Alexithymia is associated with increased age-related neurodegeneration as measured by elevated frontal theta power during response inhibition

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BACKGROUND

- Alexithymia: disrupted emotional awareness
  - Characterized by three facets: **difficulty identifying feelings (DIF)**, difficulty describing feelings (DDF), and externally oriented thinking (EOT)
- DIF is associated with cognitive control deficits[1]
- Old age is associated with both increased alexithymia and decreased cognitive control[1,2]
- Neural measure of cognitive control: EEG theta band (4-8 Hz)
  - In healthy younger adults, elevated frontal theta is associated with appropriate cognitive control
  - Theta power decreases with age in healthy aging, but increased theta power is associated with early-stage dementia (likely neural compensation for degeneration)[3]

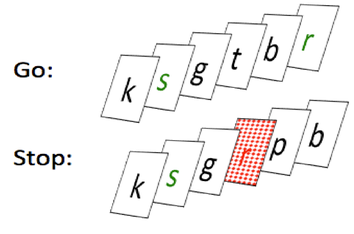
METHODS

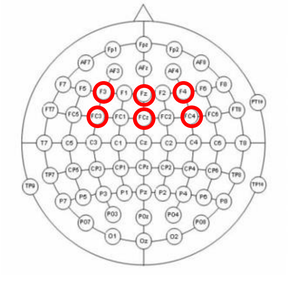
Participants:

Participant characteristic	Older adults (n = 45) *M (SD)*	Younger adults (n= 42) *M (SD)*
Age	79.7 (4.7)	19.9 (2.7)
Gender (% female)	76	74
Education	14.7 (2.3)	13.7 (1.1)
Stop-signal reaction time (ms)	541.1 (37.4)	451.4 (44.5)

Measures:

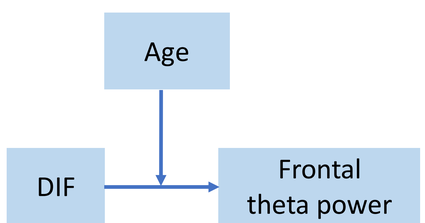
- Toronto Alexithymia Scale (TAS-20)
  - DIF subscale
- Stop-signal task
  - Go task: respond to specific stimuli in serial presentation
  - Stop task: withhold response to the same stimuli if a flashing light is presented immediately after a stimulus
- Relative EEG band power at frontal and front-central electrodes during successful response inhibition
  - Fz (frontal midline) - frontal task-related theta power





RESULTS

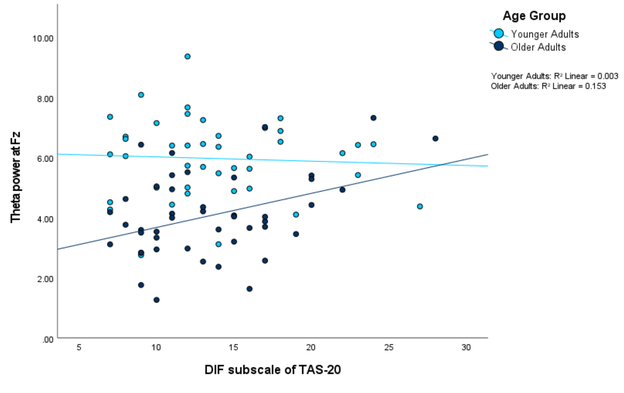
- DIF alone does not predict theta power, but DIF interacts with age to predict theta power at relevant midline and left-hemisphere electrodes



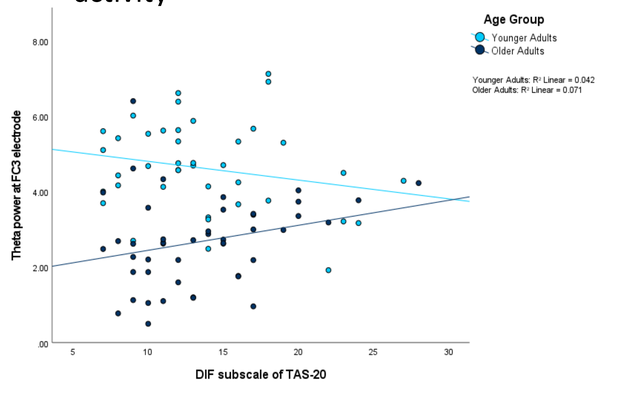
Fz					Confidence intervals (lower, upper)	
	R^2	MSE	F	p		
	0.3694	1.7649	16.2074	**<0.0001**		
	Coefficient	SE	t	p		
Age	-0.0583	0.0141	-4.1234	**0.0001**	-0.0864	-0.0302
DIF	-0.0542	0.0562	-0.9642	0.3377	-0.1661	0.576
Age*DIF	0.0021	0.0010	2.1035	**0.0384**	0.0001	0.0040
FC3						
	R^2	MSE	F	p		
	0.4117	1.4477	19.36	**<0.0001**		
	Coefficient	SE	t	p		
Age	-0.0554	0.0128	-4.3310	**<0.0001**	-0.0809	-0.0300
DIF	-0.0812	0.0509	-1.5936	0.1148	-0.1825	0.0201
Age*DIF	0.0018	0.0009	1.9896	**0.0499**	<0.0001	0.0035

In elders (navy), DIF predicts task-related theta power at:

Frontal midline (Fz)
- Inhibitory control



Left front-central (FC3)
- Potentially task-relevant motor planning activity



DISCUSSION

- In older adults, high DIF predicted high theta during successful inhibition
  - Increased theta power indicates neural compensation for age-related degeneration
  - High DIF as a trait may exacerbate degeneration
- DIF may indicate cognitive control deficits that disrupt appropriate inhibition of responses to competing stimuli
- Future directions:
  - Role of Alzheimer's biomarker (APOE epsilon 4) in DIF-theta power relationship
  - Comparison of task-state to resting-state theta power

REFERENCES

1. Correro, A. N., Paitel, E. R., Byers, S. J., & Nielson, K. A. (2021). The role of alexithymia in memory and executive functioning across the lifespan. *Cognition and Emotion*, *35*(3), 524–539. https://doi.org/10.1080/02699931.2019.1659232 **2.** Correro, A. (2020). *The Effects of Alexithymia and Age on Inhibitory Control*. https://epublications.marquette.edu/dissertations_mu **3.** Cummins, T. D. R., & Finnigan, S. (2007). Theta power is reduced in healthy cognitive aging. *International Journal of Psychophysiology*, *66*(1), 10–17. https://doi.org/10.1016/j.ijpsycho.2007.05.008