

## **Brain imaging may improve diagnosis and treatment of mental health disorders**

*Neurobiological ‘signatures’ could help clinicians select treatments*

Brain imaging may one day be used to help diagnose mental health disorders—including depression and anxiety—with greater accuracy, according to a new study conducted in a large sample of youth at the University of Pennsylvania and led by Antonia Kaczkurkin, PhD and Theodore Satterthwaite, MD.

And knowing more about the neurobiology behind psychiatric disorders could inform decisions about who might benefit from different therapies.

When diagnosing psychiatric disorders, clinicians currently rely heavily on the symptoms a person experiences, which are often subjective and may not align with what researchers have observed about brain structure and function in people with psychiatric disorders. And if neurobiology and psychological symptoms are at odds, that calls into question whether the psychological symptoms should drive treatment.

“Researchers are becoming more aware that our traditional symptom-based diagnostic categories do not align with underlying neurobiology,” says Dr. Kaczkurkin.

Part of the difficulty in treating depression and anxiety is that not all people respond to a given treatment. Identifying subtypes based on neurobiology rather than symptoms alone might lead to more targeted early intervention or more personalized treatment.

Studying the brains of children and adolescents, the researchers observed that youth can have similar symptoms but different neurobiological patterns. Drs. Kaczkurkin and Satterthwaite and their team used a type of machine learning called HYDRA to interpret information from the brain scans of over 1,100 children and adolescents who had symptoms of depression and anxiety. They focused on several variables: brain volume, thickness of the cortex (the outer layers of the brain), a particular type of brain connectivity (the synchronization of slow fluctuations in brain activity), white matter integrity (the organization of brain white matter tracts), participants’ performance on cognitive tests, and patterns of psychiatric symptoms.

Two main clinical subtypes of disorders emerged. The youth in the first subgroup had deficits in brain structure, brain function, and cognition, as well as more marked psychological symptoms than other participants in the study. Those in the second subtype still showed high levels of clinical symptoms of depression and anxiety but didn’t have the same deficits in brain structure, brain function, and cognition.

“These results suggest that there may be distinct underlying neurobiological signatures of these common symptoms,” says Dr. Kaczkurkin.

Presenter: Antonia Kaczkurkin, Ph.D., The original manuscript is an article-in-press at Biological Psychiatry.

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