

Investigating brain-cognition associations in Bipolar Disorder using Canonical Correlation Analysis

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Abstract

Bipolar disorder is associated with a range of neuropsychological impairments compared to healthy controls, even in euthymia (1). Studies have linked cognitive impairment to abnormal brain structure in patient groups, however most studies to date use univariate methods to test brain-cognition associations, which do not account for relationships between cognitive functions (2,3). Given that cognitive impairment in mood disorder groups may be hierarchical in nature (4), we used multivariate methods to investigate associations between neuropsychological performance and brain structure. N=56 euthymic patients with bipolar disorder and N=26 healthy controls underwent structural MRI scans and completed a neuropsychological battery. Cognitive scores were standardised based on healthy control data, then Canonical Correlation Analysis was utilised to test associations between cognitive performance and cortical thickness patients and controls. In the patient group, the first canonical correlation showed a strong linear correlation ($\rho=.885$) between the first canonical variate pair. The first canonical variate was associated with cortical thickness in temporal pole, inferior temporal cortex and pericalcarine cortex regions in both hemispheres, as well as insula and frontal pole regions in the right hemisphere, and medial orbitofrontal and parahippocampal regions in the left hemisphere. Performance on tests measuring attention and processing speed were most strongly associated with the first canonical variate in patients. Results suggest that impairments in these functions may be particularly associated with cortical abnormalities in patients with Bipolar Disorder.

Keywords

Adults, affective disorders, cognition, cortex, MRI, multivariate, psychiatric disorders, neuropsychology, Structural MRI.

Submission Categories

Psychiatric (eg. Depression, Anxiety, Schizophrenia); Executive Function, Cognitive Control and Decision Making; Multivariate Approaches; Cortical Anatomy and Brain Mapping; Perception and Attention Other

References

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