

Research reveals key differences in the brains of boys and girls with binge eating disorder

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Conducting the first known comparison of the brains of boys and girls with binge eating disorder, a team of researchers from the Keck School of Medicine of USC found significant differences in brain structure between the sexes. The research was recently published in [*Psychological*](#)

Medicine.

The study, which builds on [earlier work](#) suggesting that binge eating disorder is wired in the [brain](#) from an early age, is an important first step in understanding the neurobiology of binge eating disorder and how it differs between the sexes. It also presents critical evidence that males, who in the past were left out of research on [eating disorders](#), must be included in future efforts to understand the origins of eating disorders.

"Males have been excluded from research on eating disorders for decades," said Stuart Murray, DCLinPsych, Ph.D., Della Martin Associate Professor of Psychiatry and the Behavioral Sciences at the Keck School of Medicine of USC, noting that the exclusion was perpetuated by the belief that it was uncommon for males to have eating disorders. "As a result of the exclusion of boys and men, we have developed treatments only from studying females, which we then apply to boys and men and hope they work with the same efficacy."

It has become increasingly clear in recent years, however, that some eating disorders are actually nearly as prevalent among men and boys as among women and girls. At the same time, research has uncovered more and more evidence that eating disorders are diseases of the brain and not the result of social pressure or a lack of willpower, which Murray said are common misperceptions that have been disproved.

Same disease, different brain structure

Using data from the Adolescent Brain Cognitive Development study, the largest study in the U.S. assessing [brain development](#), the researchers identified 38 boys and 33 girls who had a diagnosis of binge eating disorder from the study's 11,875 participants. In children, boys represent about 57% of those with binge eating disorder. That figure changes among adults with [adult males](#) representing about 43% of those with

binge eating disorders.

The research team was able to evaluate the gray matter density in the brains of the nine- and 10-year-olds in the study, via voxel-based morphometry, a neuroimaging technique which enables researchers to examine differences in structural brain anatomy across the entire brain. It showed that, compared to a [control group](#) of 74 children who matched on age, body-mass index and developmental maturation, girls with binge eating disorder had elevated gray matter density in several parts of the brain known to be connected to impulse control and binge eating disorder symptoms. However, boys with binge eating disorder did not have elevated gray matter density in these areas. This elevated gray matter density in girls with binge eating disorder suggests that a crucial brain maturational process—synaptic pruning—may be uniquely altered or delayed in these girls.

"This study clearly suggests that any neurobiological hypothesis of binge eating disorder needs to be stratified by sex," said Murray.

Inclusion of males critical for future treatments

Likewise, the fact that boys and girls with binge eating disorder, which is the most common type of eating disorder, have different brain structures makes the case that males may require different types of treatment than females.

Murray added that that new treatments for binge eating disorder are on the horizon and include [transcranial magnetic stimulation](#) and direct current stimulation, both of which directly target the brain. As with previous research on eating disorders, so far only female subjects have been included in the research.

"The differences in [brain structure](#) between boys and girls with binge

eating disorders means that any treatments targeting the brain must be tested on males as well as females," said Murray. "Otherwise, we would be targeting parts of the brain in males that aren't necessarily abnormal."

Next, Murray and his team will test to see whether, in addition to having different structures, the brains of males and females with [binge eating disorder](#) function differently.

Additional authors of the study include Christina J. Duval, Anne A. Balkchyan, Darrin J. Lee, Steven J. Siegel, Arthur W. Toga, and Kay Jann from the Keck School of Medicine of USC; Joel P. Diaz-Fong of UCLA; Jason M. Nagata of UCSF; and Kyle T. Ganson from the University of Toronto.

More information: Stuart B. Murray et al, Sex differences in regional gray matter density in pre-adolescent binge eating disorder: a voxel-based morphometry study, *Psychological Medicine* (2022). [DOI: 10.1017/S0033291722003269](#)

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