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Study of brain networks shows differences in children with OCD

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A new study by scientists at the Wayne State University School of Medicine demonstrates that communication between some of the brain's most important centers is altered in children with obsessive-compulsive disorder.

The research led by the Department of Psychiatry and Behavioral Neuroscience's David Rosenberg, M.D., and Vaibhav Diwadkar, Ph.D., sheds significant light on our understanding of how brain networks contribute to obsessive-compulsive disorder in youth.

The study included youth with a diagnosis of OCD and a comparison group free of psychiatric illness. The investigators used functional magnetic resonance imaging, or fMRI, to collect brain responses while participants engaged in a basic working memory task. Task difficulty was varied to evoke activity in a core brain sub-network responsible for implementing complex processes such as cognitive control. Then, using sophisticated network analyses, the investigators quantified differences in brain network function between the two groups.

"Most fundamentally, we show that the dorsal anterior cingulate cortex, a key region of the brain associated with cognitive control, exerts exaggerated brain network effects in OCD," said Dr. Diwadkar, an associate professor. "This result provides a putative scientific framework for what clinicians have noted about OCD-related behaviors. These network-based effects have been suggested, but not explicitly demonstrated before in brain imaging data in the disorder. Our studies

are perfectly aligned with the renewed emphasis of the National Institute of Mental Health to discover mechanisms of neuropsychiatric disease in the brain. If you can discover a reliable mechanism underlying disease, you have the promise of improved pathways toward treatment."

The results are highly consistent with observations in the clinic, said Dr. Rosenberg, who is a professor and the department's chair. "Children with OCD are beset by preoccupations and can't easily move on from certain tasks and behaviors. As all complex behavior arises from brain networks, being trapped in this mode must arise from impaired brain network interactions in OCD. In our previous studies we had focused on assessing the structure and the neurochemistry of the anterior cingulate. We had long suspected that brain network interactions originating in this region are impaired in the disorder. But this is the first study to clearly demonstrate this."

The full paper, "Dysfunctional activation and brain network profiles in youth with obsessive-compulsive disorder: a focus on the dorsal anterior cingulate during working memory," appears in a special issue of the journal *Frontiers in Human Neuroscience*, and is available to the public on the journal's website.

More information: The paper complements WSU's OCD research most recently featured in a May 2014 episode of ABC News' ongoing series on the disorder featured on "20/20."

Provided by Wayne State University