Differential age-associated decline in MRI metrics of brain health among precariously housed individuals compared to the general population

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Background

• Homeless and precariously housed individuals experience a high burden of mental and physical illness, as well as higher mortality compared to the general population.1
• More than half of homeless or precariously housed individuals have a history of traumatic brain injury (TBI) and nearly one quarter report a history of moderate or severe TBI.2
• There is relatively little research on the role of brain health in this vulnerable population.

Objectives

1. To evaluate how MRI markers of brain health in homeless or precariously housed individuals compare to the general population.
2. To evaluate whether TBI or substance dependence are associated with greater brain atrophy among homeless or precariously housed individuals.

Methods

Hotel Study (n = 312)
• Recruited from single-room occupancy hotels, downtown community court, and St. Paul’s hospital.
• 77% male; 67% with history of homelessness.
• Substance dependence diagnoses & measures of functioning.
• TBI history.
• T1-weighted and diffusion tensor MRI.

Cambridge Centre for Ageing and Neuroscience (CamCAN; n = 385)
• Recruited from general population (Cambridge, UK).
• 47% male.
• T1-weighted and diffusion tensor MRI.

Statistical analysis
• To evaluate MRI metrics compared to the general population we used multiple linear regression with a group*age interaction term.
• We used multiple linear regression to evaluate how TBI and substance dependence were associated with MRI metrics of brain health. Each model covaried for age and sex.

Takeaways and implications

1. Our work indicates that there is a decline in MRI markers of brain health among homeless or precariously housed populations across the adult lifespan as compared to the general population.
2. These findings emphasize the important role of brain health in this population, and we identify several modifiable risk factors (TBI, HSV, cannabis dependence).

Results

Brain macrostructure (T1-weighted MRIs)

- Homeless and precariously housed individuals have more age-associated atrophy and increase in ventricular volume across the adult lifespan than those in the general population (above). The regions of the cortex that are most affected are the frontal and temporal regions, and the subcortical regions most affected are the corpus callosum (declining in volume) and the ventricles (increasing in volume), below.

White matter microstructure (diffusion tensor imaging)

- Similarly, homeless and precariously housed individuals have a more age-associated decline in FA and increase in MD across the adult lifespan compared to those in the general population. The corpus callosum, anterior thalamic radiations, and uncinate fasciculi were the most affected regions.

Factors associated with more atrophy in the precariously housed sample
• Schizophrenia (β = -0.64, p = 0.002)
• Cannabis dependence (β = -0.27, p = 0.043)
• HSV infection (β = -0.47, p = 0.009)
• History of TBI with loss of consciousness (β = -0.28, p = 0.029)

Sensitivity analysis on traumatic brain injury
• 6.4% had lesions attributable to TBI (right)
• Our findings are robust even with these participants removed, indicating that our findings are not driven by major lesions.

References

1 Fazel et al. (2014). Lancet.

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