Neuroimaging Signatures of Early-Onset Bipolar Disorder: Insights from the ABCD Study

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1. BACKGROUND

- Bipolar disorder symptoms often emerge several years prior to the onset of major episodes.
- While offspring of parents with mental illness are at heightened risk,[1] family history does not account for all cases of bipolar disorder.[2]
- This study aimed to identify early neuroimaging biomarkers of bipolar disorder and their interactions with familial risk, using measures that capture key neurodevelopmental changes.

2. METHODS

Participants

- Youth ages 9-11 years participating in the Adolescent Brain Cognitive Development (ABCD) study.[3,4]
- Groups comprised typically developing controls (mean age = 9.9 years; 47% males) and youth with bipolar disorder symptoms (mean age = 9.9 years; 48% males), subdivided by parental history of mental illness.

	+ Parental mental illness	No parental mental illness
Controls	n = 1,171	n = 1,652
Bipolar	n = 145	n = 161

Neuroimaging markers

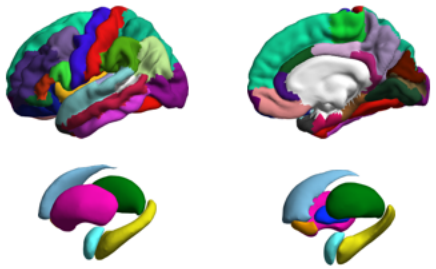
Structural and diffusion MRI scans yielded the following measures:

1) Cortical (68 regions)

- Thickness
- Surface area
- Neurite density
- Peri-cortical neurite density
- Grey-white matter contrast

2) Subcortical (16 regions)

- Volume
- Neurite density



Analysis

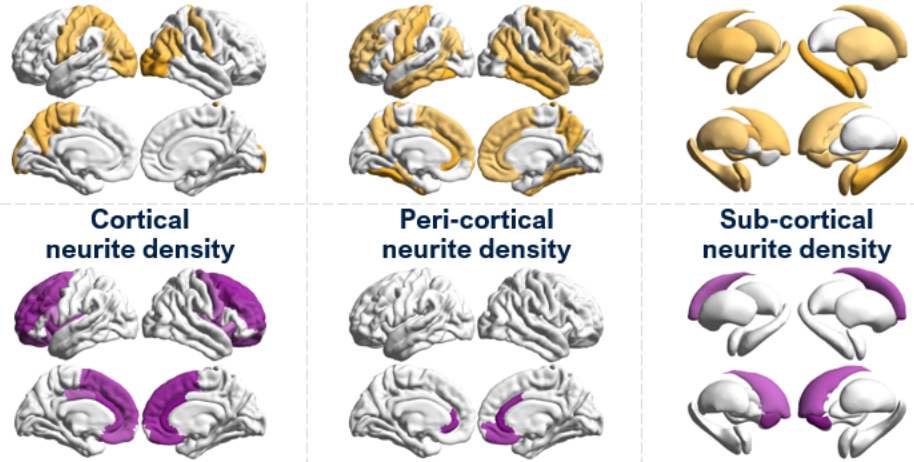
- Multivariable ANOVAs were performed on all markers to examine diagnosis, parental history, and age interactions, with sex as a covariate.
- Post hoc analyses were performed with false discovery rate correction.

3. RESULTS

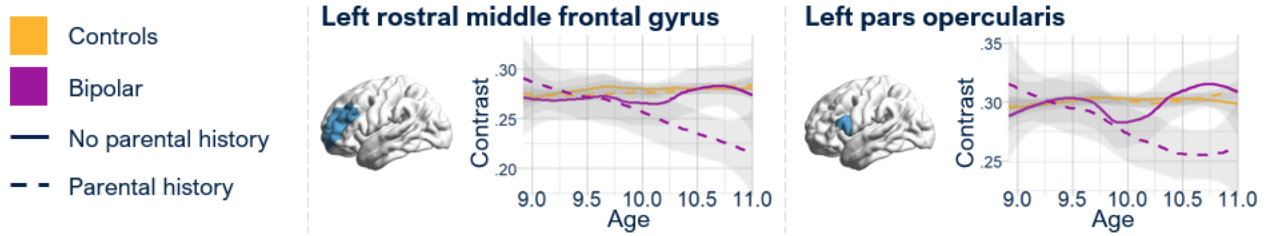
Significant main effects of diagnosis

Yellow: Controls > bipolar

Purple: Bipolar > controls



Significant diagnosis × parental history × age interactions for grey-white matter contrast



4. CONCLUSIONS

- This study identifies potential biomarkers for bipolar disorder that are robust to parental history of mental illness.
- Selective abnormalities in grey-white matter differentiation in those with familial risk could indicate early signs of more severe future manifestations.

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