

# Regional Neural Functional Efficiency Across Schizophrenia, Bipolar Disorder, and Major Depressive



# Disorder: A Transdiagnostic Resting-state fMRI Study

Jun Yang <sup>1</sup>, Zhening Liu <sup>1</sup>, Jie Yang <sup>1\*</sup>, Lena Palaniyappan <sup>2</sup>

<sup>1</sup>Department of Psychiatry, The Second Xiangya Hospital of Central South University, Changsha, China;

<sup>2</sup> Douglas Mental Health University Institute, Department of Psychiatry, McGill University, Montreal, Quebec, Canada

### Background

Major psychiatric disorders (MPDs) are delineated by distinct clinical features. However, overlapping symptoms and transdiagnostic effectiveness of medications have challenged the traditional diagnostic categories.

### Objectives

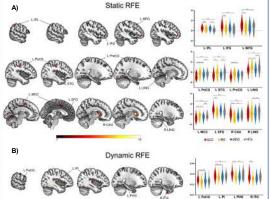
➢ We aimed to investigate if there are shared and illness-specific disruptions in the regional functional efficiency (RFE) of the brain across these disorders.

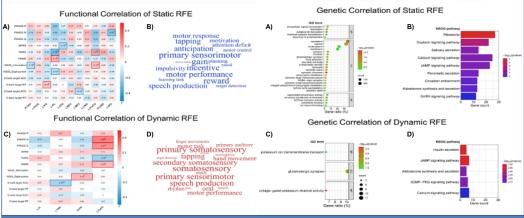
## Methods

- This study included 364 participants (118 schizophrenia [SCZ], 80 bipolar disorder [BD], 91 major depressive disorder [MDD], and 75 healthy controls [HCs]).
- We calculated the resting-state fMRI measures indicating the RFE including static amplitude of low-frequency fluctuation, regional homogeneity, and degree centrality and corresponding dynamic measures indicating variability over-time. We used principal component analysis to obtain static and dynamic RFE values.
- We conducted functional and genetic annotation and enrichment analysis based on abnormal RFE profiles.

#### Results

- SCZ showed higher RFE in the corticostriatal circuit and excessive variability in the cortico-limbic circuit. SCZ and MDD shared lower static RFE with higher dynamic RFE in sensorimotor regions than BD and HCs.
- We observed association between static RFE abnormalities with reward and sensorimotor functions and dynamic RFE abnormalities with sensorimotor functions.
- Differential expression of genes related to glutamatergic synapse and calcium/cAMP signaling seem likely in the regions with aberrant RFE.





### Conclusions

- SCZ group shares more regions with disrupted functional integrity, especially in sensorimotor regions, with MDD rather than BD.
- The neural patterns of these transdiagnostic changes appear to be potentially driven by gene expression variations relating to glutamatergic synapses and calcium/cAMP signaling.
- > The aberrant sensorimotor, cortico-striatal, and cortico-limbic integrity may collectively underlie neurobiological mechanisms of MPDs.