

Introduction

- Tourette syndrome (TS) and attention deficit hyperactivity disorder (ADHD) frequently co-occur.¹
 - TS+ADHD: ↑ cognitive, psychosocial and behavioral difficulties.²
- It remains unclear whether TS and ADHD have common or distinct neurobiological underpinnings.
 - Prior research suggest additive effects of TS and ADHD, but it is still unclear which specific frequency bands are implicated.³

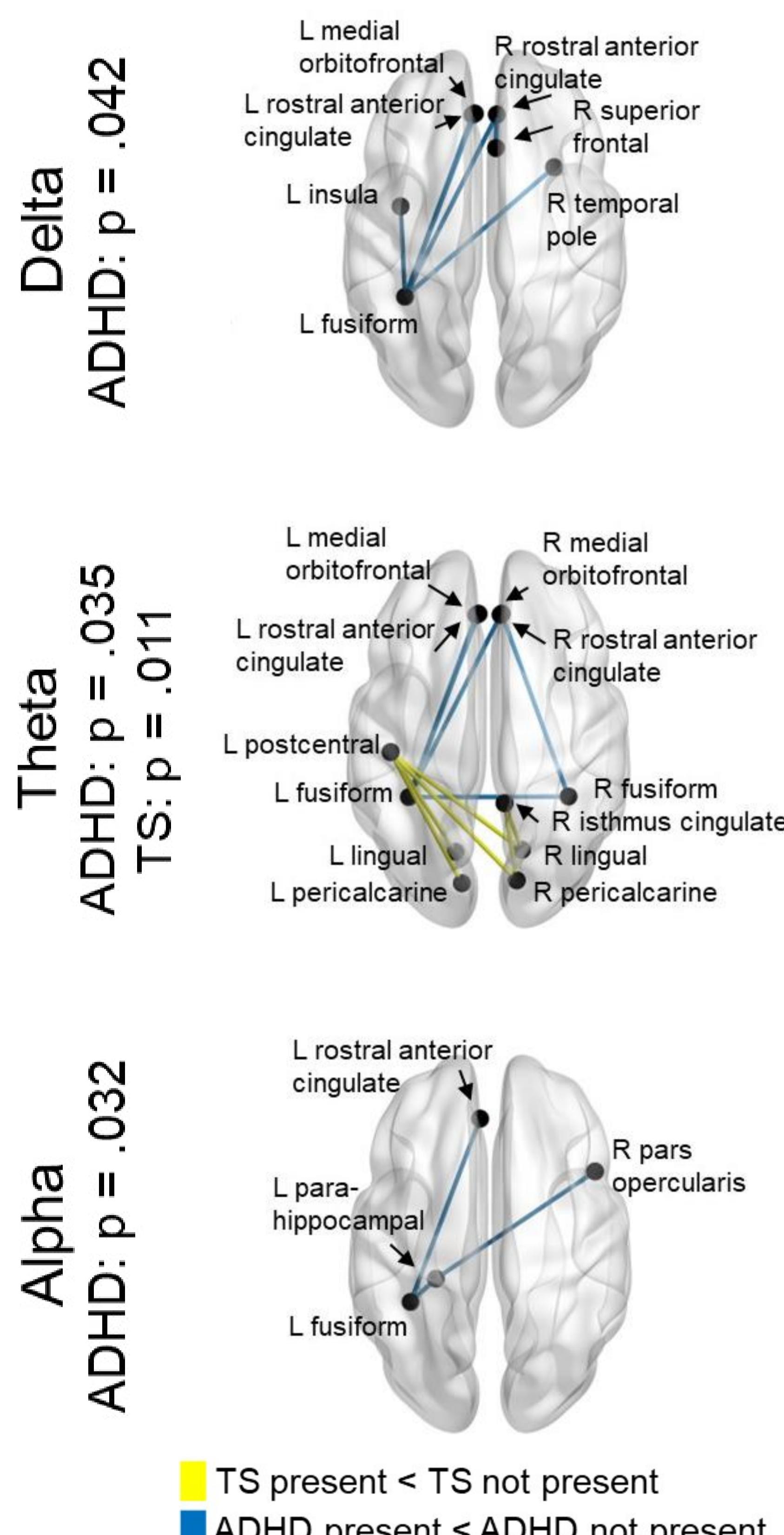
Objectives

- Assess how TS and ADHD separately and jointly impact functional connectivity.
- Assess whether functional connectivity is associated with behavioral and emotional problems in TS and ADHD.

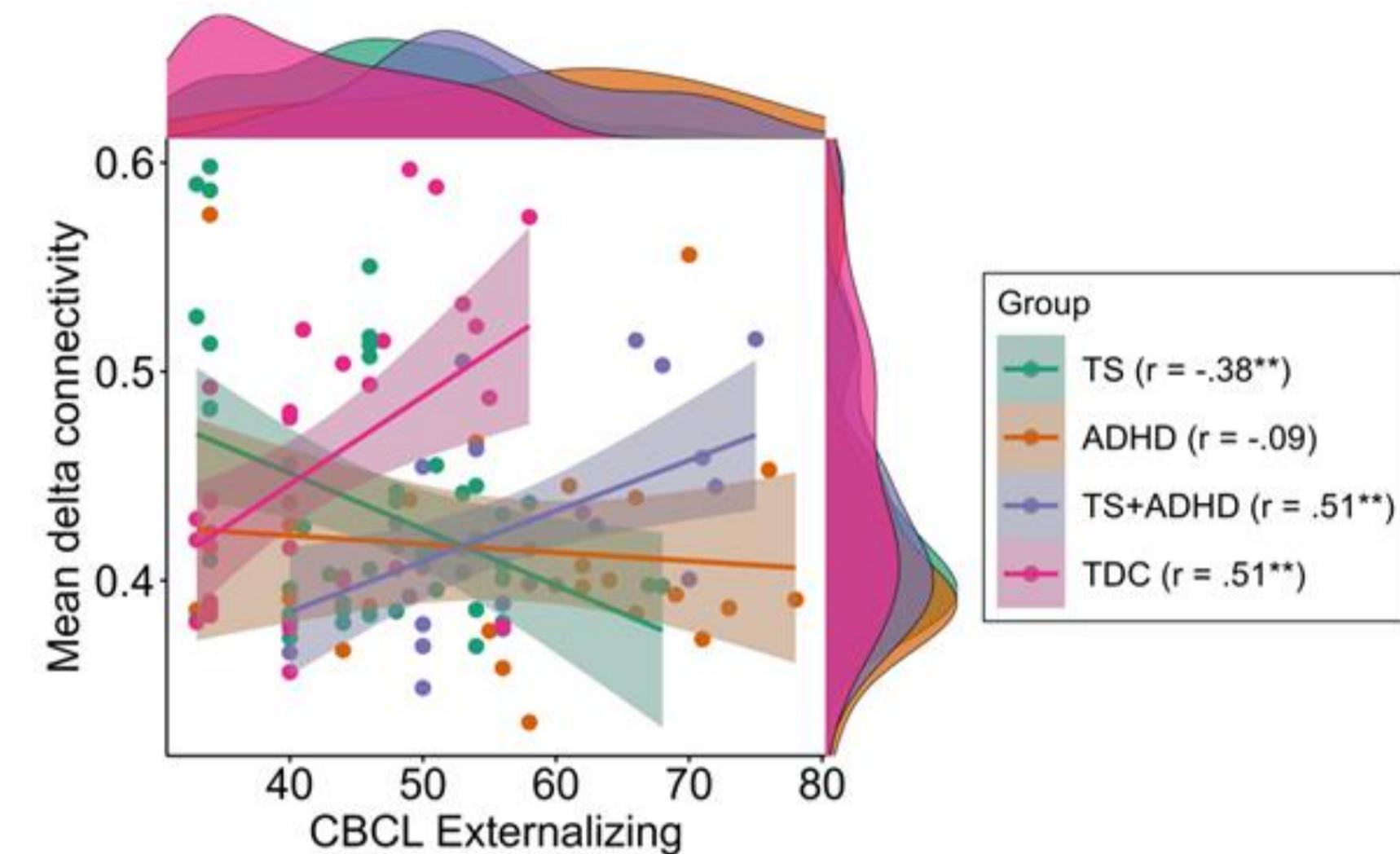
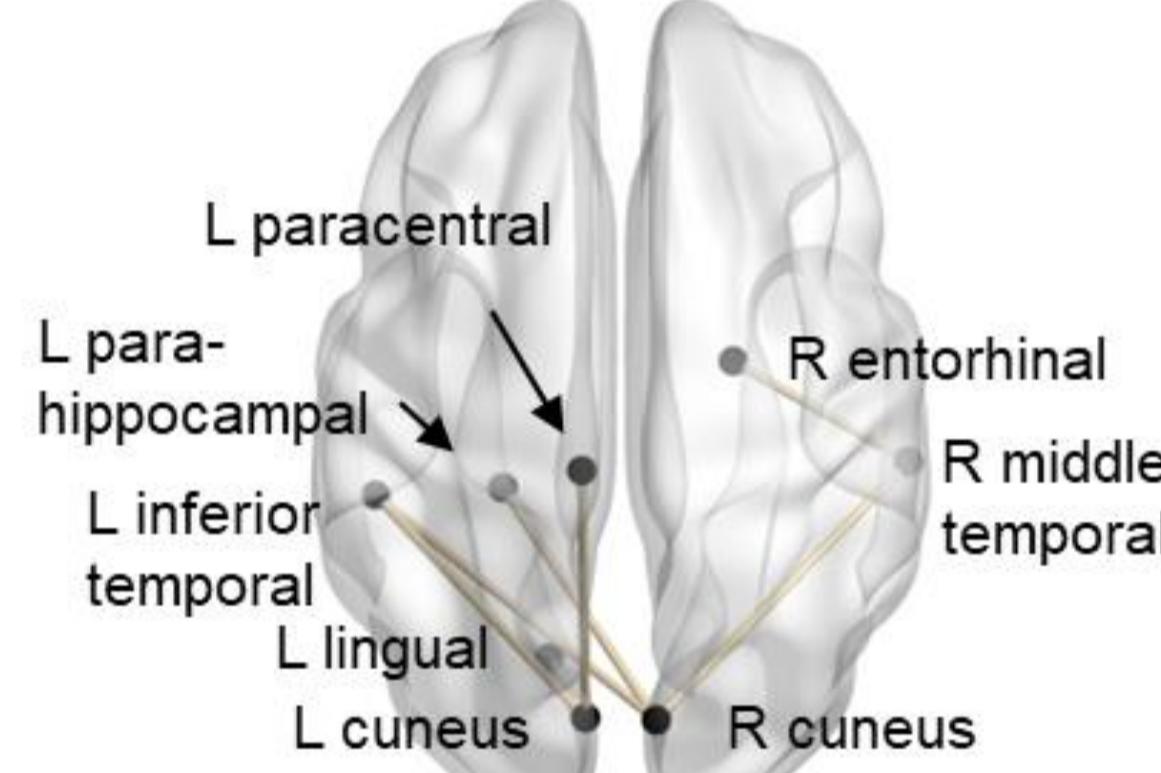
Methods

- Participants (aged 10-14)
 - TS (n = 51, 6 girls)
 - ADHD (n = 24, 5 girls)
 - TS+ADHD (n = 29, 4 girls)
 - Typically developing children (n = 33, 10 girls)
- Measure: Child Behavior Checklist (CBCL) Internalizing and Externalizing scales.
- Procedures:
 - Eyes-open resting-state (7 minutes) EEG recordings.
- Statistical analyses: Network-based statistics (main effects and interactions).

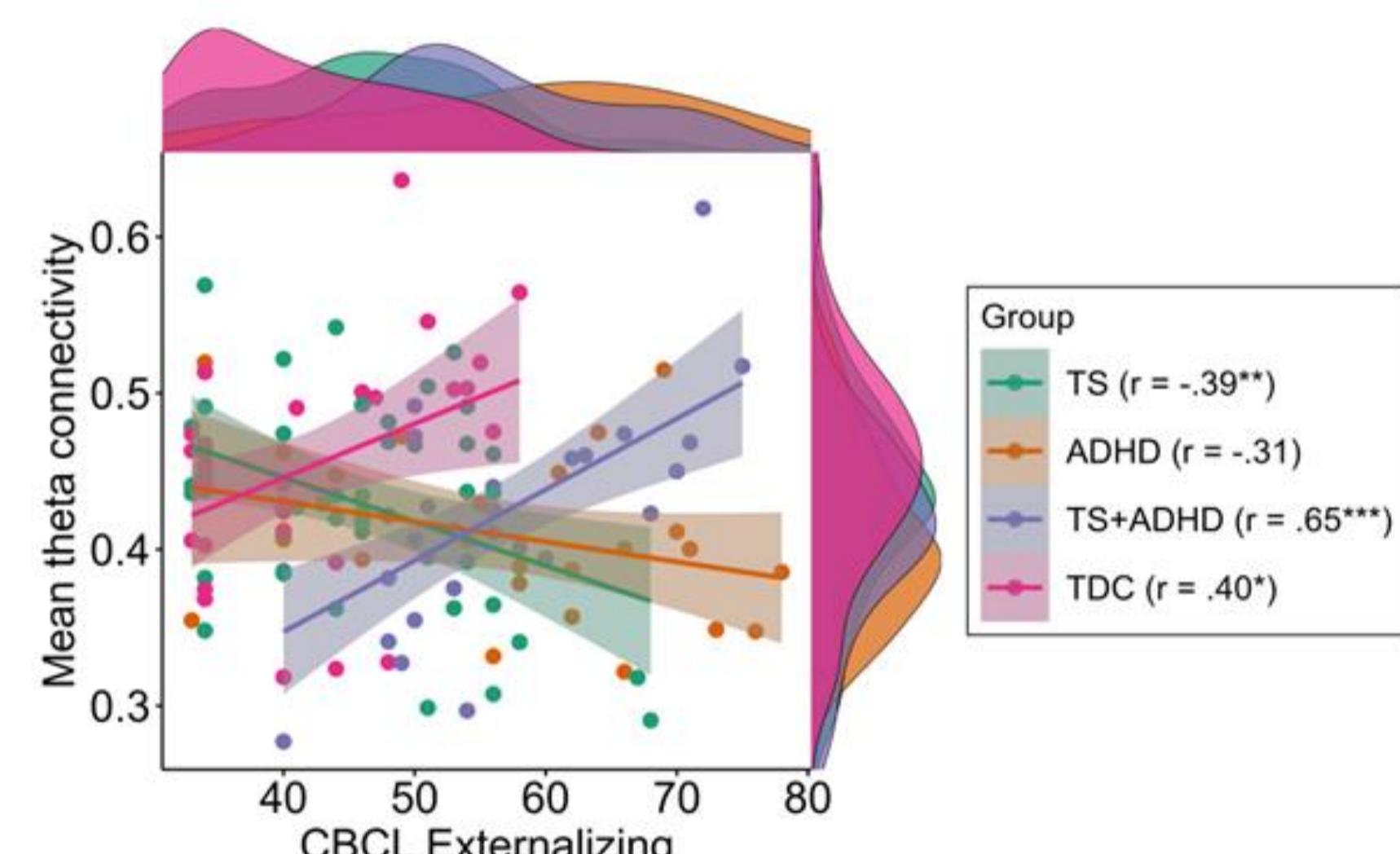
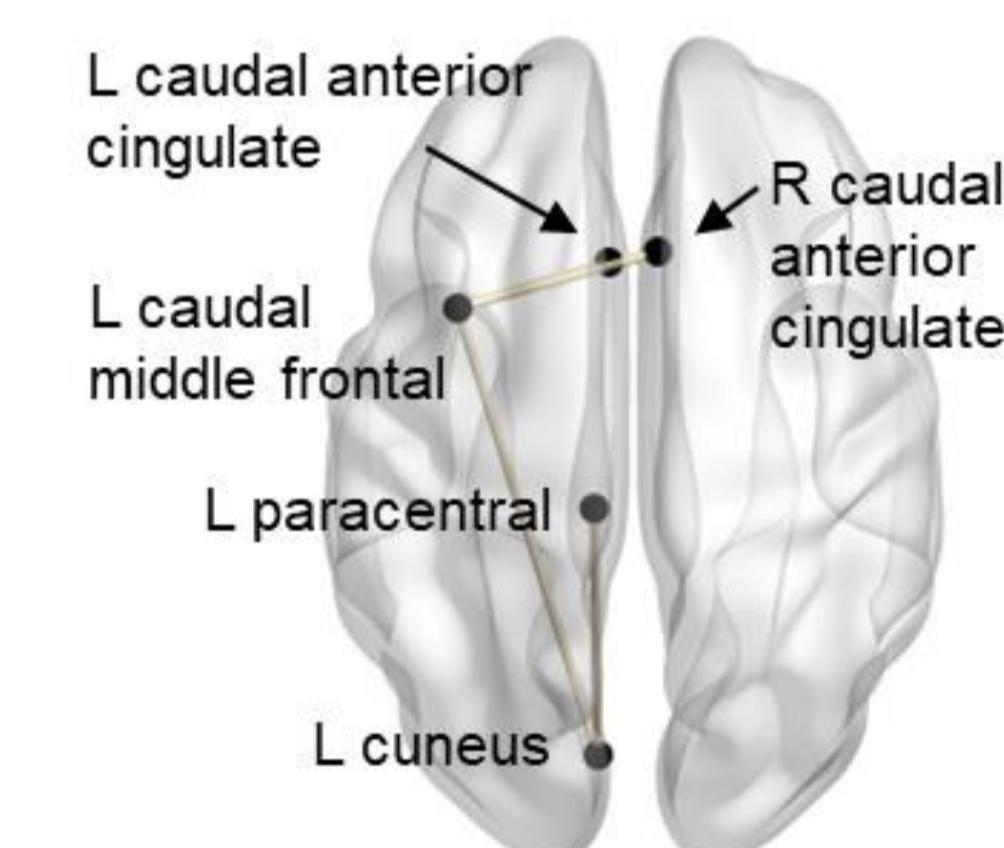
Results



Delta



Theta



Beta

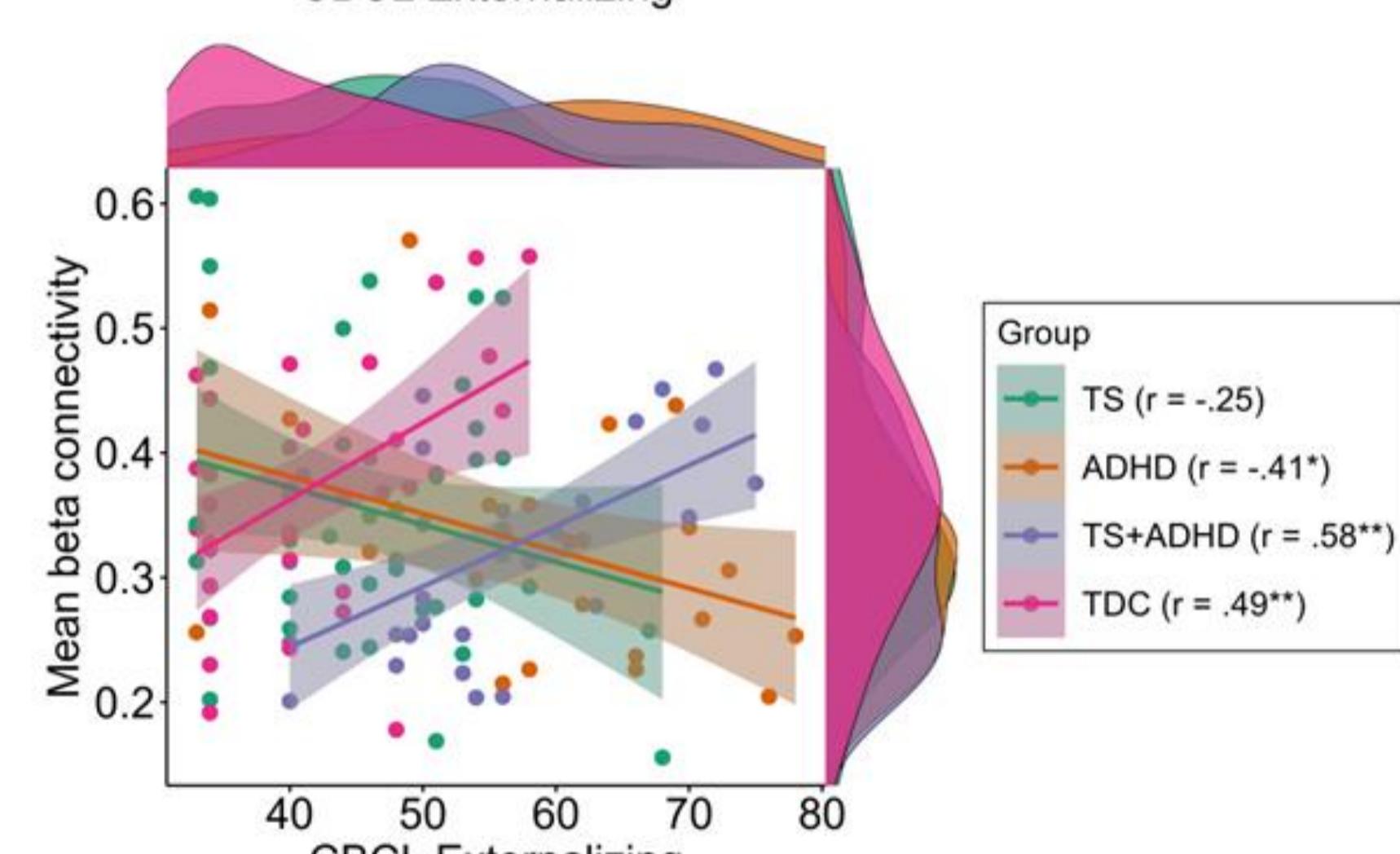
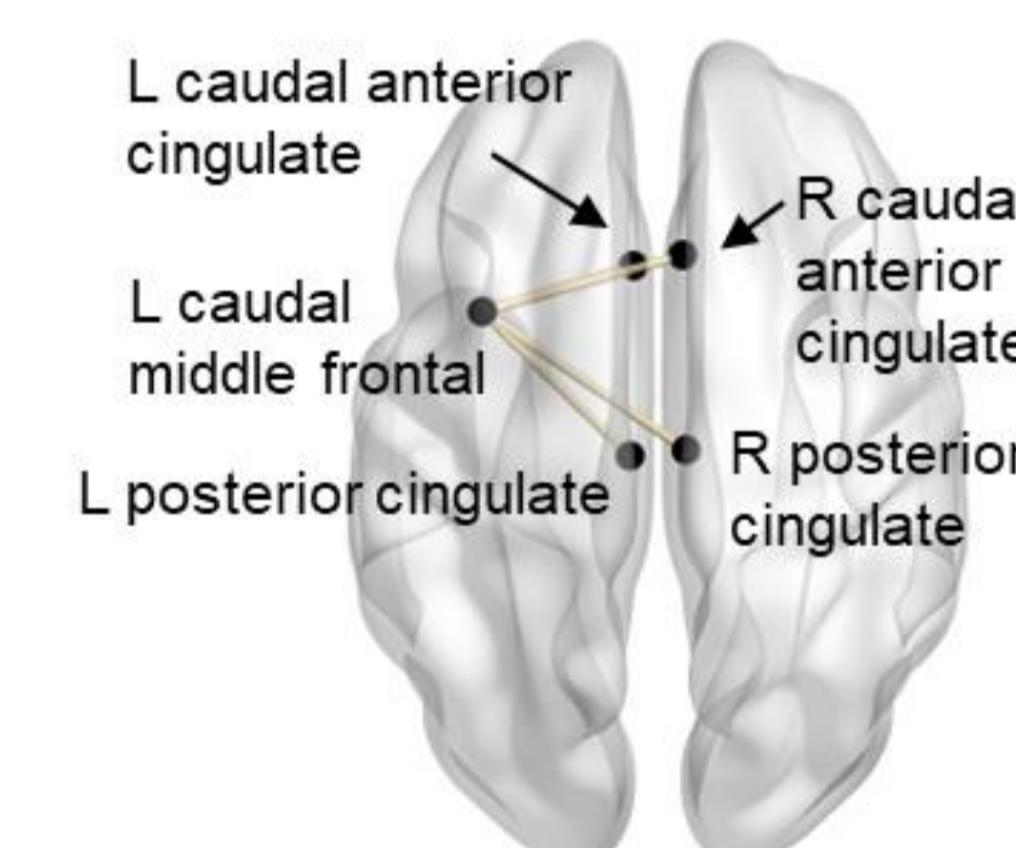


Figure 1: Additive effects of TS and ADHD on functional connectivity

Figure 2: Externalizing problems and functional connectivity

Conclusions

- Both TS and ADHD are associated with decreased connectivity in different networks, suggesting additive effects of TS and ADHD.
- TS by ADHD by Externalizing interactions across three frequency bands: different patterns of functional connectivity are associated with externalizing problems in children with TS+ADHD, relative to those with either TS or ADHD.
- TS and ADHD may be additive for basic neurobiological aspects but may interact for more complex processes.

References

- Charania SN, Danielson ML, Claussen AH, Lebrun-Harris LA, Kaminski JW, Bitsko RH. Bullying Victimization and Perpetration Among US Children with and Without Tourette Syndrome. *Journal of Developmental & Behavioral Pediatrics*. 2022;43(1).
- Ricketts EJ, Wolicki SB, Danielson ML, et al. Academic, Interpersonal, Recreational, and Family Impairment in Children with Tourette Syndrome and Attention-Deficit/Hyperactivity Disorder. *Child Psychiatry & Human Development*. 2022;53(1):3-15.
- Jurgiel J, Miyakoshi M, Dillon A, Piacentini J, Loo SK. Additive and Interactive Effects of Attention-Deficit/Hyperactivity Disorder and Tic Disorder on Brain Connectivity. *Biological psychiatry: Cognitive neuroscience and neuroimaging*. 2022.
- Tadel F, Baillet S, Mosher JC, Pantazis D, Leahy RM. Brainstorm: A User-Friendly Application for MEG/EEG Analysis. *Computational intelligence and neuroscience*. 2011;2011:879716.
- Desikan RS, Ségonne F, Fischl B, et al. An automated labeling system for subdividing the human cerebral cortex on MRI scans into gyral based regions of interest. *NeuroImage*. 2006;31(3):968-980.

Acknowledgements

This project was funded by NIMH grants K01MH079130 & R03MH094583 (to DGS). SMB was supported by a postdoctoral fellowship award from the CIHR (MFE164627) and by the Clinical Research Training Scholarship in Tourette syndrome from the TAA & ABF, in collaboration with the AAN.