

Anxiety influences perceptual processing in mid childhood: elucidating the role of cortical excitability

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AIM.

To understand how *cortical excitability* contributes to emotional and cognitive processes in girls in the last year of primary school.

PARTICIPANTS.

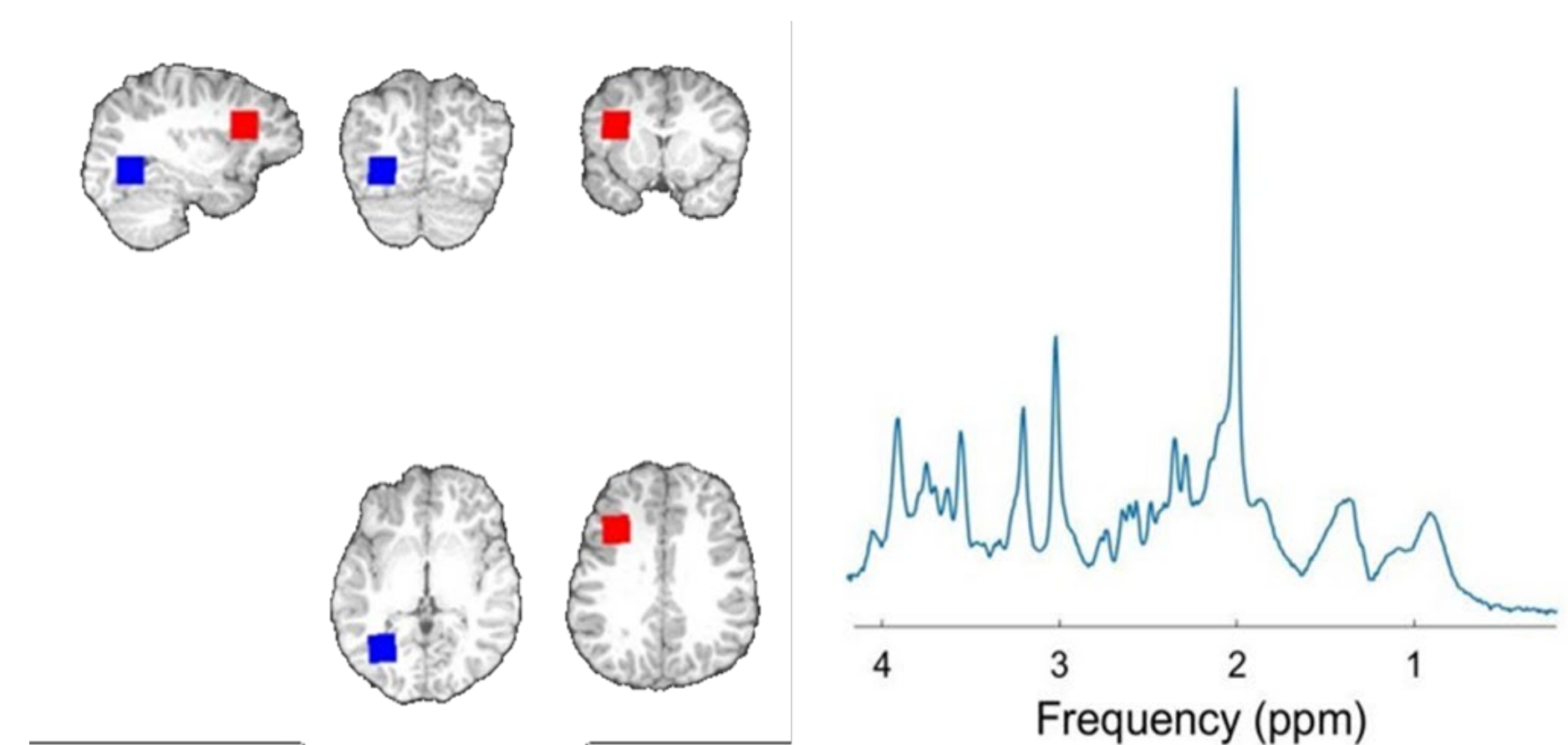
49 typically developing female children (aged 10-12 years) with no health/psychological diagnosis from South East England, UK.

MEASURES.

Anxiety (self report): Trait section of the state-trait anxiety inventory [1]

Attention networks (behavioural): Attention network test (ANT) adapted for children [2]

Neurotransmitters (H¹-MRS): Glutamate and GABA from the dlPFC and IOG using SPECIAL sequence [3]

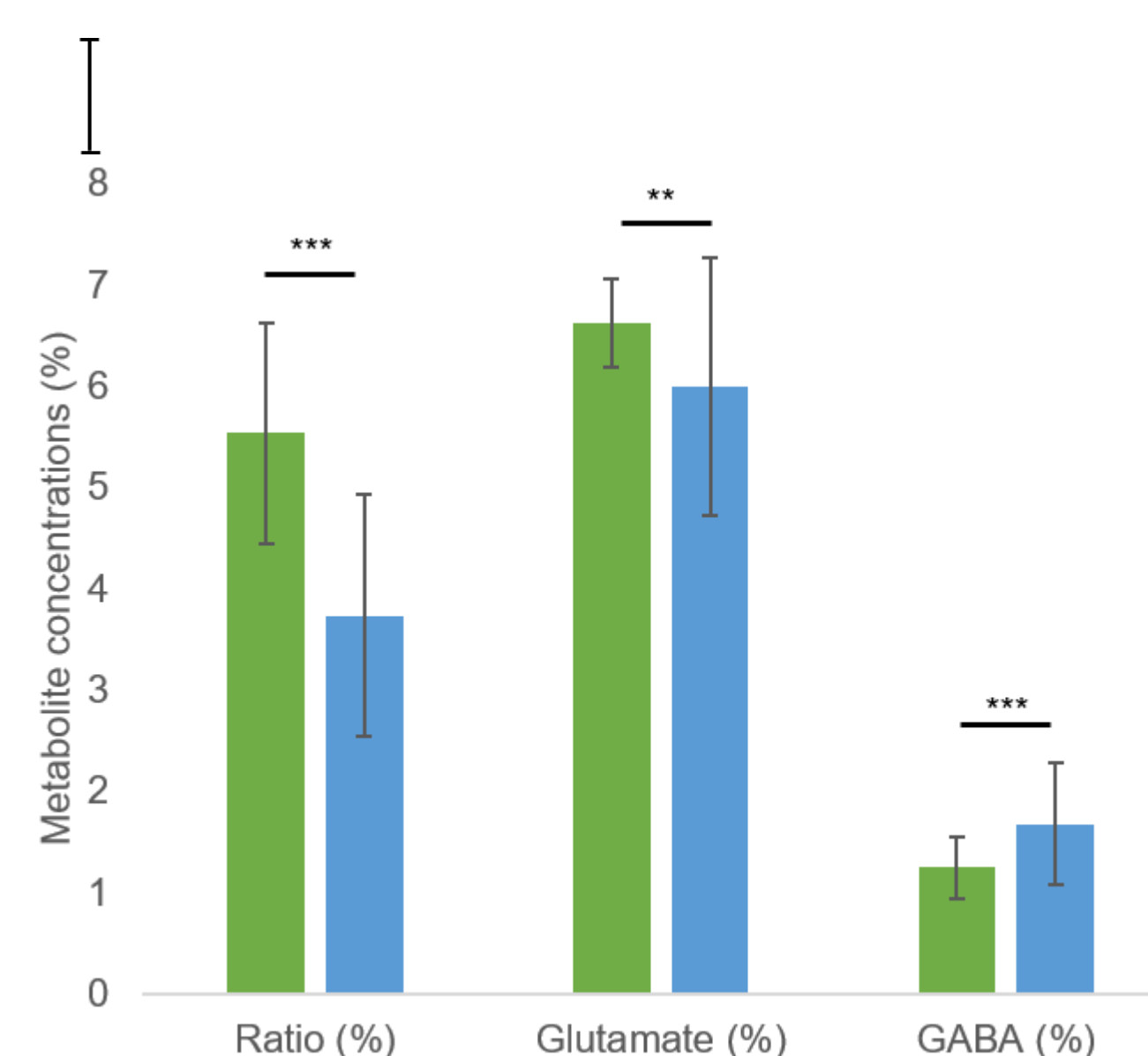


Voxels of interest (VOIs) for the MRS spectra acquisition. The dorsolateral prefrontal cortex (dlPFC) is in red and inferior occipital gyrus (IOG) is in blue.

i. Correlations

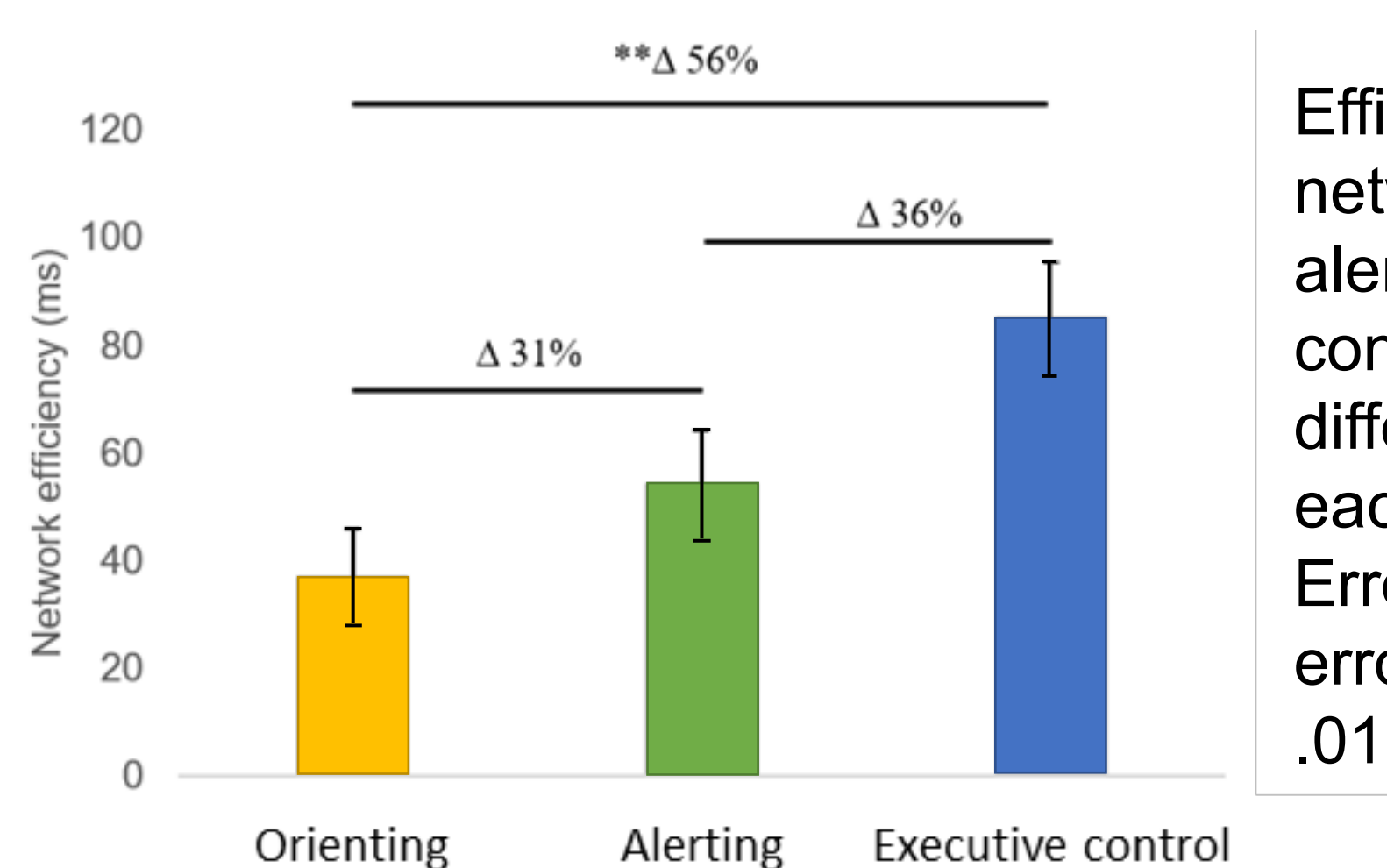
		Alerting	Orienting	Executive control
Glu:GABA ratio	Pearson's r	-0.381 *	0.360 *	-0.109
	p-value	0.024	0.033	0.534
	N	37	37	37
Glutamate	Pearson's r	-0.224	-0.049	-0.112
	p-value	0.195	0.779	0.522
	N	37	37	37
GABA	Pearson's r	0.276	-0.385 *	0.139
	p-value	0.108	0.023	0.424
	N	37	37	37

ii. Regional Neurotransmitters



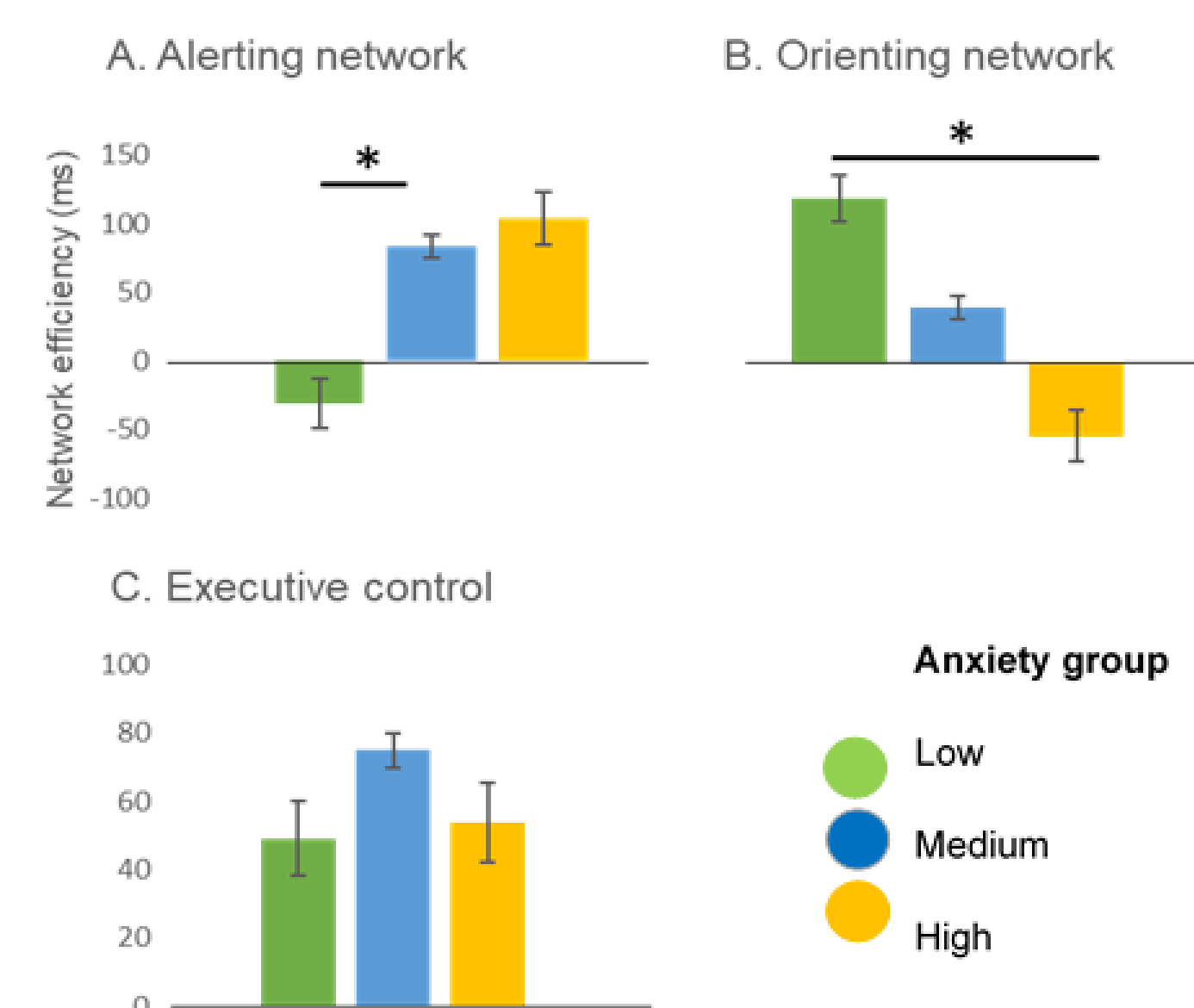
Mean metabolite concentrations corrected for grey and white matter volumes for the ratio of Glutamate to GABA, Glutamate and GABA in the dlPFC (in green) and IOG (in blue). Error bars indicate standard deviations of the mean. ** $p < .01$, *** $p < .001$

iii. ANT Performance



Efficiency (ms) in each network (orienting, alerting, and executive control). The percentage difference in efficiency in each network is shown. Error bars are standard errors of the mean. ** $p < .01$

iv. Anxiety moderates attention networks



EEMeANS from ANCOVA of attention efficiency for (A) alerting, (B) orienting and (C) executive control networks in each anxiety group (low in green, medium in blue and high in yellow). Error bars are standard error of the mean. Significant differences between groups in each network represent Bonferroni corrected p values. * $p < .05$.

- Glutamate:GABA ratio in the dlPFC was related to alerting and orienting efficiency (controlling for grey matter and age)
- No relationship between glutamate and/or GABA and self reported trait anxiety
- Anxiety mediates attention network efficacy:
 - Effects between the medium and low anxious groups in the alerting network, where the low anxious group used the alerting cues to a lower extent as the medium group.
 - Effects between the low and high anxious groups in the orienting network, where the orienting cues were used less efficiently by the high anxious group than in the low anxious group.
 - Efficiency in deploying executive control was similar across all groups

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References

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- [2] Rueda, M. R., Fan, J., McCandless, B. D., Halparin, J. D., Gruber, D. B., Lercari, L. P., & Posner, M. I. (2004). Development of attentional networks in childhood. *Neuropsychologia*, 42(8), 1029–1040. <https://doi.org/10.1016/j.neuropsychologia.2003.12.012>
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