

Age-related changes in cerebral activity following cognitive fatigue

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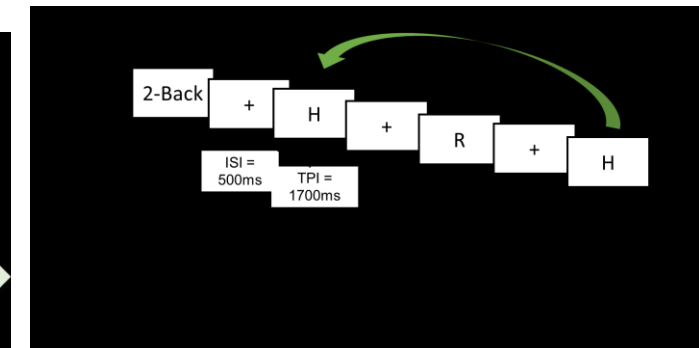
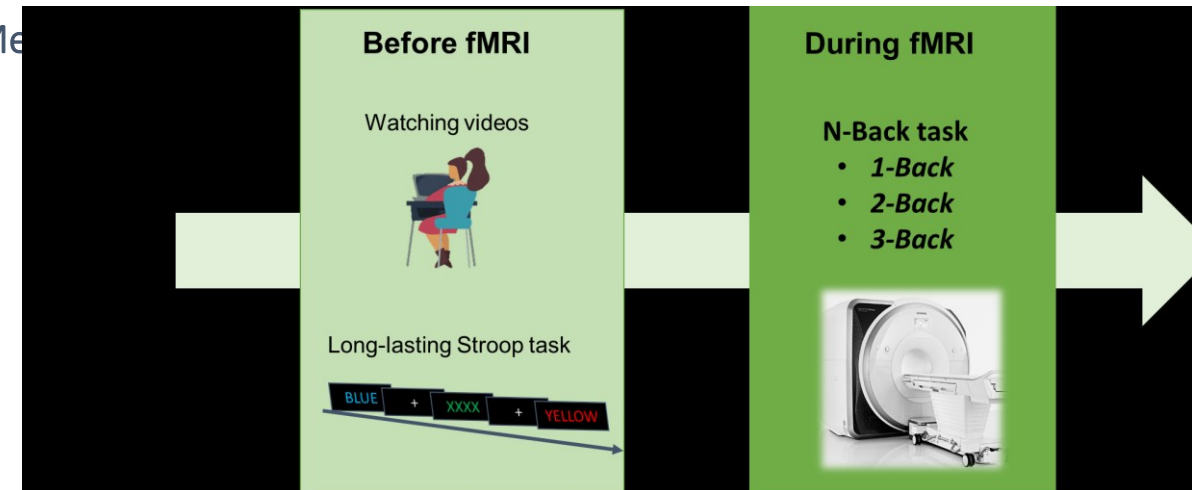
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Introduction

Cognitive fatigue is associated with the modulation of fronto-parietal areas in young people. However, very few studies have investigated fatigue-related cerebral activity changes in middle-aged and older people.

Consequently, we administered to young, middle-aged, and older people an out-scanner fatigue (or a control) condition followed by an in-scanner N-Back task with three working memory loads.

Method



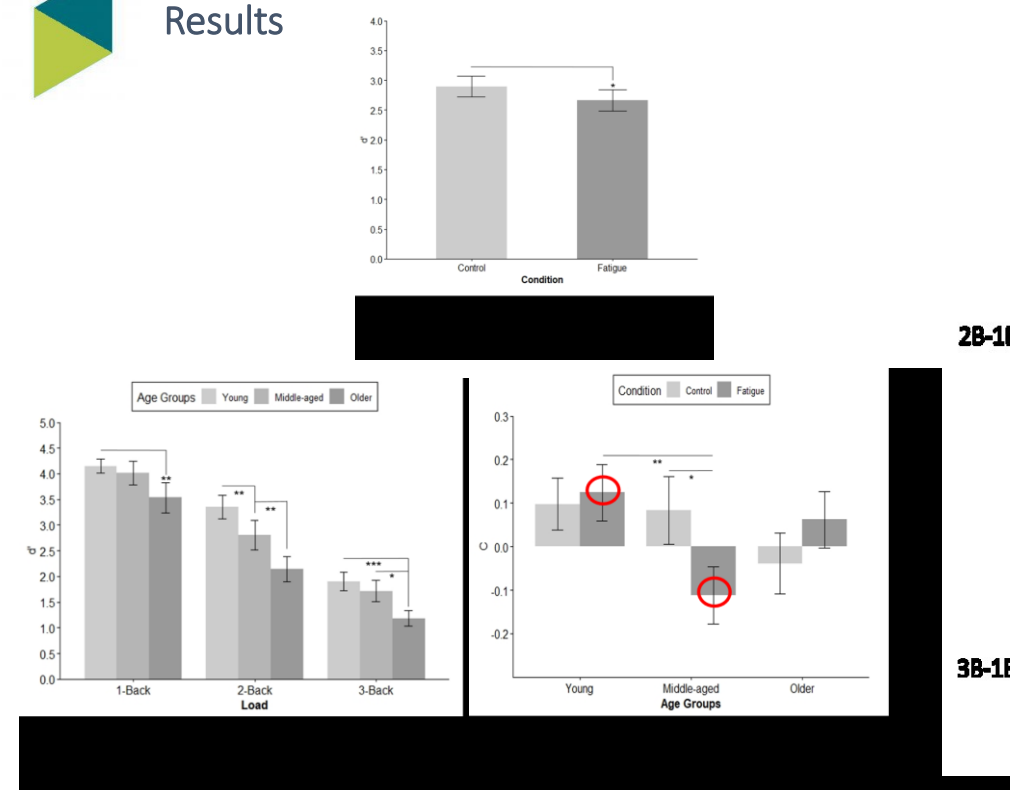
Data acquisition: Siemens 3T IRM; block design
Data analyses: SPM12 (group comparison at the RFX level)
Statistical threshold: FWE p<0.05 corrected

Participants

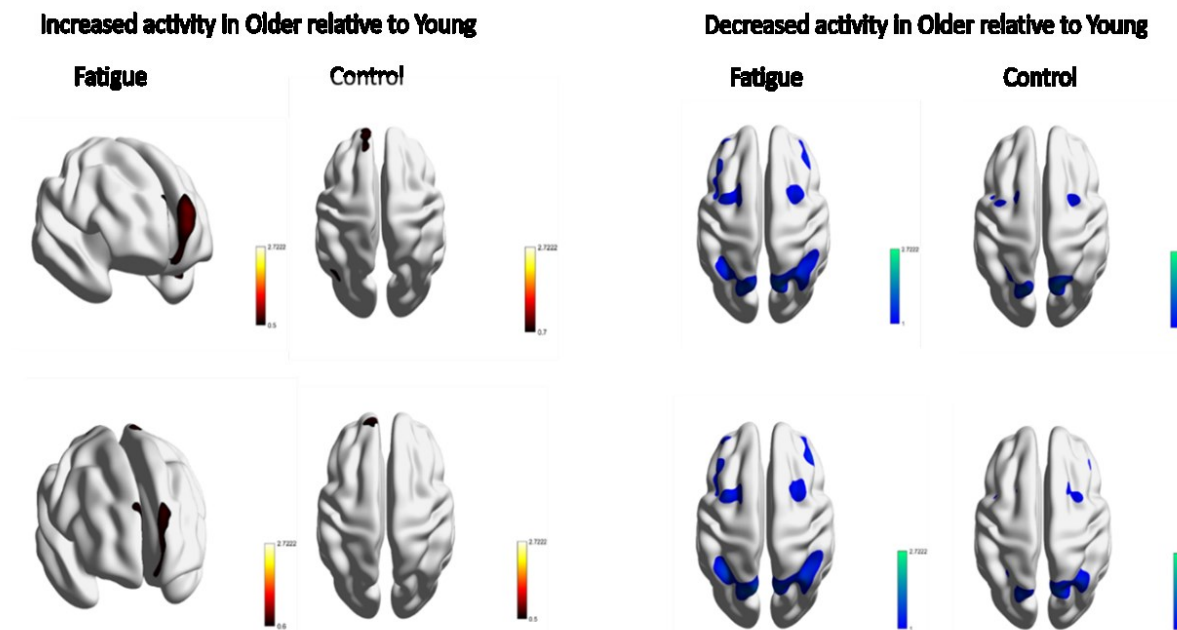
Group	Young		Middle-aged		Older	
	Fatigue	Control	Fatigue	Control	Fatigue	Control
N	25	22	20	21	20	20
Sex (M/F)	10/15	12/10	11/9	11/10	10/10	10/10
Age (y) ***	24.84 (2.25)	24 (2.79)	50.35 (5.52)	49.05 (5.98)	68.65 (5.18)	69.1 (4.54)
Educ. level (y)*	16.08 (2.16)	15.59 (2.24)	14.2 (3.85)	13.81 (1.91)	14.05 (3)	14.1 (3.6)
Vocabulary level ^a ***	24.36 (3.96)	25.77 (3.73)	27.21 (4.42)	26.14 (4.59)	28.45 (3.27)	29.45 (3.14)
Depression status ^b	8.92 (5.6)	9.55 (5.34)	10.3 (6.17)	8.19 (6.3)	7.25 (4.2)	8.8 (6.35)
Sleepiness ^c *	5.84 (3.61)	8.18 (3.87)	9.35 (4.31)	9.67 (4.35)	7.89 (3.57)	7.55 (3.38)
Sleep Quality ^d	4.68 (2.58)	4.62 (1.69)	5.1 (2.77)	4.76 (2.12)	5.89 (2.87)	5.8 (3.37)
Mattis DRS	-	-	140.95 (3.35)	141.05 (1.99)	140.75 (2.86)	141.9 (2.25)

Note. Reported values are means (SD) except for Sex (count). ^a Total number of correct responses on the MillHill test (Deltour 1993); ^b Total score on the CES-DS (Radloff 1977). Participants scoring higher than 20 were excluded; ^c Total score on the EES (Johns 1991); ^d Total score on the PSQI (Buysse et al. 1989); ^e Labels based on the Horne and Ostberg test (Horne and Ostberg 1976); Mod. = Moderate. There was 1 missing value in the Older_Fatigue subgroup. *p < .05 ** p < .01 *** p < .001

Results



No difference in brain activity between young and middle-aged



Conclusions

- Increased activity in ACC and OFC in older : higher estimation of the perceived effort to perform the task.
- Increased activity in the fronto-parietal network in young: counteracting the effect of fatigue.
- Very subtle fatigue effects, only at the behavioral level, in middle-age