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Study finds difference in way bipolar disorder affects brains of children versus adults

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A new study from Bradley Hospital has found that bipolar children have greater activation in the right amygdala – a brain region very important for emotional reaction – than bipolar adults when viewing emotional faces. The study, now published online in *JAMA Psychiatry*, suggests that bipolar children might benefit from treatments that target emotional face identification, such as computer based "brain games" or group and individual therapy.

This study is the first ever meta-analysis to directly compare brain changes in bipolar children to bipolar adults, using data from 100 functional MRI (fMRI) brain imaging studies with a pool of thousands of participants. Ezra Wegbreit, Ph.D., a postdoctoral research fellow at Bradley Hospital, led the study along with senior author Daniel Dickstein, M.D., director of the PediMIND Program at Bradley Hospital.

"Bipolar disorder is among the most debilitating psychiatric illnesses affecting adults worldwide, with an estimated prevalence of one to four percent of the adult population, but more than 40 percent of adults report their bipolar disorder started in childhood rather than adulthood," said Wegbreit. "Despite this, very few studies have examined whether brain or behavioral changes exist that are specific to children with bipolar disorder versus adults with bipolar disorder."

While fMRI studies have begun to investigate the neural mechanisms underlying bipolar disorder, few have directly compared differences in youths with bipolar disorder and bipolar adults. To address this gap, the research team conducted the large scale meta-analyses, directly comparing fMRI findings in bipolar youths versus bipolar adults, both relative to non-bipolar participants.

Analysis of emotional face recognition fMRI studies showed significantly greater amygdala activity among bipolar youths than bipolar adults. The team also analyzed studies using emotional stimuli, which again showed significantly greater levels of brain activation in bipolar children, this time in the inferior frontal gyrus and precuneus areas of the brain. In contrast, analyses of fMRI studies using non-emotional cognitive tasks showed a significant lack of brain activation in the anterior cingulate cortex of bipolar children.

"Our meta-analysis has located different regions of the brain that are either hyper active or under active in children with bipolar disorder," said Wegbreit. "These point us to the targeted areas of the brain that relate to emotional dysfunction and cognitive deficits for children with bipolar disorder."

"Despite our best current treatments, bipolar disorder exacts a considerable toll on youths, including problems with friends, parents and at school, and high rates of psychiatric hospitalization and suicide attempts," said Dickstein. "More research into targeted treatments is needed now that we know children's brains are impacted in specific, identifiable ways by bipolar disorder."

Dickstein added that Bradley Hospital's PediMIND Program is currently conducting several research projects on pediatric bipolar disorder, including potential brain-based treatment. "Understanding more about the brains of children and adults with mental illness is very important

because, ultimately, all mental illnesses are reflected in changes in brain activity," said Dickstein. "Locating the underlying brain change in bipolar youths could lead us to new, brain-based ways to improve how we diagnose and treat this disorder."

Ongoing studies by the PediMIND Program and other research groups are working to determine if computer-based "brain games" or group or individual therapy might improve these brain changes in a more targeted way, and improve the lives of children and adults with bipolar disorder.

Provided by Lifespan