Neural Markers in Pediatric Bipolar Disorder and Familial Risk for Bipolar Disorder

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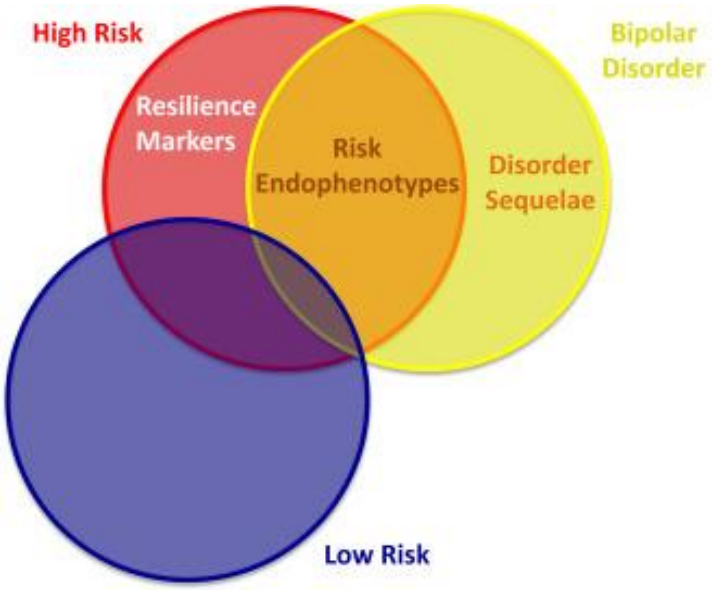
Bipolar Disorder is a chronic, serious mood disorder that is present in 2.6% of American adults. It is one of the 10 leading causes of disability and is extremely heritable, ranging from 59% to 85%. Individuals who have bipolar disorder struggle in their everyday lives, experiencing extreme ups and downs, usually evident through a manic episode. In a study conducted by multiple research scientists and medical doctors from the National Institute of Mental Health, the National Institutes of Health, San Diego State University, University of California San Diego, Catholic University of America, and the University of Denver, neuroimaging compared unaffected youth at high familial risk for bipolar disorder alongside low-risk youth.

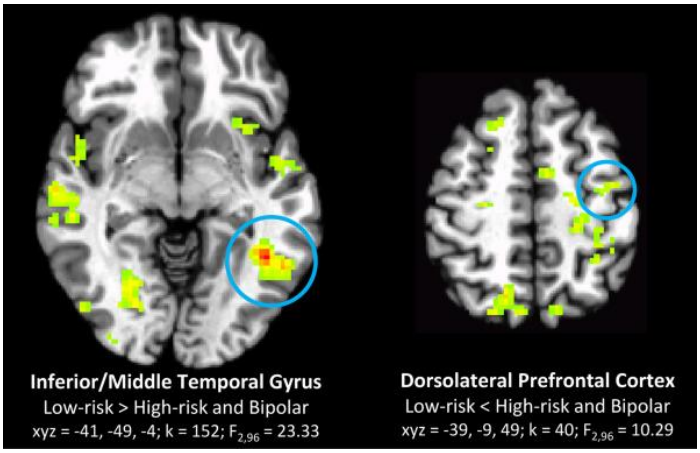
Through functional magnetic resonance imaging performed on 99 youths aged 9.8 to 24.8 years, brain functioning was analyzed while the 36 BD, 22 HR and 41 LR youth used a face emotion labeling task in the scanner. Through these scans, three patterns of results were found, as shown in the Venn diagram below.



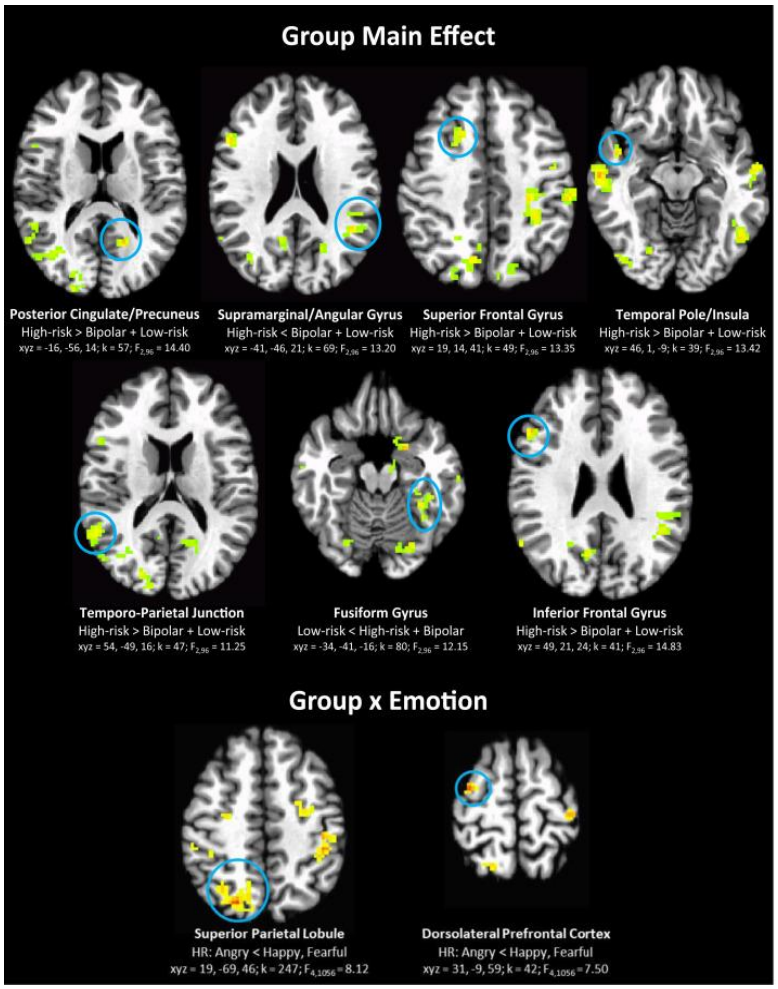
1. High risk and bipolar disorder youth share neural alterations in higher-order face processing regions.
2. Potential resilience markers are apparent in face processing regions.
3. Neural alterations were specific to the bipolar disorder group, possibly reflecting disorder sequelae in multiple social cognition and face processing regions.

Candidate Risk Endophenotypes

Risk endophenotypes included dysfunction in higher-order face processing regions, such as the **Inferior/Middle Temporal Gyrus** and the **Dorsolateral Prefrontal Cortex**. As for the candidate resilience markers and disorder sequalae, different patterns of neural responses were found across other regions mediating face processing, executive function, and social cognition.



Candidate Resilience Markers

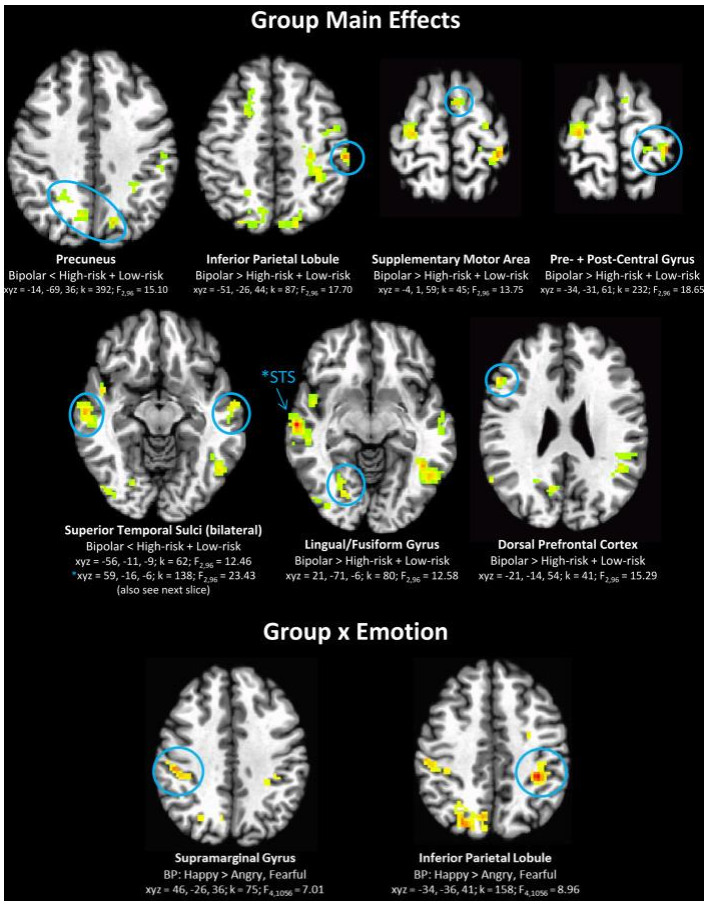


The regions of the brain with hyperactivation for high risk youth were the **Posterior Cingulate/Precuneus, Superior Frontal Gyrus, Temporal Pole/Insula, Temporo-Parietal Junction, Fusiform Gyrus,** and **Inferior Frontal Gyrus**. As for the **Supramarginal/Angular Gyrus**, there was evident hypoactivation. Specifically, in the **Superior Frontal Gyrus** and the **Superior Parietal Lobule**, there was less activation to angry faces. There was a significant interaction between angry and happy hypoactivation in the **Inferior**

Frontal Gyrus and the **Precentral Gyrus**. Also, in the **Precentral Gyrus** there was lowered interactions with angry and fearful faces.

Candidate Disorder Sequelae

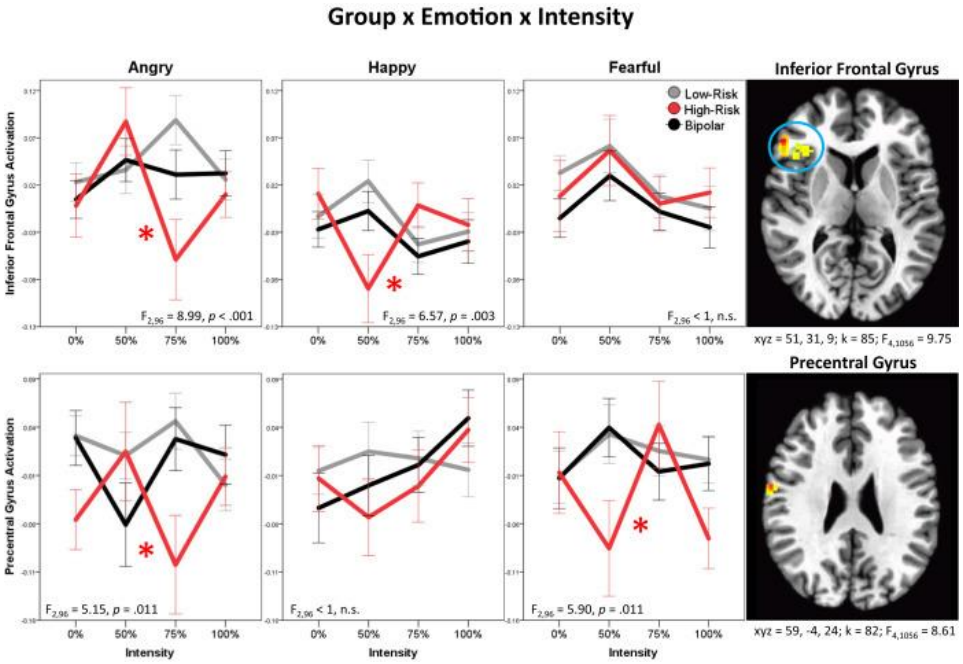
In the bipolar disorder youth, the frontal and parietal areas of the left hemisphere showed hyperactivation. This increased activation was specific to the **Supplementary Motor Area, Pre + Post-Central Gyrus, Dorsal Prefrontal Cortex, Inferior Parietal Lobule,** and **Lingual/Fusiform Gyrus.** The **Bilateral Parietal Lobe** showed more activation when happy faces were displayed. As for the **Precuneus** and **Bilateral Superior Temporal Sulci**, hypoactivation occurred in these areas.



Conclusions

Individuals with bipolar disorder showed increased reactivity to happy faces more so than angry and fearful faces. Which makes sense, due to the fact that hyperactivation to happy faces has been linked to manic symptoms in bipolar individuals. In addition, face emotion labeling tasks, as used in this study, require social cognition skills that are diminished in this population, specifically in their temporo-parietal and default network regions of the brain. In the disorder sequelae group, reduced activation in medial and increased activation in posterior lateral default network was found, which is the opposite of bipolar youth.

With these conclusions, neural patterns suggesting risk endophenotypes can be used to help and identify individuals with risk for BD, causing beneficial outcomes and preventative measures. Thanks to these scientists and doctors, positive outcomes can occur for individuals and families affected by bipolar disorder.



Pagliaccio D, Wiggins JL, Adleman NE, et al. Behavioral and Neural Sustained Attention Deficits in Bipolar Disorder and Familial Risk of Bipolar Disorder. *Biol Psychiatry*. 2016;82(9):669-678.