

Randomized Controlled Trial Of Resistance Training Reveals Deceleration Of Brain Aging In Older Adults

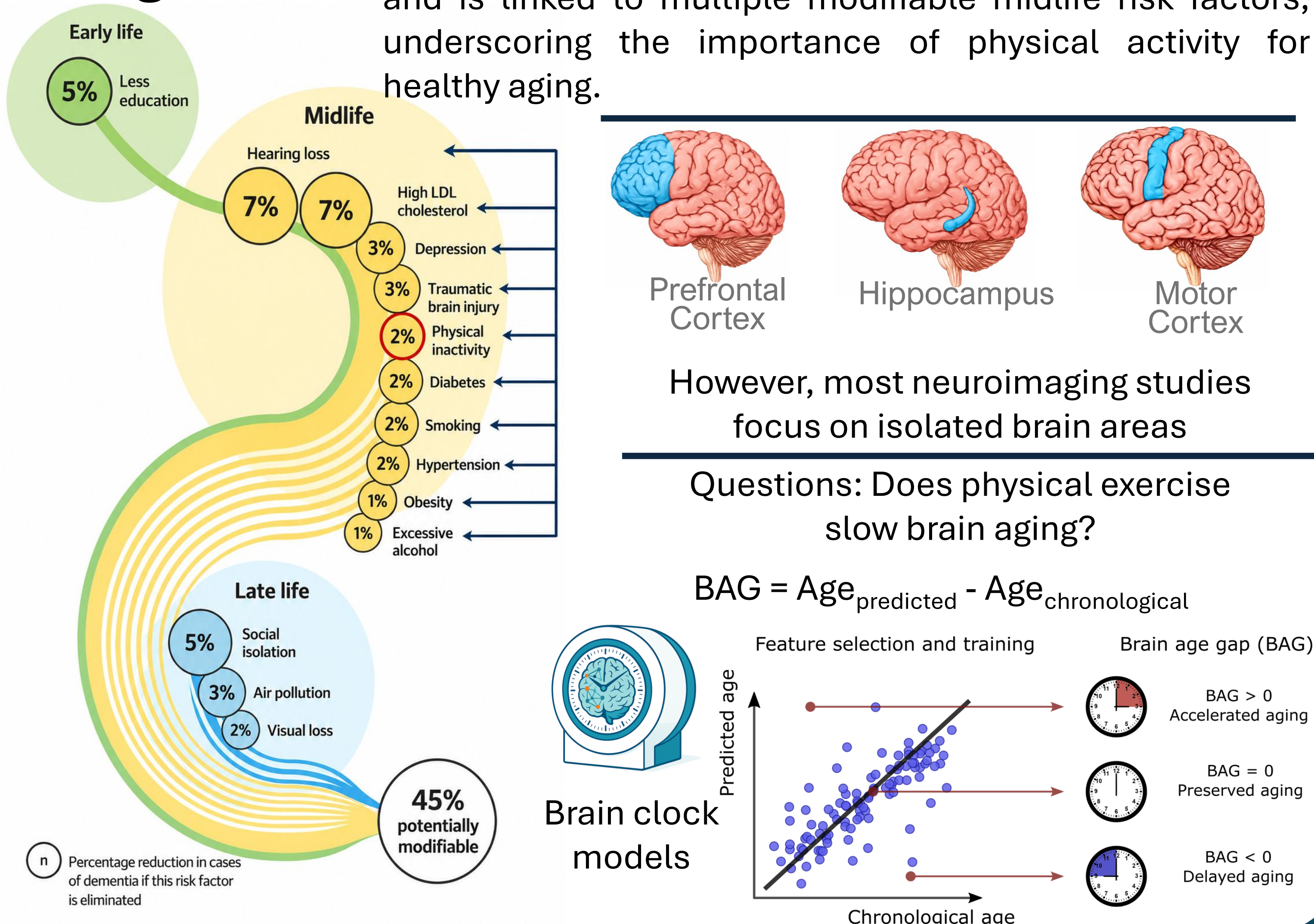
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Background

Physical inactivity contributes to ~2% of dementia cases and is linked to multiple modifiable midlife risk factors, underscoring the importance of physical activity for healthy aging.



Results

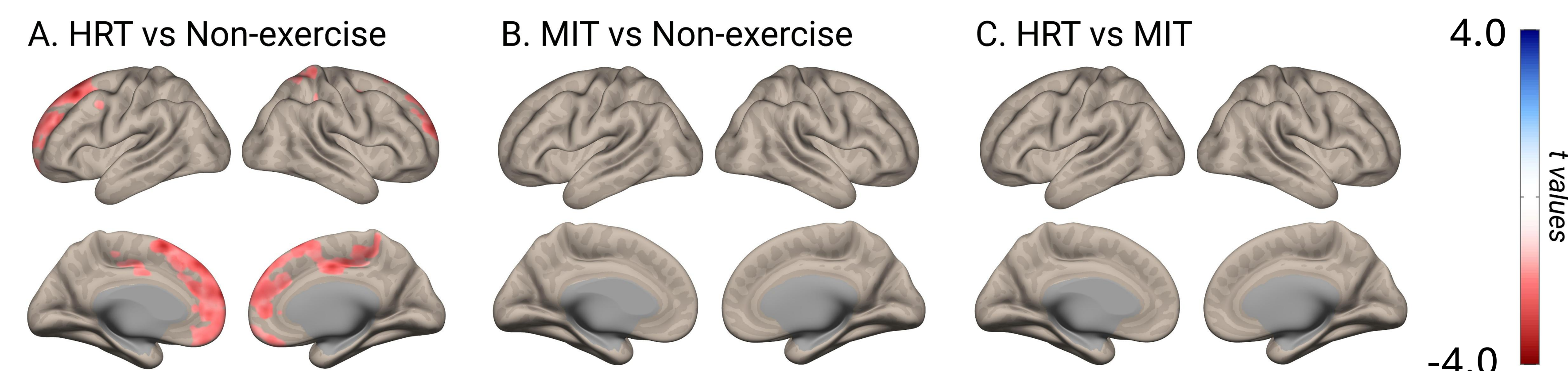
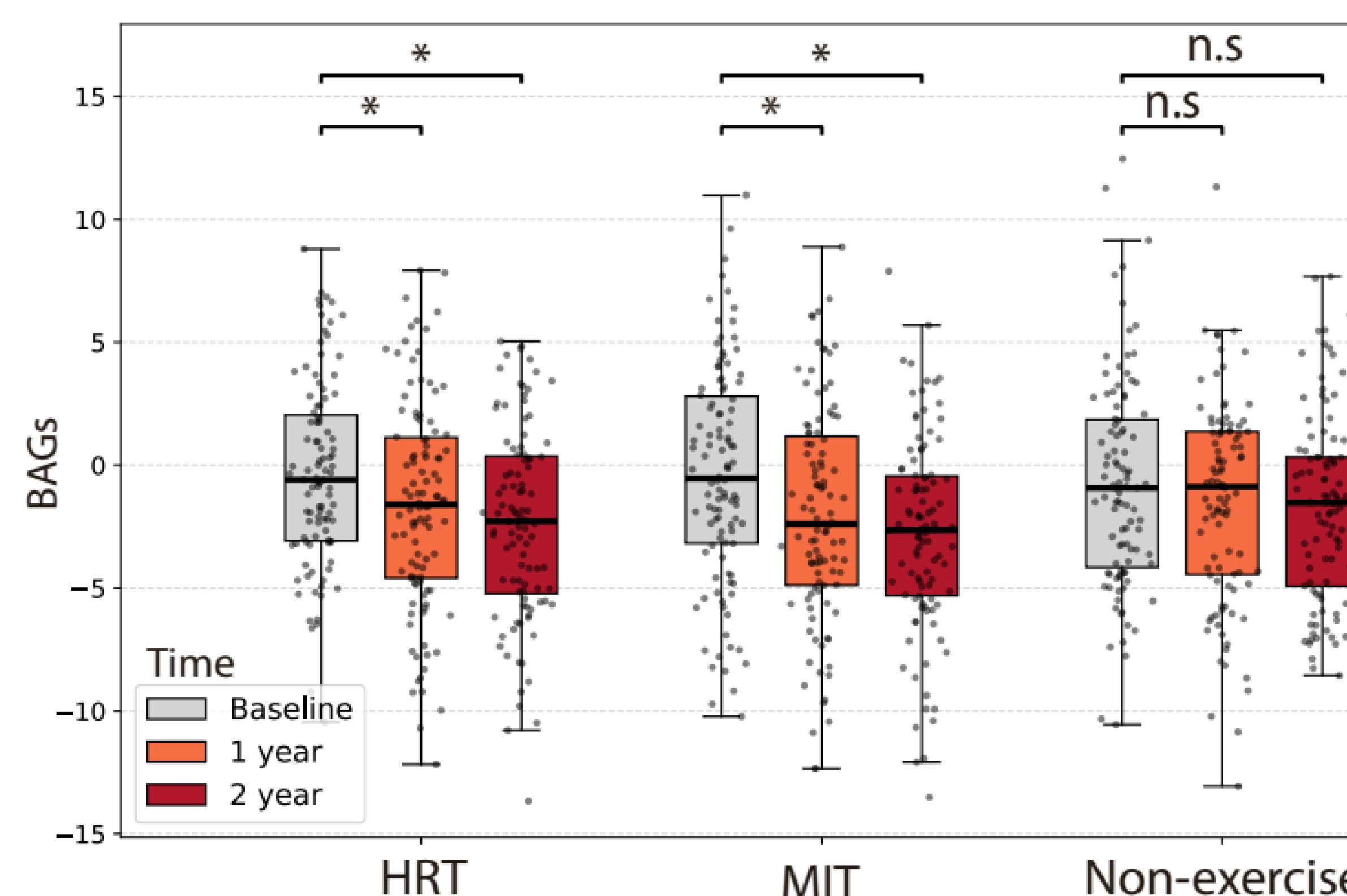
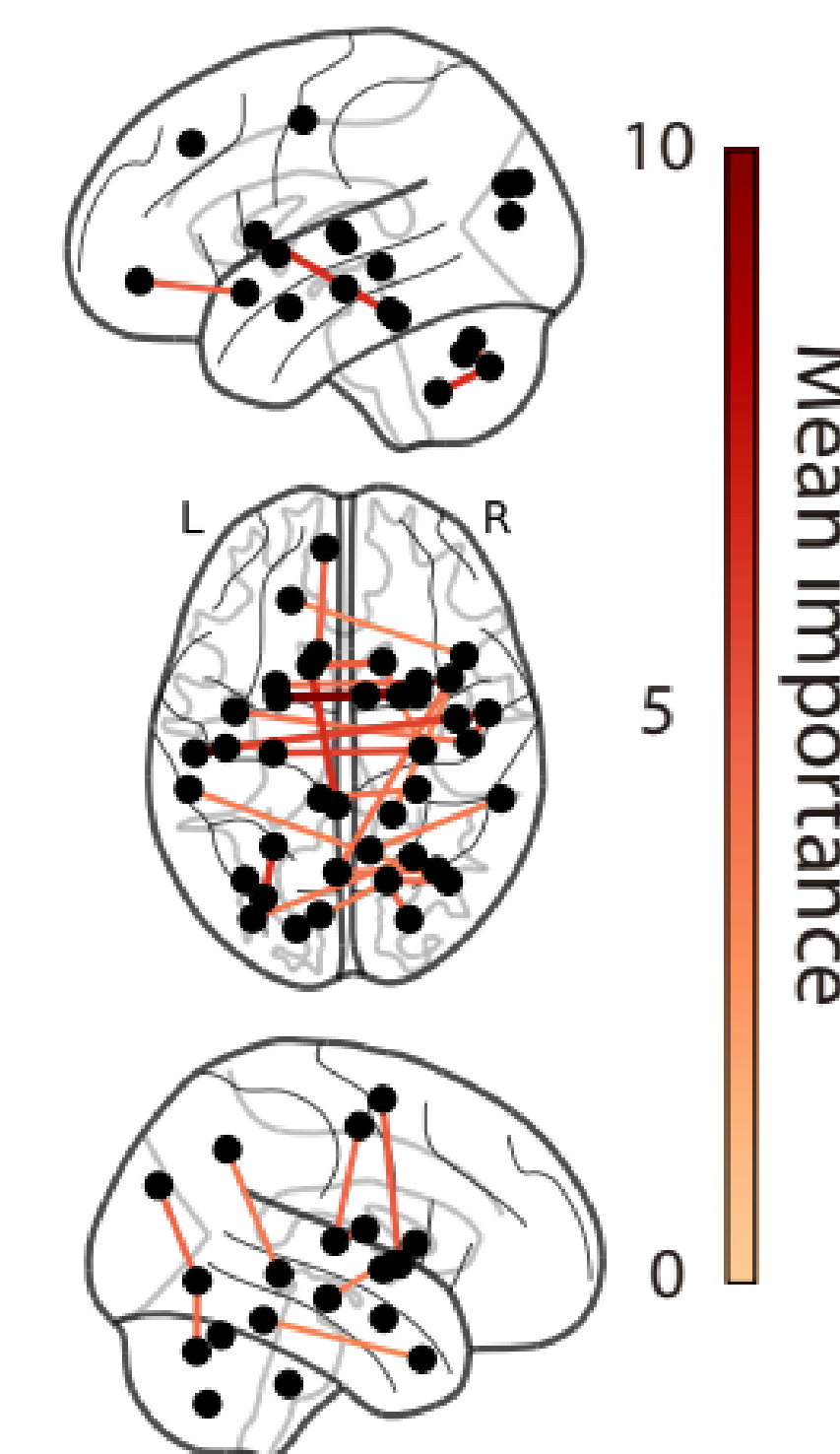


Fig. 1. Voxel-wise functional connectivity changes after physical training. Mixed-effects ANOVA assessed longitudinal changes (1 year > baseline) across HRT, MIT, and non-exercise groups, adjusting for age and sex. Results were FDR-corrected at the cluster level ($p_{FDR} < 0.05$).

A. Brain age gaps across time



B. Top connections



C. Fitness Association

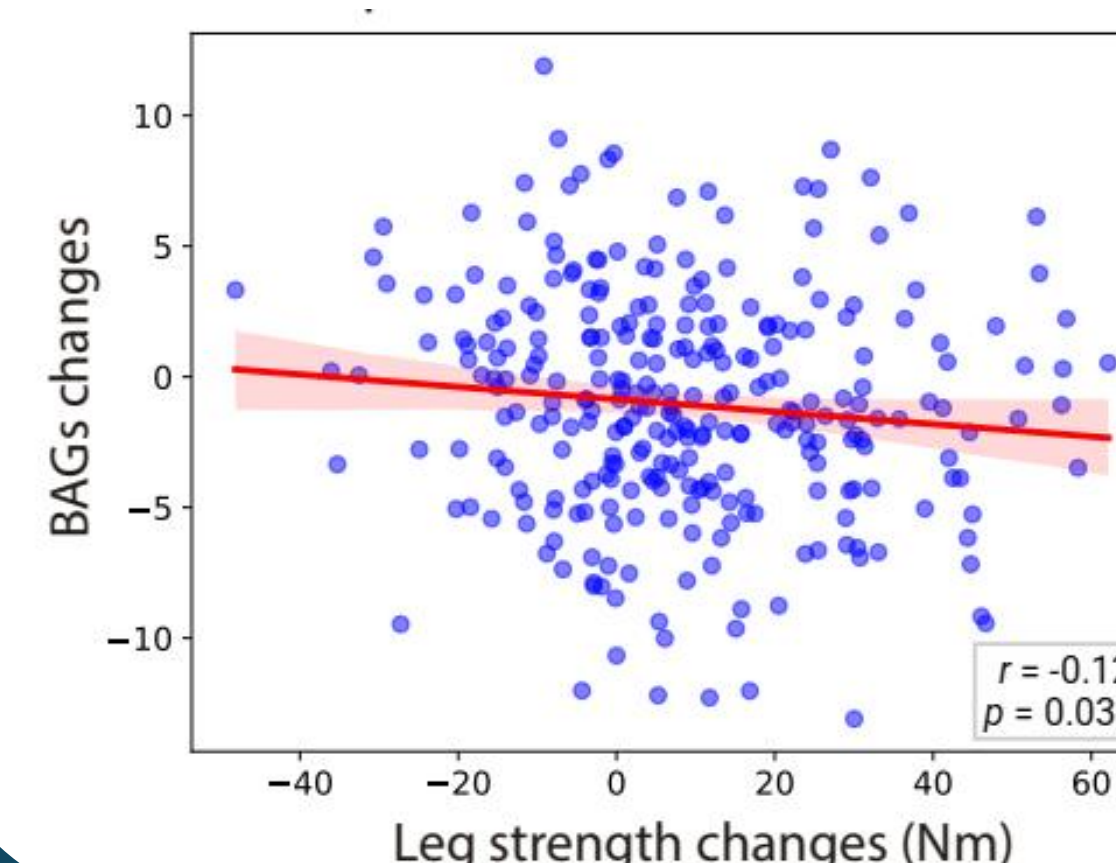
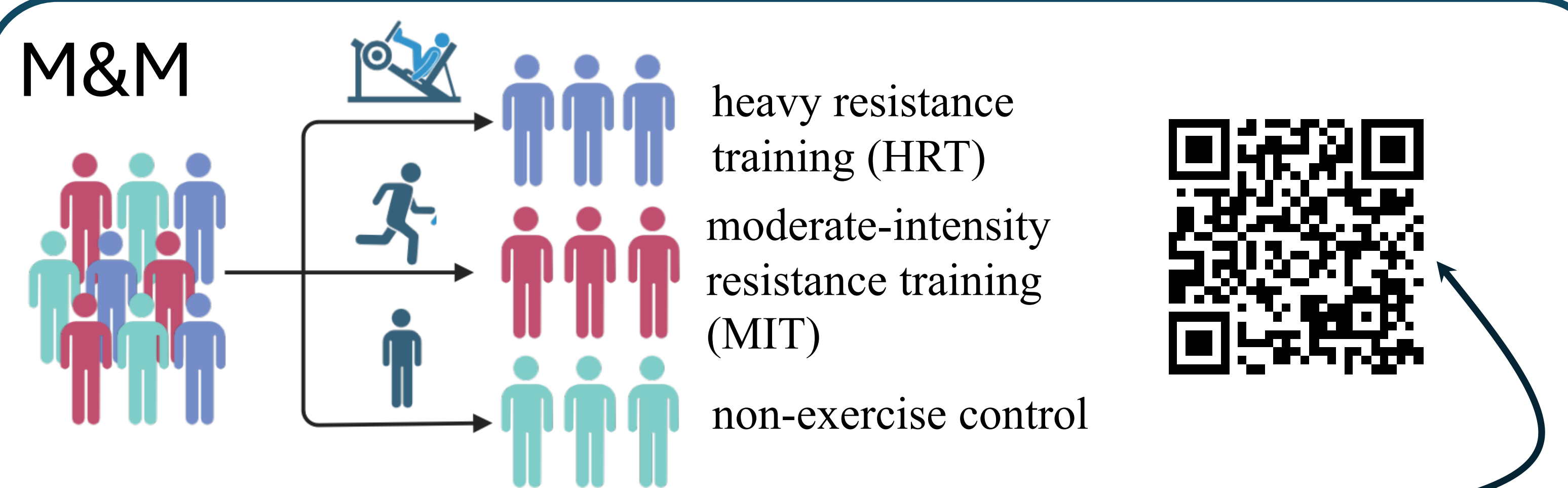


Fig. 2. Brain age gap (BAG) changes following exercise. (A) Longitudinal BAG trajectories (paired permutation tests, $p_{FDR} < 0.05$). (B) Top predictive connections. (C) Relationship between BAG and changes in leg strength over the first year. Brain clocks were derived from AAL-parcellated resting-state fMRI.

M&M



The Live active successful ageing (LISA) trial

Group	n	Age	Sex (% females)	Education
HRT	103	66.4(2.6)	39	14.2(1.8)
MIT	105	66.3(2.5)	39	14.7(2.0)
Non-exercise	101	66.8(2.4)	41	14.6(2.9)
Stats	-	F = 1.05, p = 0.35	$\chi^2 = 0.18$, p = 0.91	F = 1.69, p = 0.19
External dataset*	2433	66.4(15.1)	42	12 (7.9)

*Sample used for training brain clocks

Conclusions

- Resistance training may delay brain aging.
- Training matters more than dose: high- and moderate-intensity show similar effects.
- Brain clocks reveal distributed brain changes beyond conventional voxel- and ROI-based analyses.