kessler, Mickelson, & Williams, 1999)

- Race/ethnicity
- Gender (e.g. female)
- Appearance (e.g. weight)
- Age
- Religion
- Socioeconomic status
- LGBTQ
- Disability

Suppression of emotional expression

- Changes outward emotional expression *but not* internal emotional experience

- Linked to negative outcomes
  - Worse cognition and memory
  - Reduced rapport, closeness, likeability, & social support
  - Increased sympathetic nervous system activity like sweating and systolic blood pressure

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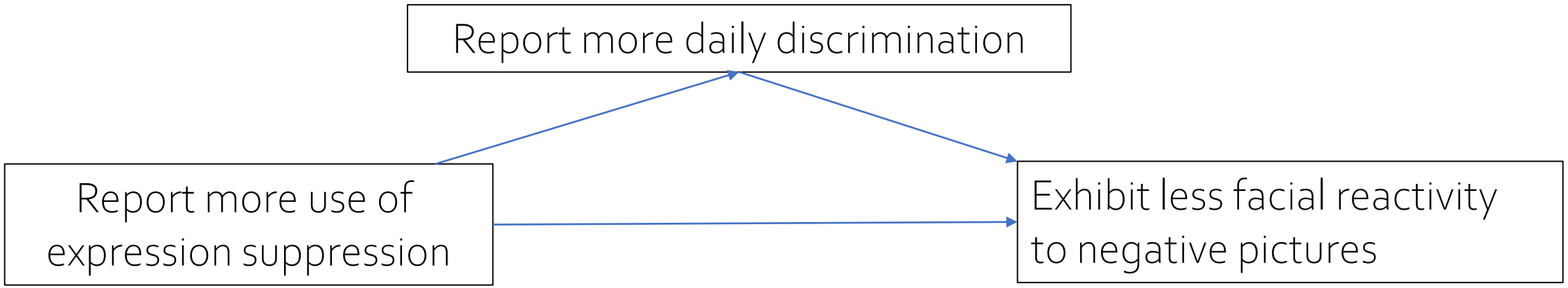
Racial Differences in Suppressing and Expressing Negative Emotions Relate to Cardiovascular Health in the Midlife in the United States (MIDUS) Study

AUTHORS
Anna J Finley, Cassandra Baldwin, Tia Hebbring, Carien van Reekum, Julian F. Thayer, Richard Davidson, Stacey M. Schaefer

Dr. Anna Finley



These relationships are seen in Black Americans, *not* in White Americans.

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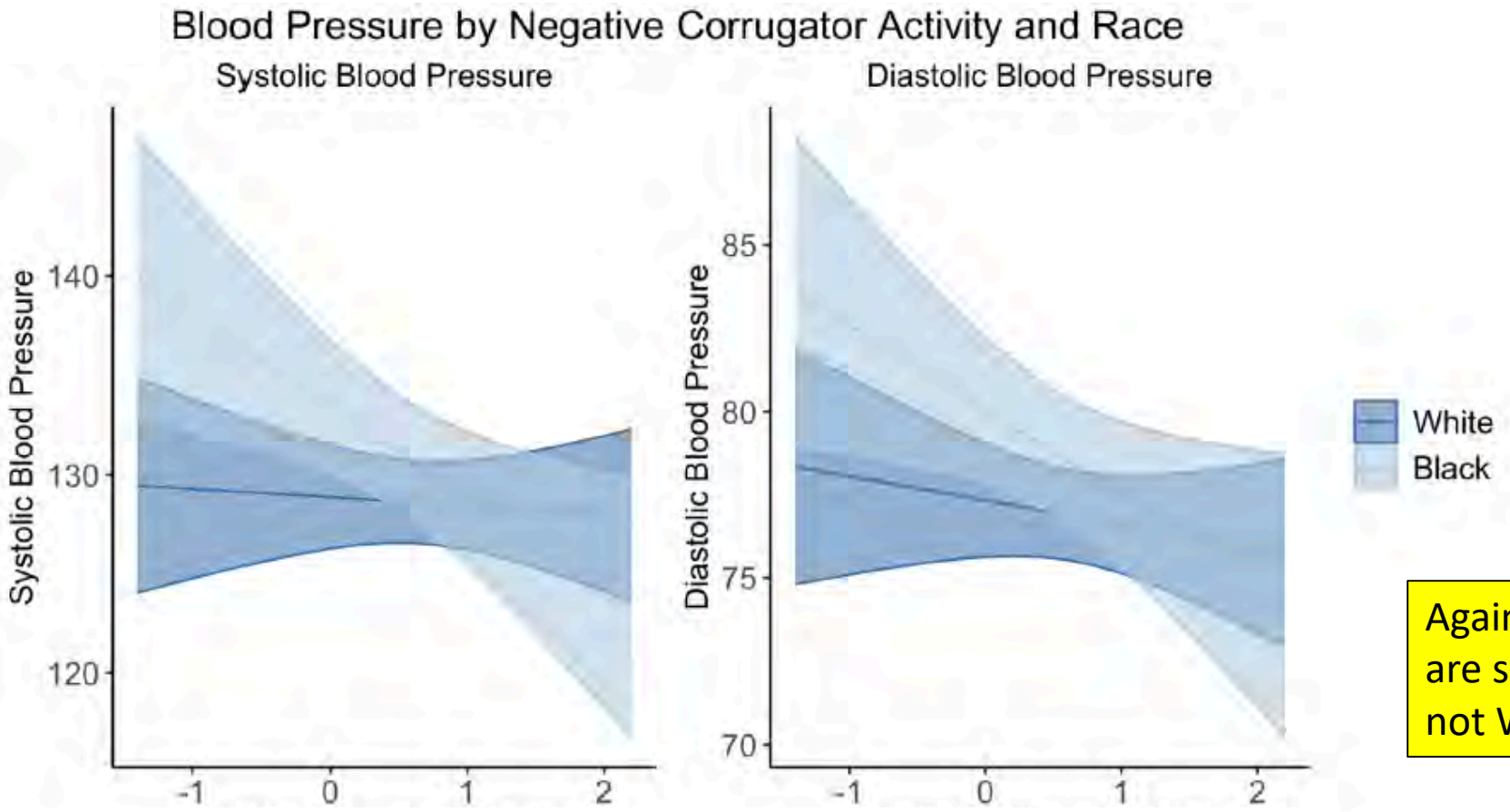


Facial reactivity to negative pictures

Again, these relationships are seen in Black Americans, not White Americans.

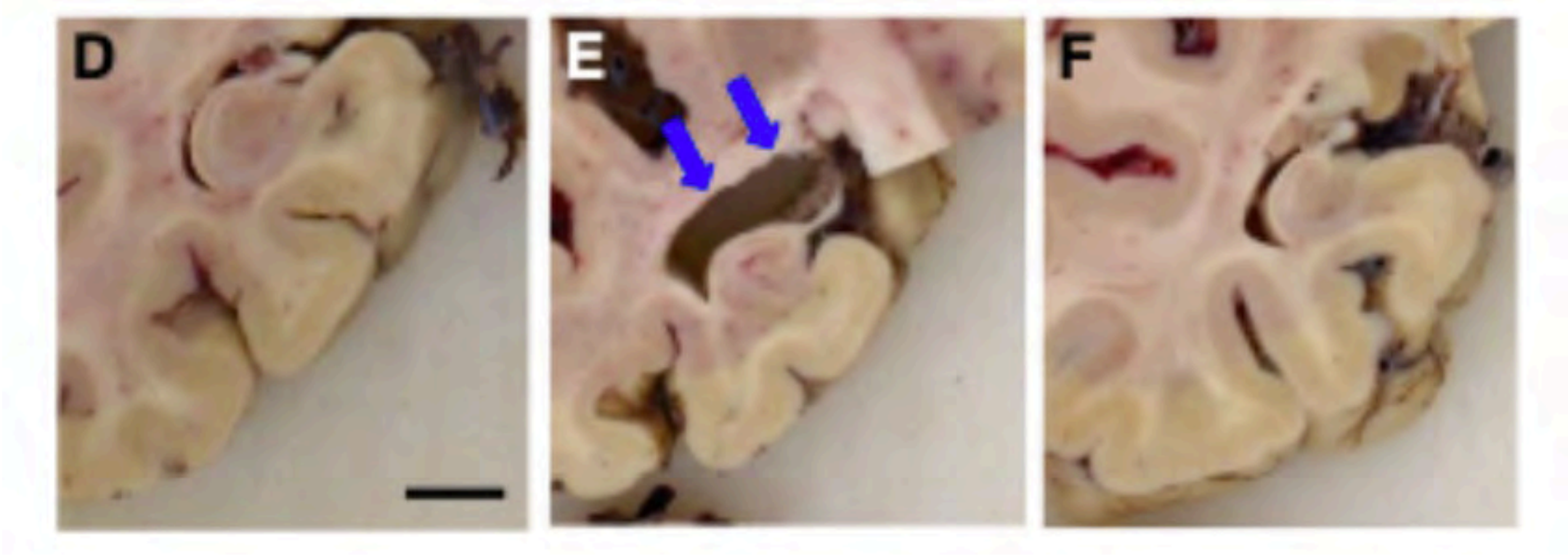
Turn to brain health

The hippocampus

- Brain temporal lobe structure critical for learning, memory, and emotion.
- Plastic and vulnerable to aging and chronic or severe stress
- Affected in many neurological and psychiatric disorders.
- Important marker of brain health and brain aging.

Gifs by Danielsabinasz generated using https://brain.sabinasz.net based on data from Human Brain Mapping, 33(8), 1914-1928; Neuroimage, 47(1), S102; Neuroimage, 54(1), 313-327. https://commons.wikimedia.org/w/index.php?curid=103151649

The hippocampus



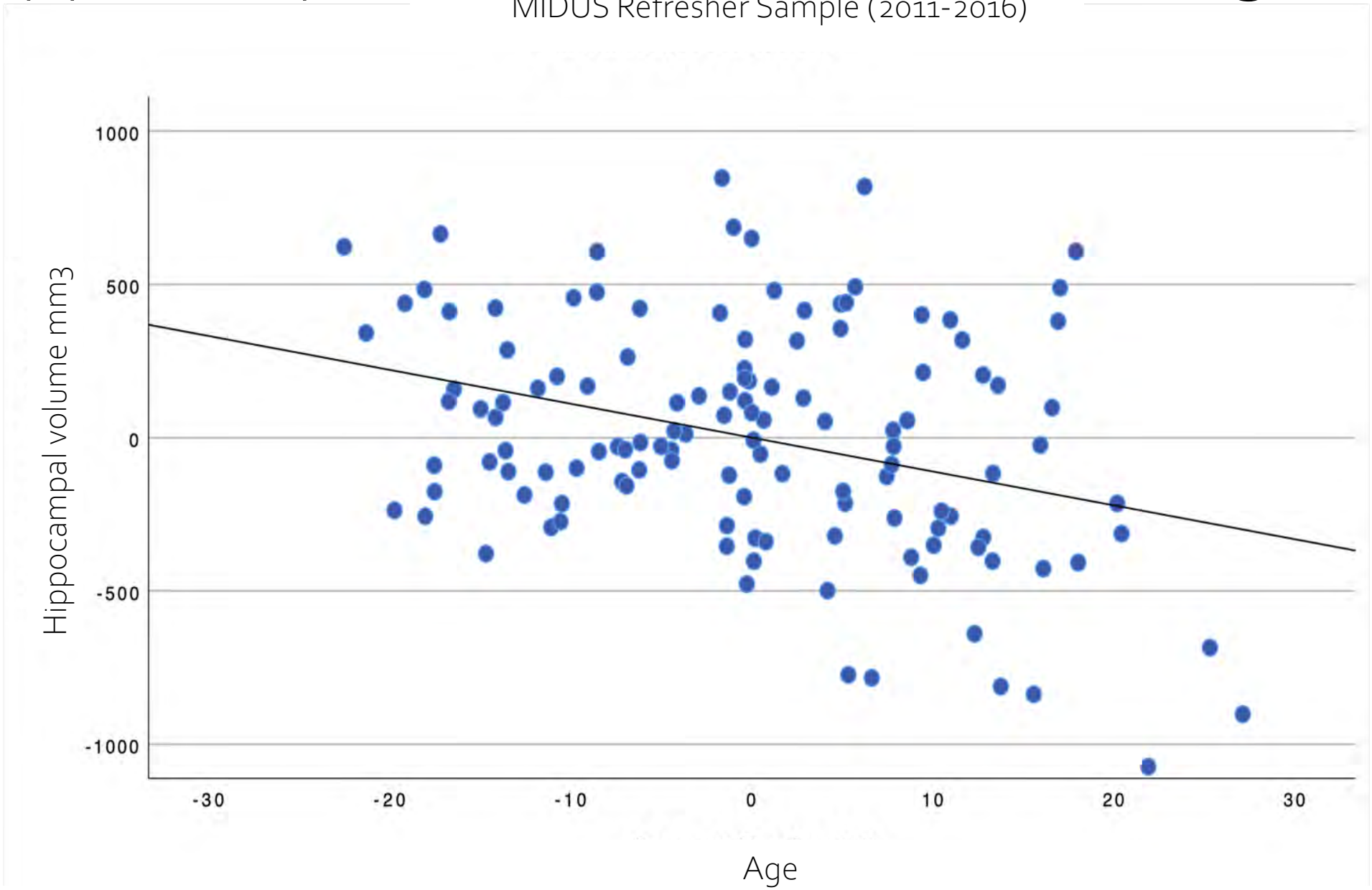
LEWY BODY DEMENTIA

ALZHEIMER'S DEMENTIA

HEALTHY CONTROL

Outeiro et al. Molecular Neurodegeneration (2019) 14:5

Hippocampal volume decreases with age.



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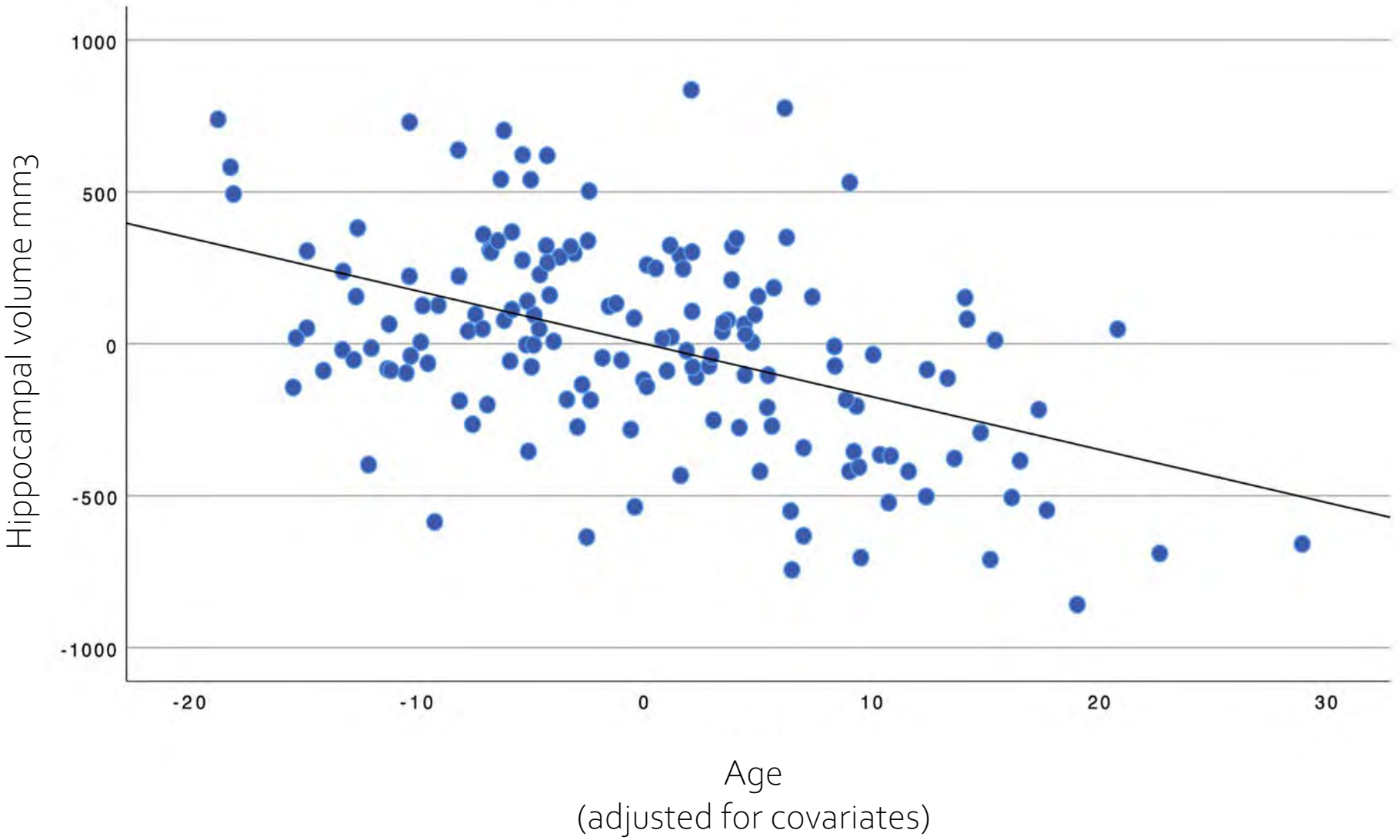
MIDUS Core Sample (2017-2022)



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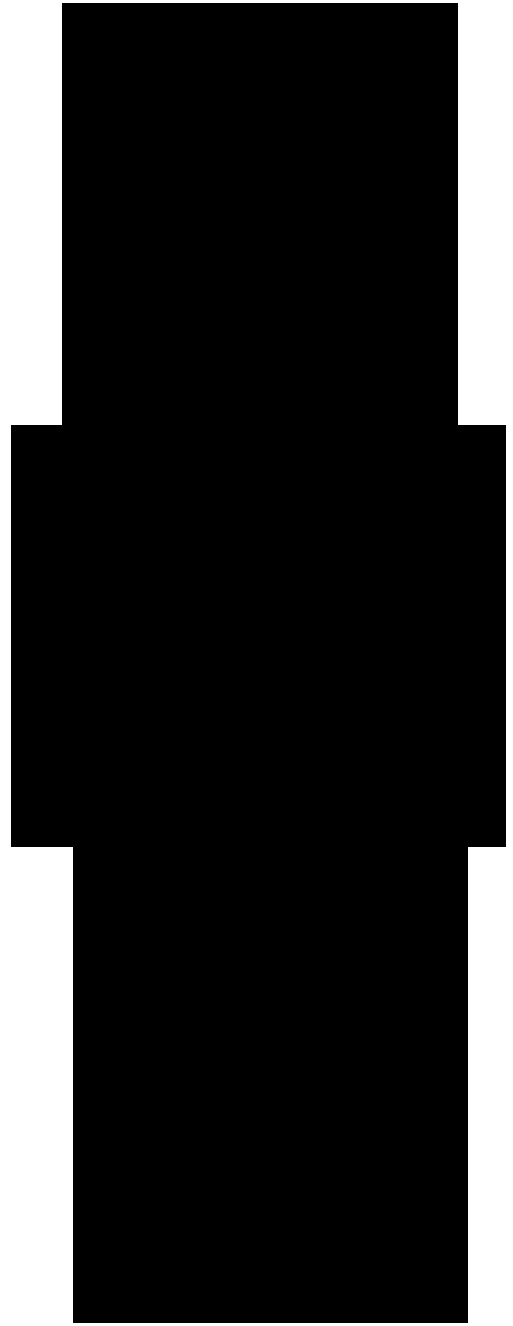

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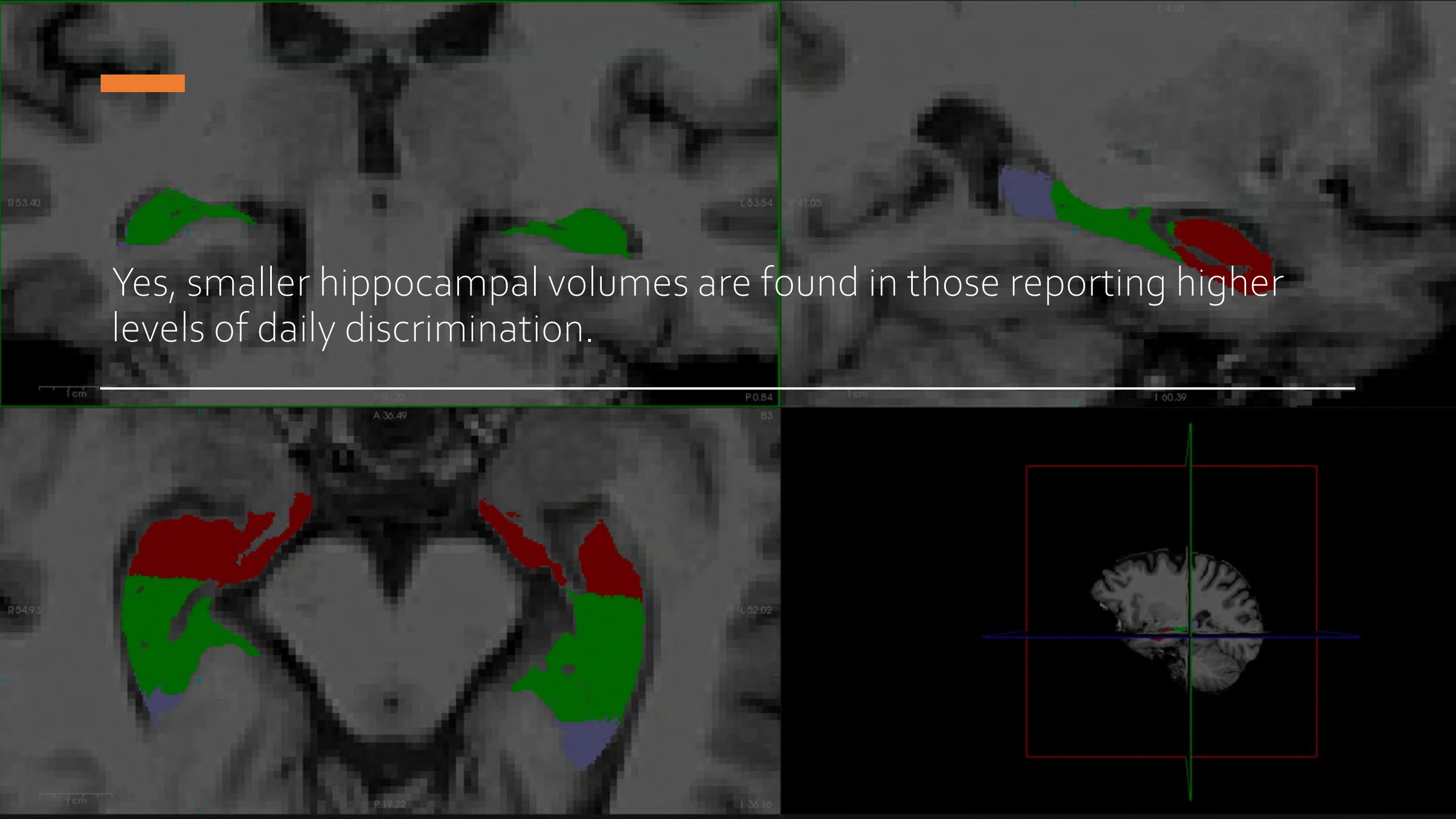
Will racial inequity and experiences of daily discrimination be associated with hippocampal volume and microstructure?



Yes, smaller hippocampal volumes are found in those reporting higher levels of daily discrimination.

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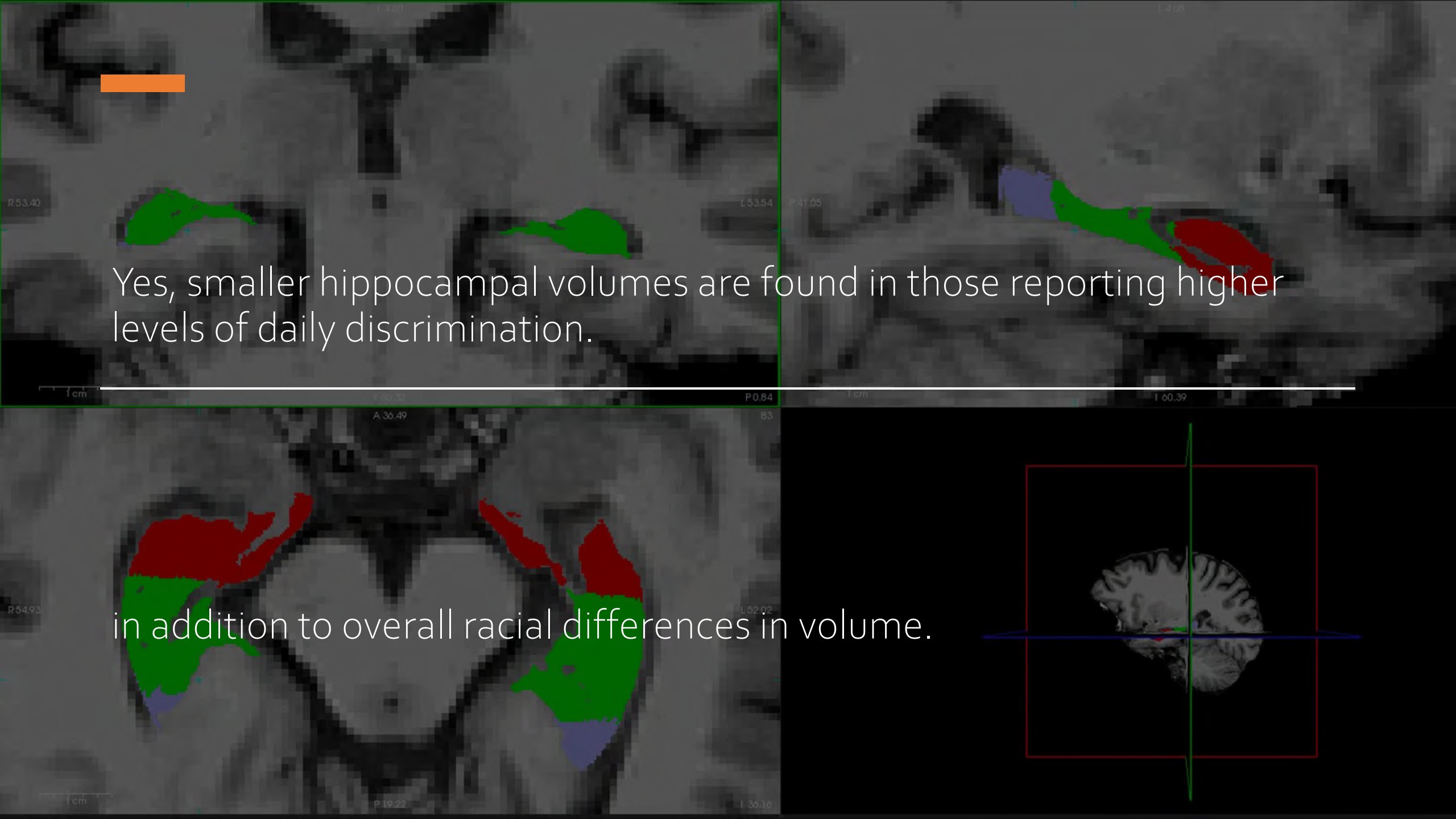
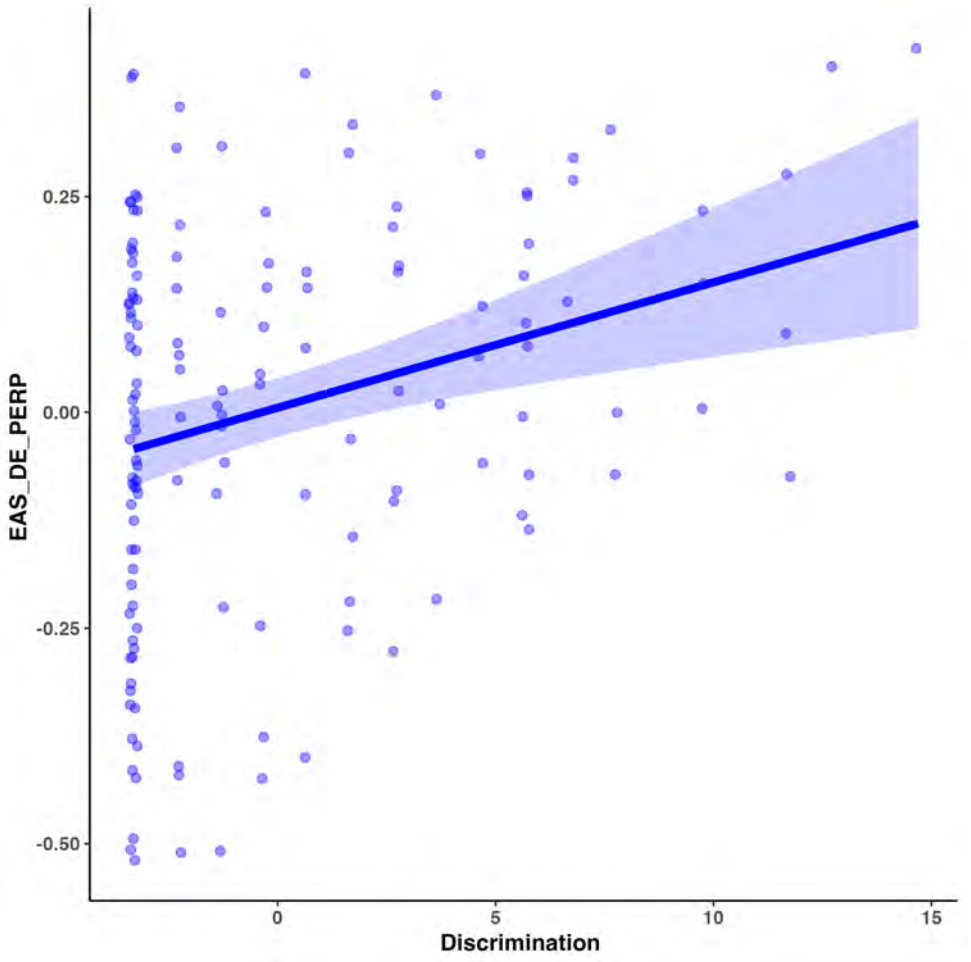
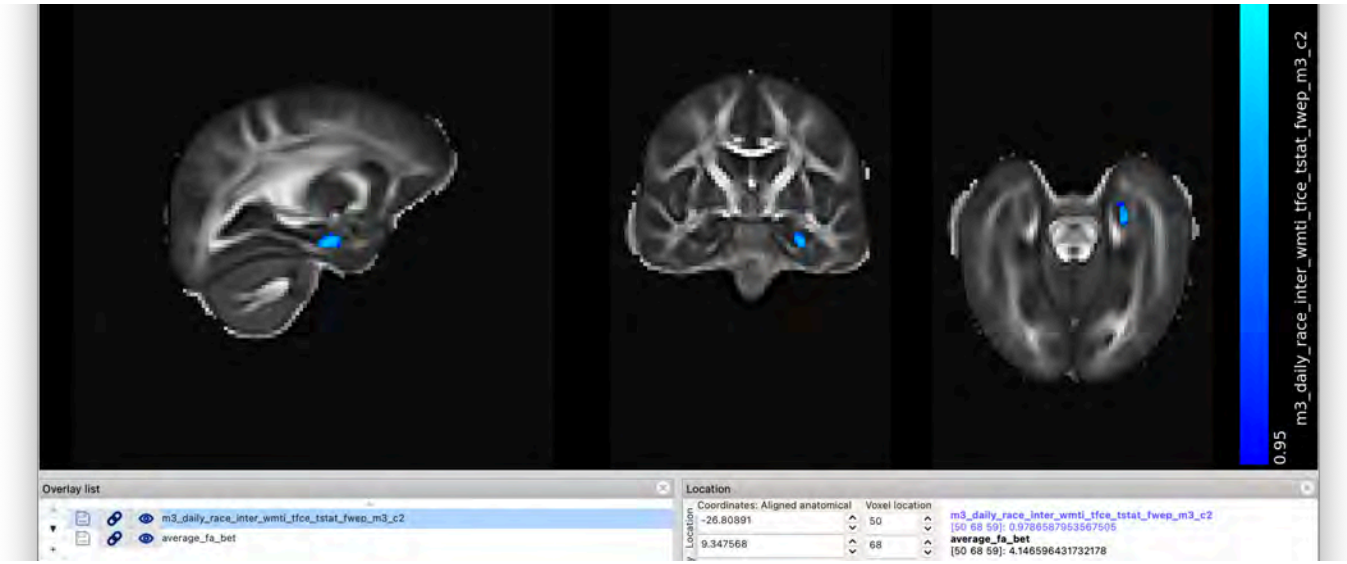
in addition to overall racial differences in volume.



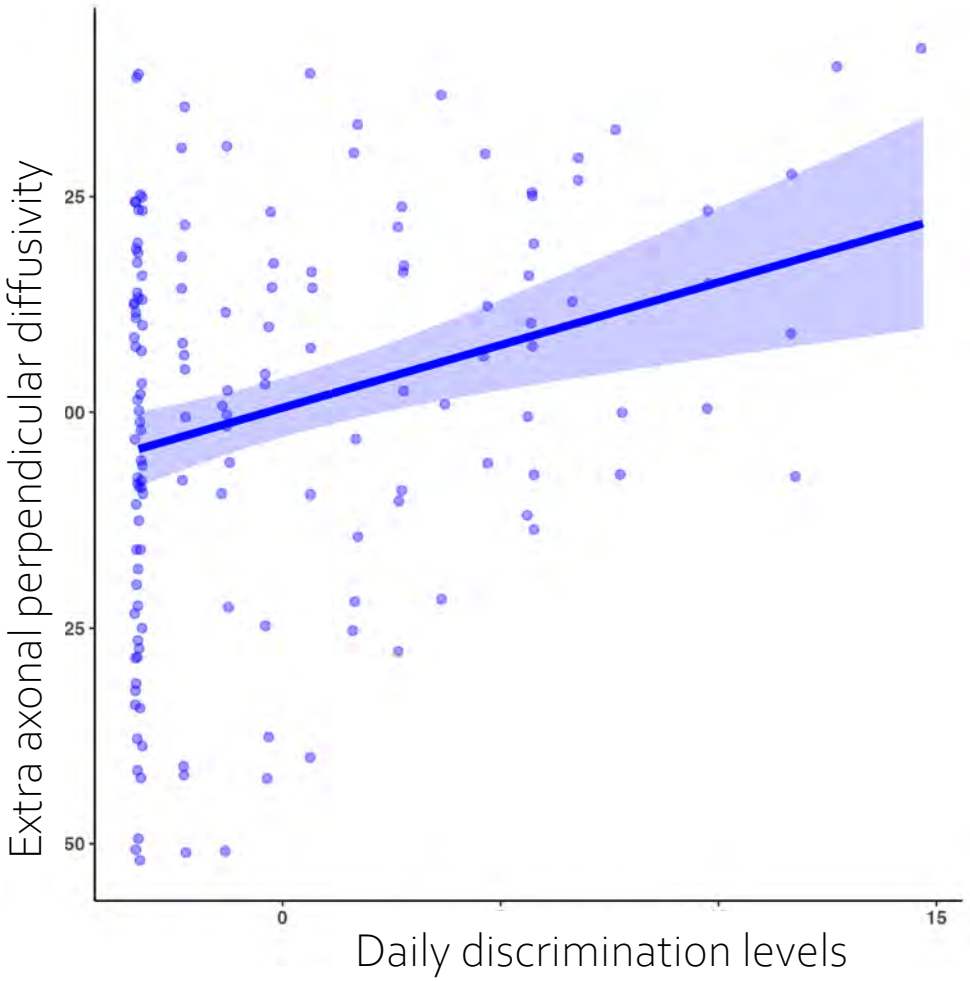
Discrimination is associated with a measure of greater diffusivity in the hippocampus -

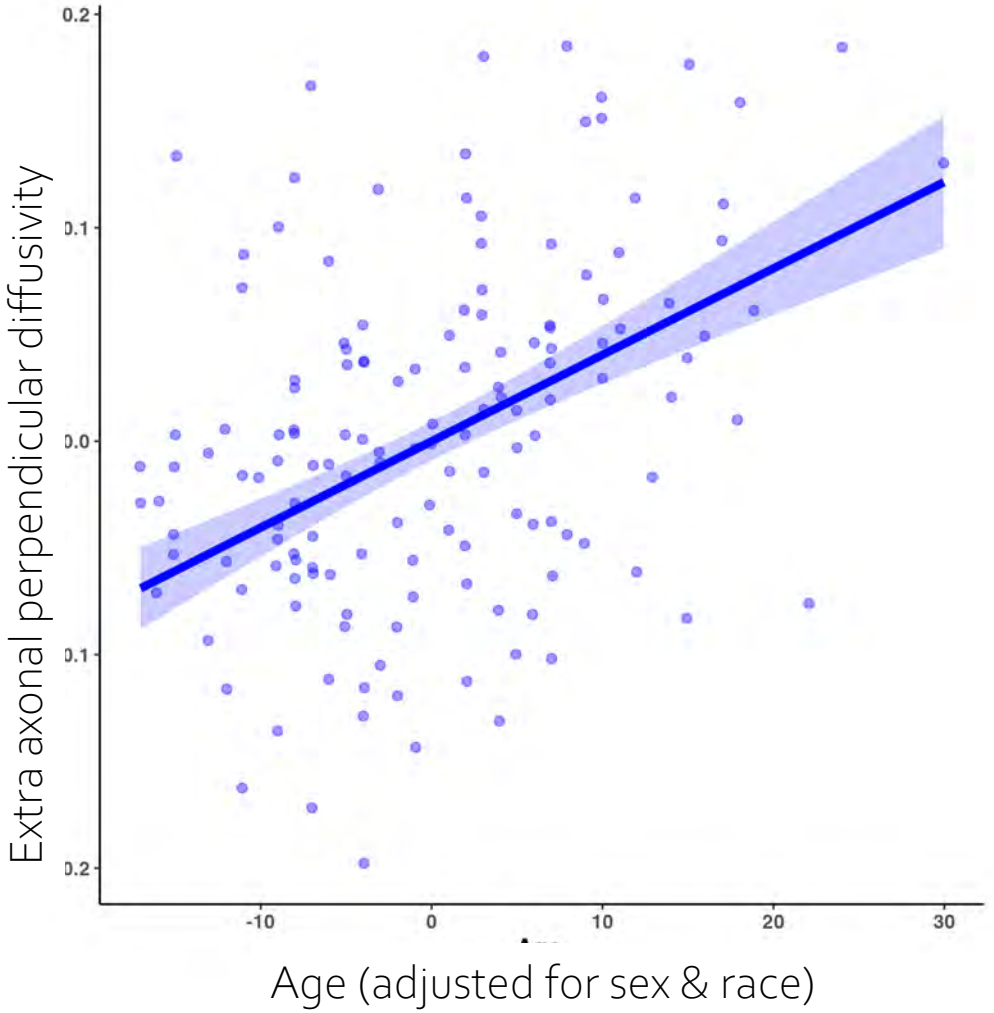
sensitive to white matter integrity & degeneration



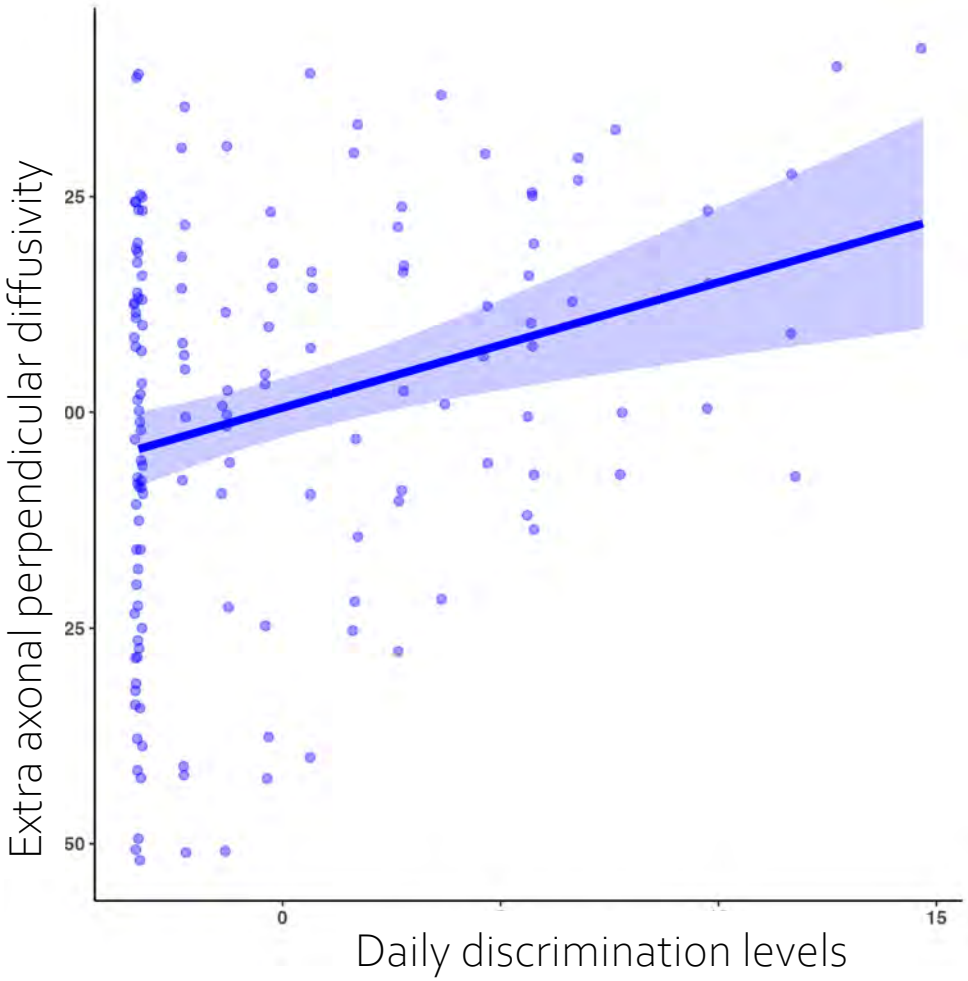


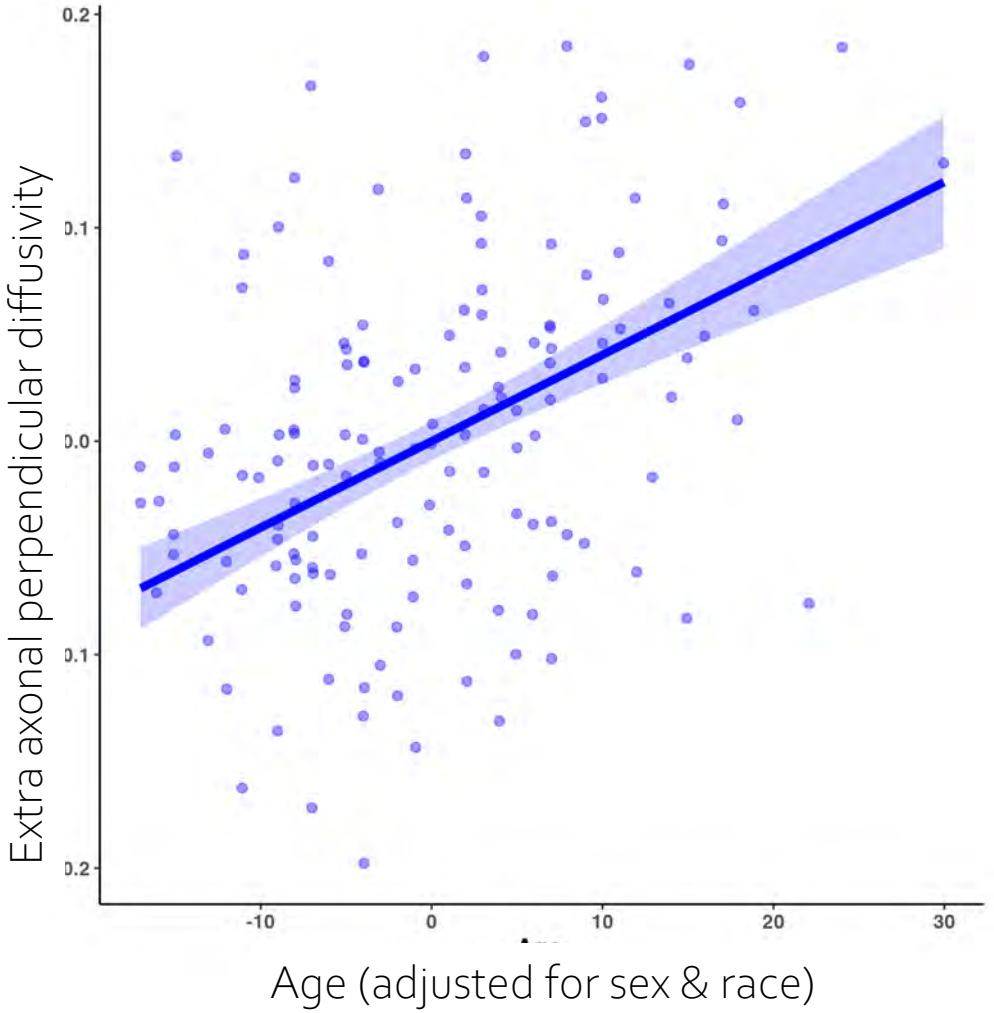
This diffusivity measure increases with age.





This suggests experiencing daily discrimination may prematurely age the brain.





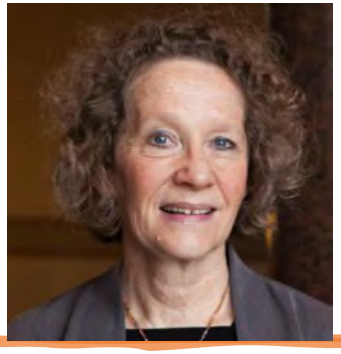
Turn to resilience – purpose in life

Purpose in life

“Life is never made unbearable by circumstances, but only by lack of meaning and purpose… “

-Viktor Frankl

Dr. Ryff's questions assessing Purpose in Life



(-) I live life one day at a time and don't really think about the future.
(+) I have a sense of direction and purpose in life.
(-) I don't have a good sense of what it is I am trying to accomplish in life.
(-) My daily activities often seem trivial and unimportant to me.
(+) I enjoy making plans for the future and working to make them a reality.
(-) Some people wander aimlessly through life, but I am not one of them.
(-) I sometimes feel as if I've done all there is to do in life.

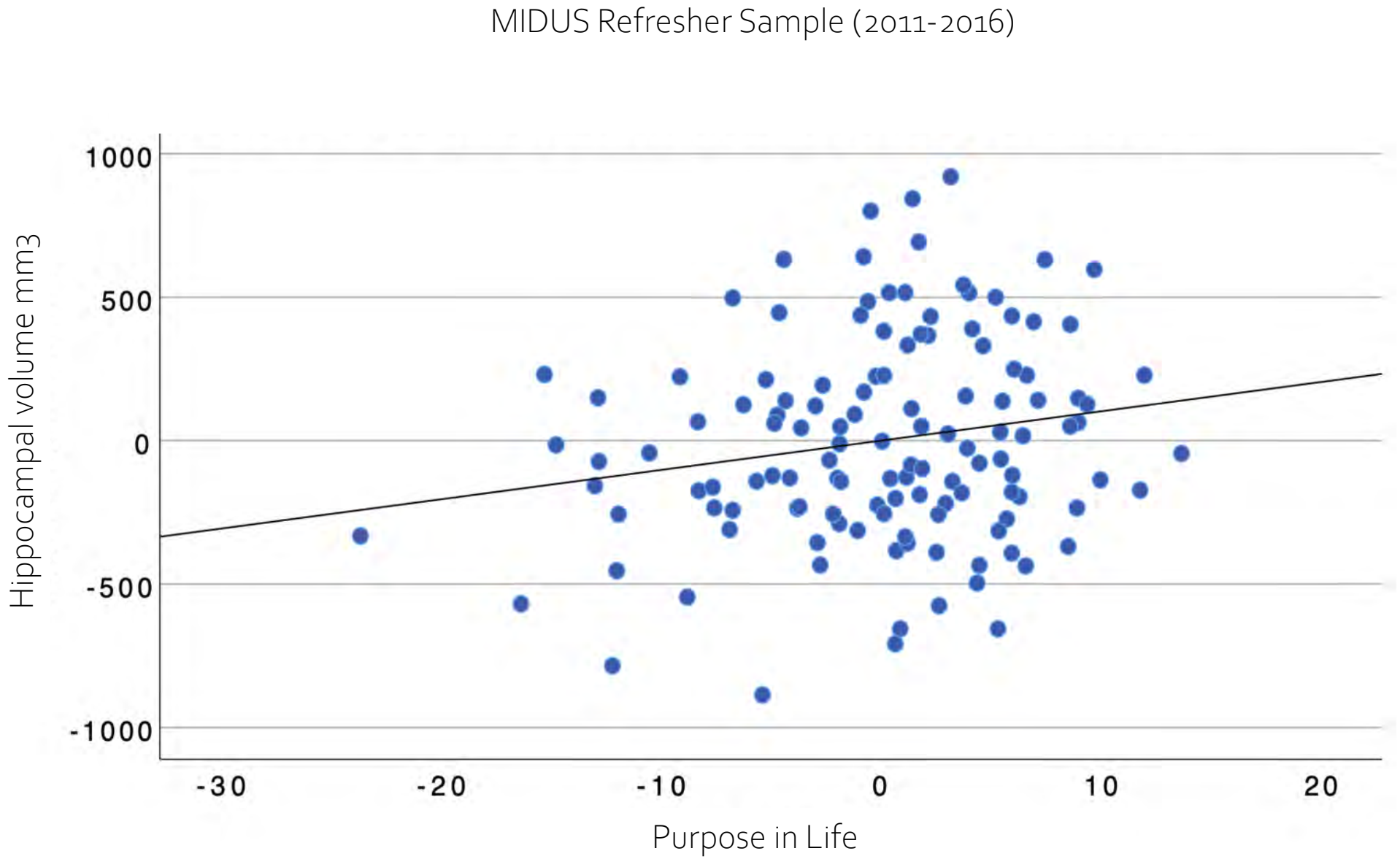
Items are rated from strongly agree to strongly disagree.

Greater purpose in Life is associated with

- Better coping with stress and recovery from negative emotion
- Lower levels of depression symptoms
- Better sleep
- Better cognition
- Reduced risk of cognitive impairment, dementia, and Alzheimer's Disease
- Reduced risk of cardiovascular events and all-cause mortality

Will feeling more purpose in life be associated with hippocampal volume and microstructure?

Hippocampal volume is larger in those with more purpose.



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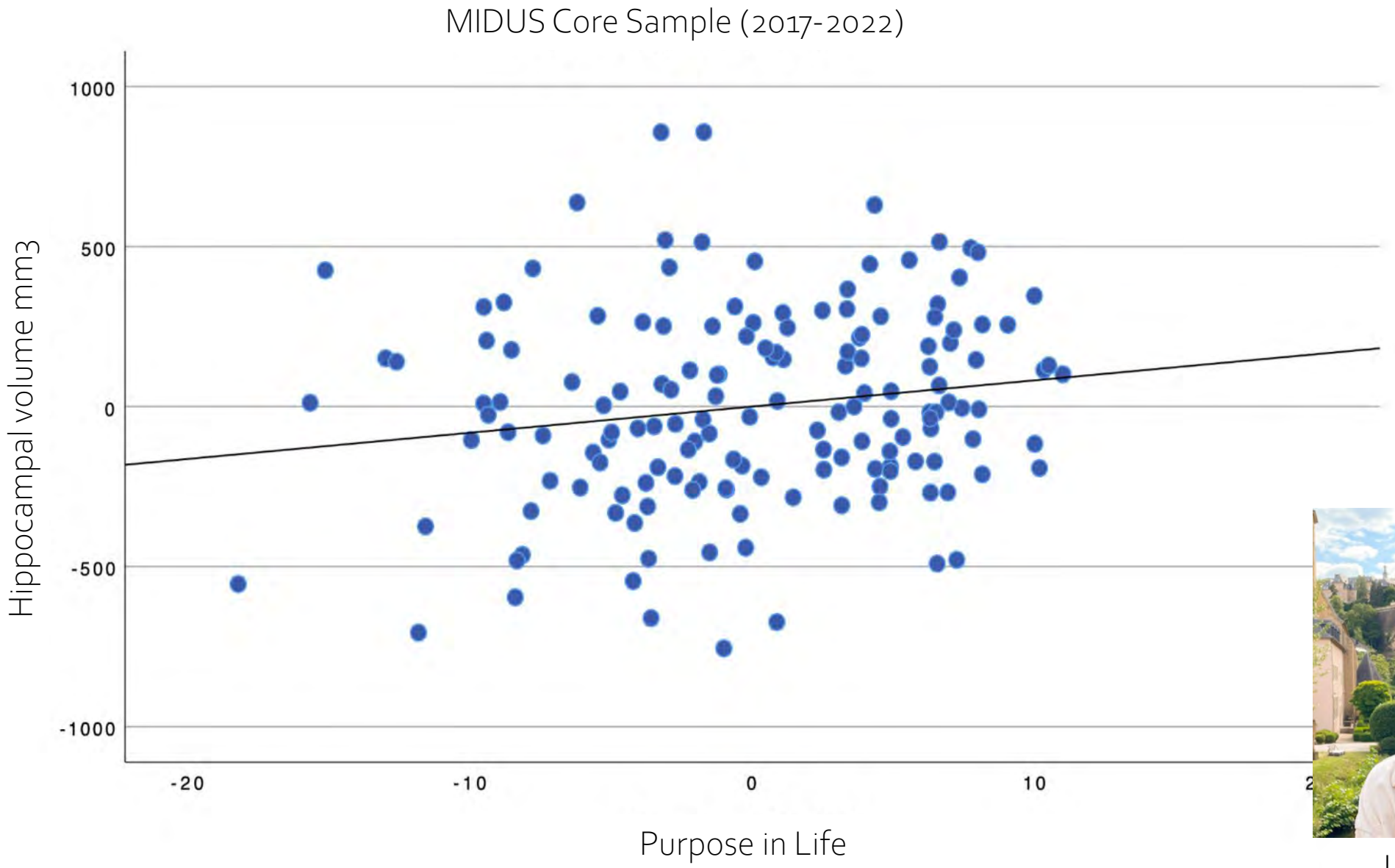
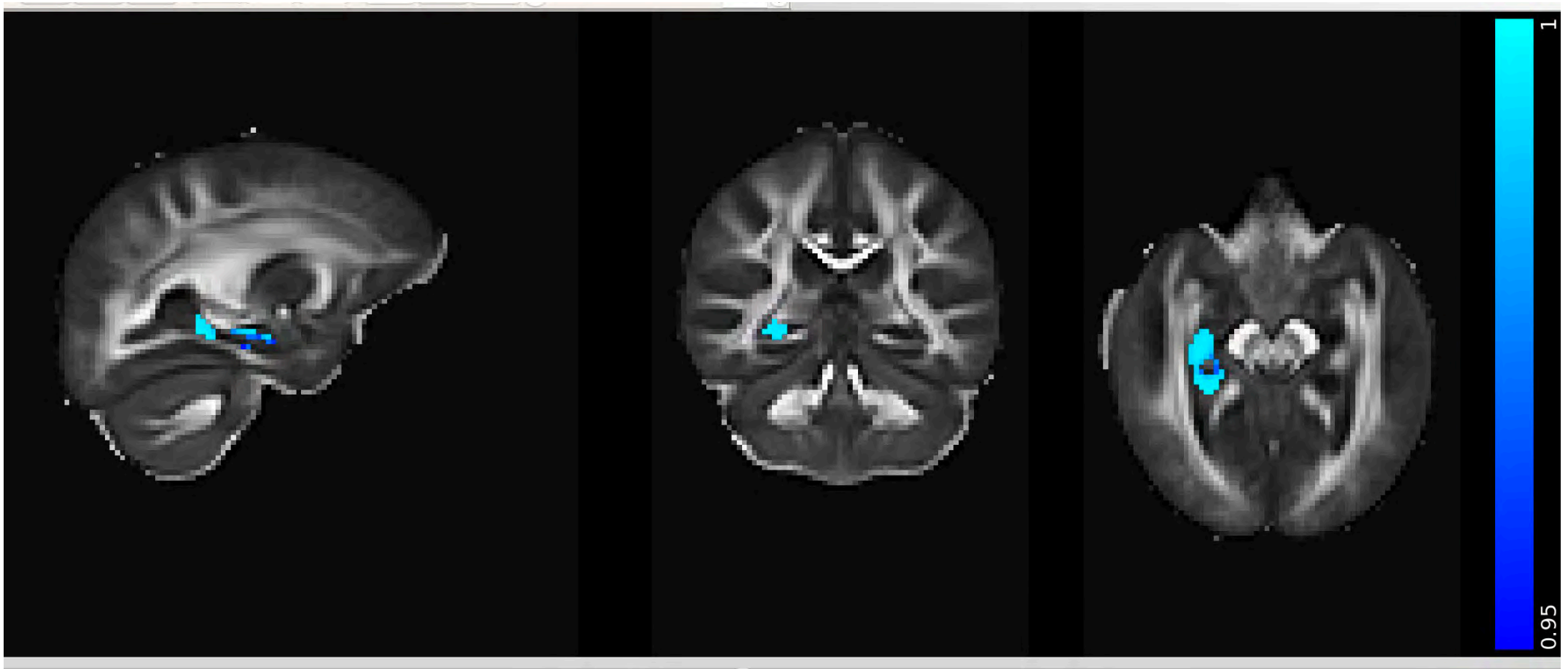


Lauren Krist

Feeling more purpose is also associated with better preserved hippocampal microstructure.

Dr. Ajay Kumar Nair



Summary

- Discrimination is a stressor impacting health and wellbeing, including
  - How people respond to emotional stimuli and display their emotional responses (expression suppression)
  - Cardiovascular health
  - Brain health ~ decreased volume and microstructural integrity of the hippocampus

Summary

- Purpose in life impacts many health and wellbeing processes
    - Better recovery from negative emotion and coping with stress
    - Better brain health including larger volume and microstructure integrity of the hippocampus.

As MIDUS samples grow older, we have new opportunities to learn

- The socioemotional determinants of accelerated aging

but also

- The early and midlife factors that promote resilience and better functioning *despite* experiences of adversity, inequity, genetic vulnerability, or the presence of pathology.

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- The early and midlife factors that promote resilience and better functioning *despite* experiences of adversity, inequity, genetic vulnerability, or the presence of pathology.

This knowledge will inform public policy & intervention science.

WHAT'S NEXT FOR MIDUS?

6 MORE YEARS of RESEARCH
funded by NIA in 2022, including:

New Waves of Data:

- A fourth wave of data from original participants will span 30 years of data.

New Focus on Alzheimers:

MIDUS is uniquely situated to

- identify markers of risk before symptomatology appears
- discover factors that protect against cognitive decline.

Examining the Impact of the Pandemic:

- MIDUS will look at whether those hit hardest by the Great Recession also suffer disproportionately during the pandemic.

Thank you to the funders, the many contributors, the MIDUS participants, and thank you for listening!

Institute on Aging
UNIVERSITY OF WISCONSIN–MADISON

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- John D. & Catherine T. MacArthur Foundation Research Network
- National Institute on Aging (P01-AG020166, U19-AG051426, U01-AG077928)

The MIDUS Neuroscience Project was also supported by the University of Wisconsin-Madison's Waisman Intellectual and Developmental Disabilities Research Center (U54-HD090256) awarded by the National Institute of Child Health and Human Development.