

Diminished activation of specific prefrontal brain region may directly contribute to binge eating in bulimia nervosa

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New research conducted by an investigator from the Icahn School of Medicine at Mount Sinai has revealed a key neural mechanism underlying the feeling of being unable to stop eating, the most salient aspect of binge episodes in eating disorders like bulimia nervosa.

The researcher found deficient activation of the medial and lateral prefrontal cortices ([brain regions](#) known to play a role in the control of cravings, behaviors, and emotions) during eating-specific response inhibition in participants with bulimia nervosa compared with healthy controls. The findings, published February 25 in *Psychological Medicine*, provide initial evidence that this diminished activation of the prefrontal cortex may directly contribute to more severe, out-of-control, maladaptive eating behaviors. This supports the idea that medial and lateral prefrontal cortex dysfunction may be a promising treatment target.

Bulimia nervosa is a serious, common psychiatric disorder that is associated with high rates of disability and mortality. Fewer than half of adults treated with first-line interventions recover. The neural bases of bulimia nervosa's symptoms remain poorly understood, hindering efforts to develop more efficacious treatments. Decades of previous research suggest that the sense of a loss of control over eating is the most important feature of the binge eating that characterizes the disorder. Therefore, pinpointing the brain-based alterations that occur specifically during attempts to control eating could ultimately improve our understanding of, and targeted treatment for, this often chronic condition.

This study, led by Laura Berner, Ph.D., Assistant Professor of Psychiatry at Icahn Mount Sinai and a leading investigator in the Mount Sinai Center of Excellence in Eating and Weight Disorders and the Center for Computational Psychiatry, is the first to examine brain activation during attempts to control eating behavior in individuals with eating disorders.

Most studies of how we stop or prevent ourselves from engaging in a behavior ask people to perform a task that involves withholding button-pressing responses. But Dr. Berner developed a new task that asks people to withhold eating responses. Using a portable brain imaging technology called functional near-[infrared spectroscopy](#) (fNIRS), the research team measured activation of the prefrontal cortices of 23 women with bulimia nervosa (BN) and 23 healthy controls during this novel go/no-go task requiring inhibition of eating responses and during a standard go/no-go task requiring inhibition of button-pressing responses.

They found women with BN made commission errors on both tasks—they ate and pressed the button when they were not supposed to—more often than women without an eating disorder. Coupled with this reduced ability to control their eating responses, the subsets of women with BN who had the most severe sense of loss of control over their eating in the last month, and those who felt most strongly that they binge-ate during the task, both showed abnormally reduced bilateral ventromedial (vmPFC) and right ventrolateral prefrontal cortex (vlPFC) activation during eating-response inhibition. Similarly, in the entire sample, lower eating-task activation in right vlPFC was related to more frequent and severe loss-of-control eating, but no group differences in activation were detected on either task when this full sample was compared with healthy controls. Notably, BN diagnosis and severity were unrelated to brain activation during button-pressing inhibition.

"Our patients describe feeling like they just can't stop themselves from taking that next bite or sip during binge-eating episodes, but we didn't understand the neural mechanisms that might underlie that experience. For the first time, this method has allowed us to measure what is happening in the brains of people with bulimia nervosa when they are trying to inhibit their eating responses, but cannot," said Dr. Berner. "Our findings suggest that eating-specific impairments in inhibitory control-related activation may serve as a new target for treatment. In

fact, we just learned that we received funding from the National Eating Disorders Association to test this idea. We will be using fNIRS-based neurofeedback to train women with [bulimia nervosa](#) to increase their own prefrontal cortex activation while eating, and we'll test how that training impacts symptoms."

More information: Laura A. Berner et al, Altered prefrontal activation during the inhibition of eating responses in women with bulimia nervosa, *Psychological Medicine* (2022). [DOI: 10.1017/S0033291722000198](#)

Provided by The Mount Sinai Hospital

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