Error detection failures in schizophrenia: ERPs and FMRI

Self-monitoring of actions, critical for guiding goal-directed behavior, is deficient in schizophrenia. Defective error-monitoring may reflect more general self-monitoring deficiencies. Prior studies have shown that the error-related negativity (ERN) component of the event-related potential (ERP) is smaller in patients with schizophrenia. Other studies using functional magnetic resonance imaging (fMRI) have shown the anterior cingulate cortex (ACC) and dorsolateral prefrontal cortex (DLPFC), both critical for error detection, to be less responsive to errors in patients with schizophrenia. In the present study, both ERP and fMRI data were collected while 11 patients with schizophrenia and 10 healthy controls performed a Go–NoGo task requiring a button press to Xs (p=.88) while withholding responses to Ks (p=.12). We measured the ERN and ACC and DLPFC activations to false alarms. The task elicited a robust ERN and modest activations in ACC and DLPFC to false alarms. As expected, ERN was larger in controls than patients. However, ACC and DLPFC activations were not greater in controls than patients. Surprisingly, DLPFC was more activated by errors in patients than controls. ERPs may be superior to fMRI for assessing error processing abnormalities in schizophrenia because (1) ERNs can be measured precisely without needing to control for the multiple comparisons of fMRI, and (2) ERPs have the temporal precision to detect transient activity necessary for error detection and on-the-fly behavioral adjustments.

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