

Abnormal Salience Network Segregation in Adolescents and Young Adults with Prodromal Psychosis Symptoms

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Abstract

Coordination between the salience brain network and other networks is known to be altered in schizophrenia patients, but little is known for the psychosis prodrome. Understanding the neurobiological similarities between individuals who exhibit prodromal symptoms can help improve early identification and intervention strategies. In this study, we aimed to (1) identify neurobiologically similar subject groups by integrating salience network functional connectivity (FC) and psychosis prodrome symptoms and (2) identify symptom profiles and brain network segregation patterns in the subject groups. We used the Philadelphia Neurodevelopmental Cohort to address our aims. Our sample ($N=1158$) included subjects ages 12-21 with fMRI and self-reported psychopathology data. Data was obtained from dbGaP after data access and IRB approvals. After preprocessing and stringent quality control of the fMRI data, 792 subjects were included in the final analysis. We first constructed a two-layer network using pairwise distance measures between subjects for resting state FC within the salience network (neuroimaging layer) and responses to prodromal questions (symptom layer). We then fit a multiplex stochastic block model to identify subject clusters based on the computed similarity distances. Across multiple age groups, the block with the highest mean response value to prodromal questions had the greatest mean normalized difference in FC between the salience network and each of the default mode, frontoparietal, and dorsal attention networks. Our findings suggest a possible link between abnormal segregation involving the salience network and prodromal symptoms, although further investigation is required.

Keywords: brain network segregation, functional connectivity, prodromal psychopathology symptoms, salience network, stochastic block model