



### BACKGROUND

Discrimination refers to the unfair treatment of individuals based on personal attributes or group identity such as age, gender, race, education, body morphology, etc.<sup>1</sup>

Major discrimination is associated with :

- poorer mental and physical health<sup>2</sup>
- greater chronic pain<sup>3</sup>
- poorer cognition and faster biological aging<sup>4-5</sup>
- higher odds of all-cause mortality.<sup>6</sup>

Assessments of the effect of lifetime discrimination on brain health are limited.

We examined microscopic structural features using diffusion MRI metrics in white matter (wiring between brain regions) and in the hippocampus (a region important for memory) and assessed if discrimination exacerbated age linked microstructural differences.

### METHODS

- Data from the Midlife in the United States (MIDUS3; <https://midus.wisc.edu>) neuroscience project third wave (2017-2022).

Total = 147 participants, aged 48-95 years, 80 females, and 40 Black, Indigenous, and People of Color (BIPOC)

- Perceived lifetime discrimination questionnaire<sup>7</sup> was used.
- Microstructural indices were derived using
  1. diffusion tensor imaging
  2. white matter tract integrity<sup>8</sup> metrics
  3. neurite orientation dispersion and density imaging.<sup>9</sup>
- Examined moderating role of lifetime discrimination on age and microstructure metrics voxel-wise (2x2x2 mm cubes).<sup>10</sup>
- Accounted for influence of sex, education, and race.

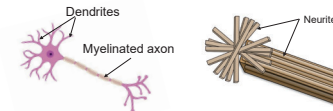
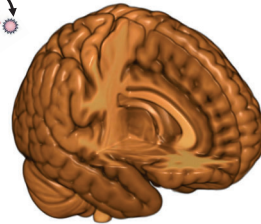
### LIFETIME DISCRIMINATION AND BRAIN HEALTH

**Lifetime discrimination: How many times in your life have you been discriminated against because of some personal characteristic?**

- |  |   |
|--|---|
| <input type="checkbox"/> You were discouraged by a teacher or advisor from seeking higher education.                       | <input type="checkbox"/> You were hassled by the police.  |
| <input type="checkbox"/> You were denied a scholarship.  | <input type="checkbox"/> You were denied a bank loan.   |
| <input type="checkbox"/> You were not hired for a job.   | <input type="checkbox"/> You were denied or provided inferior medical care.   |
| <input type="checkbox"/> You were not given a promotion.   | <input type="checkbox"/> You were denied or provided inferior service by a plumber, care mechanic, or other service provider. |
| <input type="checkbox"/> You were fired.   |   |
| <input type="checkbox"/> You were prevented from renting or buying a home in the neighborhood you wanted.                  |   |
| <input type="checkbox"/> You were prevented from remaining in a neighborhood because neighbors made life so uncomfortable. |   |

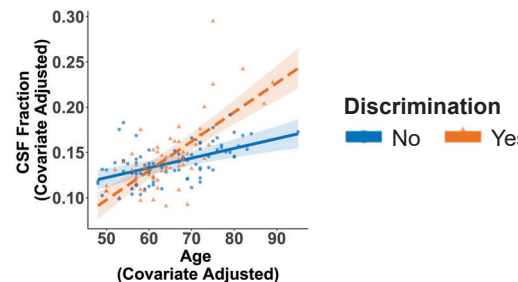
**Can lifetime discrimination predict brain health?**

1. We checked indices of brain health by looking at the diffusion of **water molecules** in brain tissue using **diffusion MRI**



2. We checked many models of brain **"microstructure"** – to find information about the tissues at the microscopic level

3. Then we assessed the relationship of lifetime discrimination with indices of brain health. **Converging evidence** from multiple models suggest that experience of **lifetime discrimination accelerates brain aging**.



### FINDINGS

- Perceived discrimination amplified age-associated differences in multiple microstructure measures including higher mean and radial diffusivities, extra-axonal radial diffusivity, and free water fraction.

### DISCUSSION

- Older age is associated with brain microstructure differences, such as increased extracellular free water, that are detectable well before frank volume loss and cognitive decline is observed.<sup>11</sup>
- We found higher free water in both white matter and hippocampus for those who experienced lifetime discrimination vs. similarly aged individuals who did not.
- These findings from complementary diffusion MRI measures suggest that experience of lifetime discrimination accelerates age-associated differences in brain microstructure.
- It is crucial to develop interventions to support individuals coping with discrimination and form policies to reduce systemic inequity.

### REFERENCES

- 1.Potter et al., 2019. Stigma Health.
- 2.Lewis et al., 2015. Annu. Rev. Clin. Psychol.
- 3.Brown et al., 2018. Soc. Sci. Med.
- 4.Lindert et al., 2022. Soc. Psychiatry Psychiatr. Epidemiol.
- 5.Carroll et al., 2022. Soc. Sci. Med.
- 6.Obaoye et al., 2023. Aging Ment. Health.
- 7.Kessler et al., 1999. J. Health Soc. Behav.
- 8.Fieremans et al., 2011. Neuroimage.
- 9.Zhang et al., 2012. Neuroimage.
- 10.Winkler et al., 2016. Neuroimage.
- 11.Merluzzi et al., Neurobiol. Aging.

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