



# Brain networks associated with disruptive behavior in children with Tourette syndrome

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## Introduction

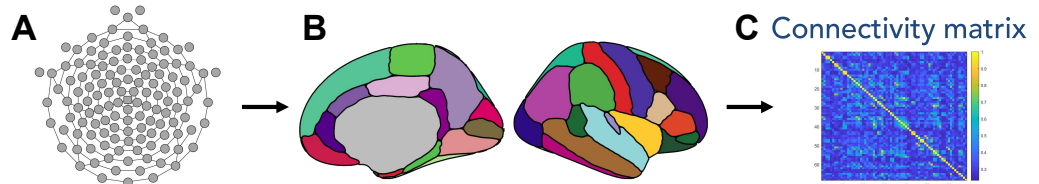
- Irritability and low frustration tolerance are common features in children with Tourette syndrome (Conte et al., 2020).
- Often, these symptoms result in disruptive behaviors such as anger outbursts, aggression, and noncompliance (Ashurova et al., 2021).
- For many children with TS and their family, disruptive behaviors are also among the most debilitating symptoms associated with TS (Dooley et al., 1999).
- Few studies have investigated the neural correlates of disruptive behaviors in TS.

## Objective

- To assess the brain networks associated with the severity and the interference caused by disruptive behaviors in children with TS.

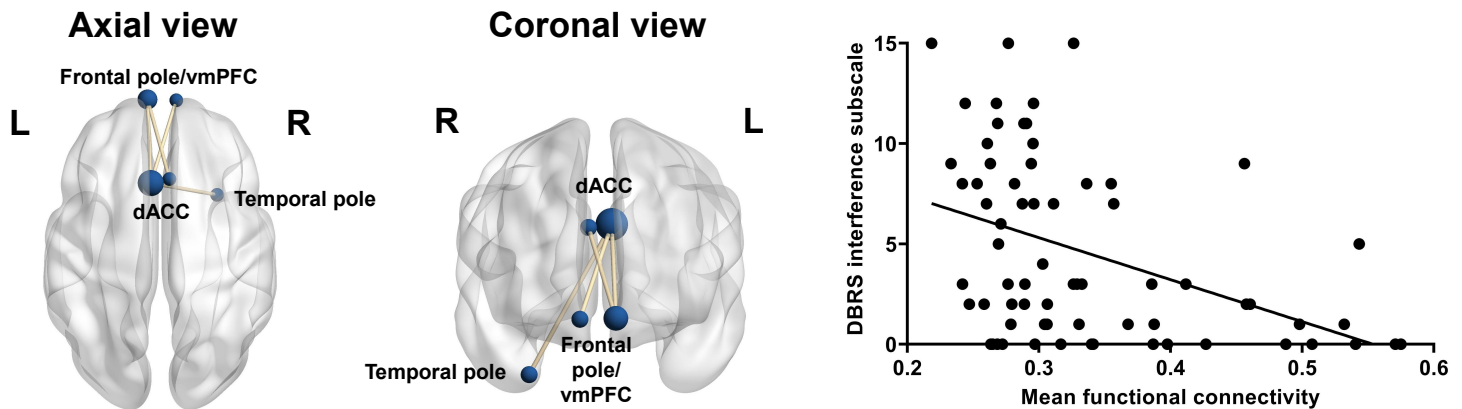
## Methods

- Participants:
  - 68 children with TS (60 boys, 8 girls)
  - Mean age: 11.2 (SD: 1.8, range: 8-16)
  - Mean YGTSS/50 score: 24.1 (SD: 7.8, range: 7-39)
- Measure of disruptive behavior:
  - Disruptive Behavior Rating Scale (DBRS) subscales
    - Severity subscale: presence of symptoms of oppositional defiant disorder (8 items);
    - Interference subscale: degree of interference of disruptive behavior (8 items).
- Brain activity recordings:
  - High-density EEG (128 electrodes; Fig. 1A).
    - During a resting-state session
  - Brain sources reconstructed using weighted minimum norm estimation (wMNE) in Brainstorm software.
- Functional connectivity analyses:
  - Connectivity between 68 cortical regions (Fig. 1B) computed with the phase locking value (PLV) in the alpha band (Fig. 1C).
  - Network-based statistics (NBS): identification of a subnetwork associated with disruptive behavior while controlling for multiple comparisons.



**Fig. 1: Source-reconstructed EEG connectivity pipeline**

## Results



**Figure 2: Subnetwork of decreased functional connectivity associated with the interference subscale of the DBRS**

- Network-based statistics did not reveal a subnetwork that was significantly associated with the severity subscale of the DBRS.
- However, there was a subnetwork which was negatively associated with the interference subscale of the DBRS ( $p = .028$ ). That subnetwork comprised 4 connections between 5 brain regions. Of note, the bilateral ventromedial prefrontal cortex and dorsal anterior cingulate were part of that subnetwork.

## Conclusions

- Our results suggest that disruptive behaviors in TS are associated with reduced functional connectivity between the ventromedial prefrontal cortex and the dorsal anterior cingulate.
- Such connectivity pattern is similar to previous findings in children with disruptive behavior without tics (Sukhodolsky et al., 2021).
- The ventromedial prefrontal cortex and the dorsal anterior cingulate cortex are involved in emotion processing and regulation, and reduced connectivity between these regions may lead to disruptive behaviors in children with TS (Alegria et al., 2016).

## References

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