New study reveals key differences in brain activity in people with anorexia nervosa

October 12 2015

When people with anorexia nervosa decide what to eat, they engage a part of the brain associated with habitual behavior. This finding by researchers at Columbia University Medical Center, New York State Psychiatric Institute, the Mortimer B. Zuckerman Mind Brain Behavior Institute, and New York University was published today in *Nature Neuroscience*.

Anorexia nervosa is a serious and puzzling illness. Even as its clinical signs have become increasingly recognized, the mortality rate remains among the highest of any psychiatric disorder. A highly stereotyped feature of this illness is the persistent selection of low-calorie, low-fat food, despite the individual's desire for change. The brain mechanisms underlying this persistent and restrictive eating disorder are unclear.

The researchers used functional magnetic resonance imaging—which tracks activity in the brain in real time—to monitor 21 women with anorexia nervosa and 21 healthy individuals while they made a series of choices about what food to eat. As expected, individuals with anorexia nervosa consistently chose fewer high-fat foods. The brain regions they used to make those choices were also different: for individuals with anorexia nervosa, choices about what to eat were associated with activation in the dorsal striatum, a brain region known to be related to habitual control of actions. Furthermore, activation in fronto-striatal brain circuits during the experiment predicted how many calories they chose to consume in a meal the following day. These are the first data linking abnormalities in brain activity with the salient behavioral disturbance of anorexia nervosa, restrictive food choice.

These findings open up entirely new avenues for treatment development and understanding of disease mechanisms. "We are already developing a new psychotherapy intervention built on principles of habit reversal that helps patients with anorexia nervosa change maladaptive behaviors," says Joanna Steinglass, MD, one of the lead authors and associate professor of clinical psychiatry at Columbia University Medical Center. "As we improve our understanding of brain mechanisms, new medication targets may emerge as well."

"This study may also help link anorexia nervosa to disorders like substance abuse, gambling and other conditions that may involve choices related to excessive activity in the dorsal striatum," added Daphna Shohamy, PhD, author and associate professor of psychology and principal investigator at Columbia University's Mortimer B. Zuckerman Mind Brain Behavior Institute. "There is tremendous value in studying how the brain makes decisions in both health and disease. Understanding how common brain circuits for decision-making contribute to seemingly unrelated disorders will allow researchers to focus on core disturbances and leverage treatment advances across different disorders."

More information: Neural mechanisms supporting maladaptive food choices in anorexia nervosa, DOI: 10.1038/nn.4136

Provided by Zuckerman Mind Brain Behavior Institute