

# Study shows brain differences in interpreting physical signals in mental health disorders

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Researchers have shown why people with mental health disorders, including anorexia and panic disorders, experience physical signals differently.

The researchers, from the University of Cambridge, found that the part of the [brain](#) which interprets physical signals from the body behaves

differently in people with a range of [mental health disorders](#), suggesting that it could be a target for future treatments.

The researchers studied 'interoception' - the ability to sense internal conditions in the body—and whether there were any common brain differences during this process in people with mental health disorders. They found that a region of the brain called the dorsal mid-insula showed different activity during interoception across a range of disorders, including depression, schizophrenia, eating disorders and [anxiety disorders](#).

Many people with mental health disorders experience [physical symptoms](#) differently, whether that's feeling uncomfortably full in anorexia, or feeling like you don't have enough air in panic disorder.

The results, reported in *The American Journal of Psychiatry*, show that activity in the dorsal mid-insula could drive these different interpretations of bodily sensations in mental health. Increased awareness of the differences in how people experience physical symptoms could also be useful to those treating mental health disorders.

We all use exteroception—sight, smell, hearing, taste and touch—to navigate daily life. But interoception—the ability to interpret signals from our body—is equally important for survival, even though it often happens subconsciously.

"Interoception is something we are all doing constantly, although we might not be aware of it," said lead author Dr. Camilla Nord from the MRC Cognition and Brain Sciences Unit. "For example, most of us are able to interpret the signals of low blood sugar, such as tiredness or irritability, and know to eat something. However, there are differences in how our brains interpret these signals."

Differences in interoceptive processes have previously been identified in people with eating disorders, anxiety and depression, panic disorder, addiction and other mental health disorders. Theoretical models have suggested that disrupted cortical processing drives these changes in interoceptive processing, conferring vulnerability to a range of mental health symptoms.

Nord and her colleagues combined brain imaging data from previous studies and compared differences in brain activity during interoception between 626 patients with mental health disorders and 610 healthy controls. "We wanted to find out whether there is something similar happening in the brain in people with different mental disorders, irrespective of their diagnosis," she said.

Their analysis showed that for patients with bipolar, anxiety, major depression, anorexia and schizophrenia, part of the cerebral cortex called the dorsal mid-insula showed different brain activation when processing pain, hunger and other interoceptive signals when compared to the control group.

The researchers then ran a follow-up analysis and found that the dorsal mid-insula does not overlap with regions of the brain altered by antidepressant drugs or regions altered by psychological therapy, suggesting that it could be studied as a new target for future therapeutics to treat differences in interoception.

"It's surprising that in spite of the diversity of psychological symptoms, there appears to be a common factor in how physical signals are processed differently by the brain in mental health disorders," said Nord. "It shows how intertwined physical and mental health are, but also the limitations of our diagnostic system—some [important factors](#) in mental health might be 'transdiagnostic', that is, found across many diagnoses."

In future, Dr. Nord is planning studies to test whether this disrupted activation could be altered by new treatments for [mental health](#) disorders, such as brain stimulation.

**More information:** *American Journal of Psychiatry* (2021). [DOI: 10.1176/appi.ajp.2020.20091340](https://doi.org/10.1176/appi.ajp.2020.20091340)

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