



BIPOLAR DISORDERS Factsheet

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NeuRA
(Neuroscience Research Australia) is one of the largest independent medical and clinical research institutes in Australia and an international leader in neurological research.

Diseases of the brain and nervous system pose the greatest health, economic and social burden of any disease group because they are chronic, debilitating and have no known cures.

Medical research is the cornerstone of efforts to advance the health and wellbeing of families and the community. Our dedicated scientists are focussed on transforming their research into significant and practical benefits for all patients.

While we hope you find this information useful, it is always important to discuss any questions about bipolar disorder or its treatment with your doctor or other health care provider.

What is magnetic resonance imaging (MRI)?

MRI is based on the magnetisation properties of cellular protons. The application of a strong magnetic field causes the protons within cells to shift direction, which will return to their original position over time ("precession"). The rate of precession differs across tissue types (such as grey matter and white matter in the brain), which can be interpreted by specialised programs to represent a 3D image.

What is the evidence for MRI findings in people with bipolar disorder?

Grey matter decreases compared to controls

High quality evidence shows small decreases in hippocampal subfields in people with bipolar disorder. Moderate quality evidence also suggests decreases in bilateral insula, superior temporal gyrus, superior and ventral medial prefrontal cortex, anterior cingulate cortex, left dorsomedial prefrontal cortex, left ventrolateral prefrontal cortex, and right precentral gyrus. Moderate to low quality evidence suggests decreases in left medial frontal, right inferior frontal, precentral frontal, left inferior longitudinal fasciculus, left insula, superior corona radiate, and the left limbic posterior cingulum.

In people with first-episode bipolar disorder, moderate to high quality evidence suggests small decreases in whole brain grey matter. In youth with bipolar disorder, moderate quality evidence found decreases in the left orbitofrontal cortex, right claustrum, and right dorsolateral prefrontal cortex. In people with bipolar disorder and psychotic symptoms (not necessarily diagnosed with bipolar I disorder), moderate quality evidence suggests decreases in bilateral superior frontal gyri, bilateral insula, bilateral median cingulate/paracingulate gyri, left anterior cingulate/paracingulate gyri, and right precentral gyrus (particularly in females). In people diagnosed with bipolar I disorder, decreases were also found in the right superior temporal gyrus, and the rolandic operculum.

Grey matter increases compared to controls

Moderate quality evidence suggests increases in the cerebellum, bilateral middle frontal gyrus, right middle temporal gyrus, right inferior temporal gyrus, the right middle occipital gyrus, left putamen, and left posterior cingulate cortex of people with bipolar disorder. In people diagnosed with bipolar I disorder, increases were also found in the left precuneus. In relatives of people with bipolar disorder, moderate to high quality evidence suggests small increases in intracerebral volume, with no differences in the thalamus, striatum, amygdala, hippocampus, pituitary, or frontal lobes. Compared to people with bipolar disorder, relatives also show a small increase in grey matter volume.

White matter decreases compared to controls

Moderate to high quality evidence suggests decreases in the posterior corpus callosum extending to the posterior cingulate cortex, with smaller reduced clusters in the left optic radiation and right frontal superior longitudinal tracts. In people with first-episode bipolar disorder, moderate to high quality evidence suggests small decreases in total white matter.

White matter increases compared to controls

Moderate to high quality evidence suggests small increases in the cerebellum and the right lenticular nucleus.

Ventricular changes

Moderate to high quality suggests an increased risk of having a cavum septum pellucidum.

Compared to people with schizophrenia

Moderate quality evidence suggests fewer grey matter reductions in people with bipolar disorder in the right dorsomedial frontal cortex and the left dorsolateral prefrontal cortex. While grey matter reductions were more extensive in male-dominated schizophrenia samples, there was no effect of gender on the findings in bipolar disorder. Moderate to high quality evidence shows fewer reductions in people with bipolar disorder in the amygdala and hippocampal regions of the left cornu ammonis (CA)1, left CA2/3, left CA4/dentate gyrus, right presubiculum and right subiculum, with no differences in the left presubiculum or subiculum, or right CA1, CA2/3, or CA4/dentate gyrus.

Compared to people with major depression

Moderate to low quality evidence suggests increased grey matter volume in people with bipolar disorder in the right middle frontal gyrus, left hippocampus, right inferior temporal gyrus, left inferior parietal lobule, and right cerebellar vermis.

Compared to people with borderline personality disorder

Moderate to low quality evidence finds reduced grey matter volume and density in people with bipolar disorder in bilateral medial orbital frontal cortex, right insula, and right thalamus, and increased in the right putamen. In borderline personality disorder, grey matter was reduced in bilateral medial prefrontal cortex, bilateral amygdala, and right parahippocampal gyrus.

For more information see the technical table

HOW YOUR SUPPORT HELPS

We are able to make significant advances due to the generosity of countless people. Your donation allows us to continue to work towards transforming lives. For information on how you can support our research, phone **1300 888 019** or make a secure donation at neura.edu.au.