**EEG functional connectivity patterns in children with Tourette syndrome and attention deficit hyperactivity disorder**

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**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 suggests 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.
- Brain sources reconstructed using weighted minimum norm estimation.\(^5\)
- Functional connectivity computed across 68 cortical regions in 5 frequency bands (delta, theta, alpha, beta, and gamma).
- Statistical analyses: Network-based statistics (main effects and interactions).

**Results**

- **Delta**
  - ADHD: p = 0.42
  - TS: p = 0.042
- **Theta**
  - ADHD: p = 0.035
  - TS: p = 0.011
- **Alpha**
  - ADHD: p = 0.032
- **Beta**
  - ADHD: p = 0.003

**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**


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