



Background

- Estrogen is involved in many aspects of neural function ¹
- Menopause has been associated to cognitive decline ²
- An increased number of children has been associated to improved cognition in later life, although whether this should be attributed to pregnancy or parenthood is highly debated. ³
- Multiple lifestyle risk factors for dementia can also interact with female reproductive health and history.

Objectives

- Investigate the relationship between menopause, the number of children, risk factors for dementia and brain morphometry using a multivariate approach.
- Assess the impact of these variables on cognition.

Methods

DATA

57 male and 67 female cognitively healthy subjects aged 40-70 were included in this study. Demographic, cognitive and imaging data was obtained from the Cambridge Center for Ageing and Neuroscience. ⁴

MRI ACQUISITION AND PROCESSING

Data was collected using a 3T Siemens TIM Trio scanner (MPRAGE, 1mm³) ⁴, was preprocessed using minc-bpipe library and vertex-wise cortical thickness (CT) data was extracted using CIVET 2.1.0. ⁵

PARTIAL LEAST SQUARES

Partial least squares (PLS) correlation was used to extract patterns of covariance between demographic/health related variables and CT measures.

Results

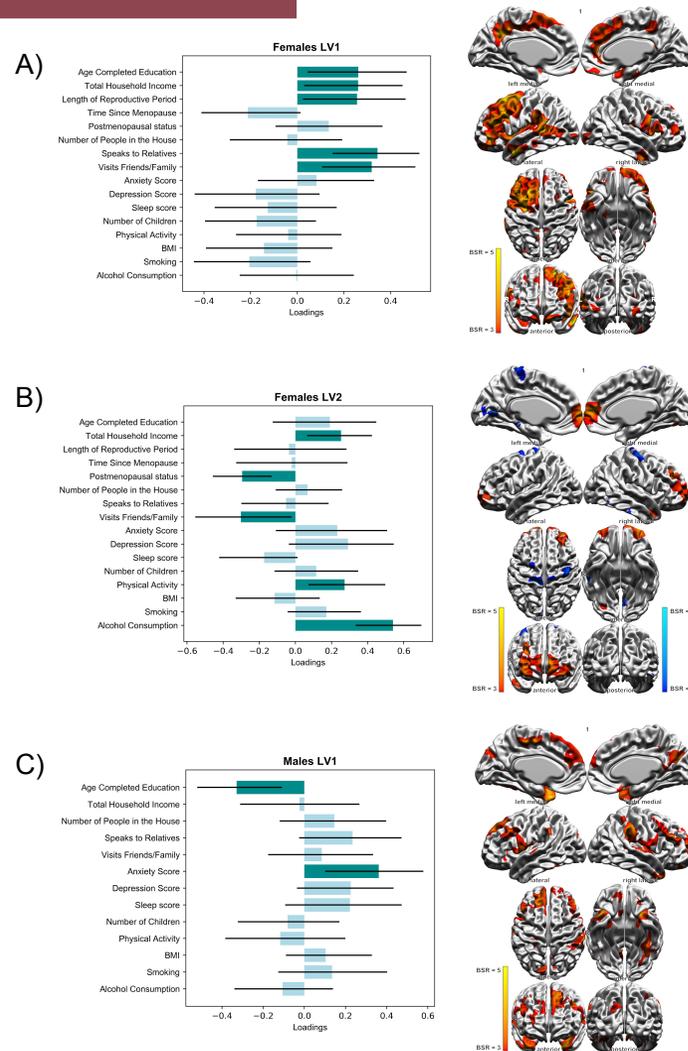


Figure 1: PLS results yielded two significant latent variables (LV) for females (A, B) and one for males (C). LV1 in females explained 47.3% of the variance in the data ($p < 0.001$) and LV2 explained 14.9% ($p = 0.044$). In males the significant latent variable explained 48.9% of the variance ($p = 0.0024$).

Age was residualized from every demographic and every CT variable.

The plots on the left describe the correlation of each demographic variable with the LV, where variables with an error bar that doesn't cross the zero line are considered significant. On the right, CT at coloured vertices have a significant positive correlation with the LV and a brighter color indicates a stronger correlation.

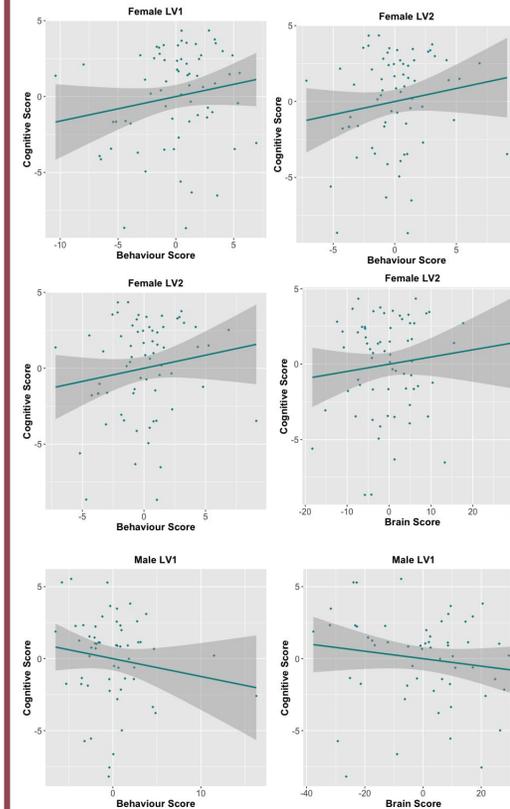


Figure 2: Linear models between brain or behaviour scores and total score obtained on the cognitive tests in the ACE-R battery. Brain and behaviour scores indicate the correlation between a specific participant's brain or demographic pattern and the pattern in the LV, where a high score indicates high correlation. None of the relationships were found to be significant

Conclusions

- Menopause has an impact on CT even after correcting for age.
- The number of children has no impact on CT, regardless of sex.
- SES, social contact, physical activity, alcohol consumption and anxiety can be linked to CT and show sex effects.
- No significant relationship can be found between these patterns and cognitive decline.

Acknowledgements



References

- ¹Gillies et al *Pharmacological Reviews* 2010 | ²Brinton et al *Nature Reviews Endocrinology* 2015 | ³Zhao et al *Scientific Reports* 2020 | ⁴Taylor et al *NeuroImage* 2017 | ⁵Ad-Dab'bagh et al *NeuroImage* 2006