



Date: March 23, 2015
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Hunger Versus Reward: How Do Anorexics Control Their Appetite?

Philadelphia, PA, March 23, 2015 – Many adults, regardless of their weight, resolve to avoid fatty foods and unhealthy desserts. But despite one's best intentions, when the moment for decision comes, that chocolate lava cake is often too enticing and self-control vanishes.

This behavior is normal because hunger increases the intensity of food rewards. Yet, individuals with anorexia nervosa (AN), despite their state of starvation, are able to ignore such food-related rewards.

A new study by Dr. Christina Wierenga, Dr. Walter Kaye, and colleagues, published in the current issue of *Biological Psychiatry*, sheds new light on the brain mechanisms that may contribute to the disturbed eating patterns of anorexia.

They examined reward responding in relation to metabolic state (hungry or satiated) in 23 women recovered from AN and 17 healthy women without eating disorder histories (e.g., the comparison group). Women with active AN weren't studied to reduce potential confounds related to starvation.

The healthy women, when in a state of hunger, showed increased activity in the part of the brain that motivates the seeking of reward, but the women recovered from AN did not. The recovered women also exhibited increased activation of cognitive control circuitry regardless of metabolic state.

Thus, this study found that women who have recovered from anorexia nervosa show two related patterns of changes in brain circuit function that may contribute to their capacity to sustain their avoidance of food.

First, hunger does not increase the engagement of reward and motivation circuits in the brain. This may protect people with anorexia from hunger-related urges. Second, they showed increased activation of executive 'self-control' circuits in the brain, perhaps making them more effective in resisting temptations.

"This study supports the idea that anorexia nervosa is a neurobiologically-based disorder. We've long been puzzled by the fact that individuals with AN can restrict food even when starved. Hunger is a motivating drive and makes rewards more enticing," said Wierenga, an Associate Professor of Psychiatry at the University of California, San Diego. "These findings suggest that AN individuals, even after recovery, are less sensitive to reward and the motivational drive of hunger. In other words, hunger does not motivate them to eat."

"This study offers new insights about the brain in AN, which we are using to guide treatment development efforts, and reduce stigma associated with this life-threatening disorder," added Kaye, who is a Professor of Psychiatry and Director of the Eating Disorder Program at UCSD.

"Anorexia nervosa is a devastating illness and this study sheds new light on brain mechanisms that may enable people to starve themselves. In identifying these mechanisms, this work may provide circuit-based targets for therapeutics," commented Dr. John Krystal, Editor of *Biological Psychiatry*. "But these same circuits and processes seem to be engaged 'in reverse' for obesity. Thus, this study may have broad implications for the country's obesity epidemic as well."

The article is "Hunger Does Not Motivate Reward in Women Remitted from Anorexia Nervosa" by Christina E. Wierenga, Amanda Bischoff-Grethe, A. James Melrose, Zoe Irvine, Laura Torres, Ursula F. Bailer, Alan Simmons, Julie L. Fudge, Samuel M. McClure, Alice Ely, and Walter H. Kaye (doi: 10.1016/j.biopsych.2014.09.024). The article appears in *Biological Psychiatry*, Volume 77, Issue 7 (April 1, 2015), published by Elsevier.

Notes for editors

Full text of the article is available to credentialed journalists upon request; contact Rhiannon Bugno at +1 214 648 0880 or Biol.Psych@utsouthwestern.edu. Journalists wishing to interview the authors may contact Bonnie Ward, Senior Communications and Media Relations Manager at UC San Diego, at +1 619 471 9049 or bjward@ucsd.edu.

The authors' affiliations, and disclosures of financial and conflicts of interests are available in the article.

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