

Autoimmune-Encephalitis and Eating Disorders

Content Warning: Eating Disorders

Eating disorders impact the lives of millions of people around the world, with negative effects on the physical and mental health of people with these disorders as well as their families and friends. In 2018, the estimated prevalence of eating disorders in the United States was 4.6%¹. Caretakers of relatives with eating disorders also report impaired mental health with feelings of anxiety, powerlessness, sadness, and desperation². In the US, eating disorders cost an estimated \$64.7 billion, or \$11,808 per affected person between 2018 and 2019³. Public awareness of these disorders is essential as early identification and treatment can be one of the best predictors of successful outcomes⁴.

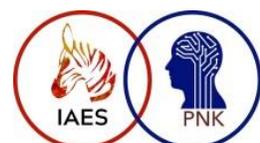
Eating disorders are typically characterized by disturbances in eating behavior and body weight that impact a person's mental and physical health. There are three common eating disorders: anorexia nervosa, bulimia nervosa, and binge-eating disorder. Anorexia nervosa is characterized by restricted eating and a fixation on thinness. Bulimia nervosa involves episodes of overeating followed by behaviors that compensate such as vomiting, fasting, or excessive exercising. Binge-eating disorder is the most common eating disorder in the United States and is characterized by periods of uncontrolled overeating⁵. Eating disorders not only have negative impacts on physical health, but have been associated with several other disorders including depression⁶.

Two well-established risk factors for eating disorders are age and sex. Prevalence is much higher in women than men, with 8.4% of women experiencing an eating disorder in their lifetime compared to 2.2% of men¹, although eating disorders in men are likely underdiagnosed⁷. Age is also an important risk factor, with peak onset between the ages of 15 and 25⁸.

While risk factors like age and sex are well established, recent work has pointed to autoimmune disorders as an additional risk factor for developing an eating disorder. Autoimmune diseases have already been linked to several psychiatric disorders⁹, and several recent case studies have reported that some patients suffering from a type of autoimmune disease called anti-NMDAR encephalitis first presented with eating disorders. Four such cases involved teenage girls who were first admitted to eating disorder clinics with diagnoses of anorexia nervosa. All four patients eventually developed seizures and other symptoms that led to a diagnosis of autoimmune encephalitis¹⁰⁻¹². Following treatment of their autoimmune encephalitis, the patients returned to pre-illness eating patterns.

One possibility for how autoimmune encephalitis and eating disorders are linked has to do with a receptor in the brain called an NMDA (*N*-methyl-D-aspartate) receptor. Anti-NMDAR encephalitis causes patients to have fewer NMDA receptors than healthy people¹³. NMDA receptors have many functions in the human brain, and studies in rats have shown that they

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play an important role in feeding behavior^{14,15}. Researchers have been able to both increase¹⁶ and decrease¹⁷ an animal's eating by modulating activity of NMDA receptors in the brain. Cases of anti-NMDAR encephalitis that present as eating disorders provide compelling evidence that NMDA receptors also play an important role in eating behavior in humans.

The growing evidence that autoimmune encephalitis cases can present first as eating disorders highlights the importance of recognizing diagnoses of eating disorders as possible early signs of autoimmune encephalitis. This is especially important given that both autoimmune encephalitis and eating disorders are often diagnosed in the same populations of people. The average onset of anti-NMDAR autoimmune encephalitis is 21 years¹¹, which coincides with the peak onset of eating disorders between 15 and 25 years of age⁸. Similarly, both autoimmune encephalitis and eating disorders are more prevalent in women than in men^{1,13}. Awareness of the relationship between these two diagnoses can help lead to earlier diagnosis and treatment of autoimmune encephalitis¹¹ which hopefully leads to better outcomes.

If you think that you or someone you know may be dealing with an eating disorder, these resources are available to help: [National Eating Disorders Association](#), [Mayo Clinic](#)

References

1. Galmiche, M., Déchelotte, P., Lambert, G. & Tivolacci, M. P. Prevalence of eating disorders over the 2000–2018 period: a systematic literature review. *Am. J. Clin. Nutr.* **109**, 1402–1413 (2019).
2. De LA Rie, S. M., Van furth, E. F., De Koning, A., Noordenbos, G. & Donker, M. C. H. The Quality of Life of Family Caregivers of Eating Disorder Patients. *Eat. Disord.* **13**, 345–351 (2005).
3. Streatfeild, J. *et al.* Social and economic cost of eating disorders in the United States: Evidence to inform policy action. *Int. J. Eat. Disord.* **54**, 851–868 (2021).
4. Chang, P. G. R. Y., Delgadillo, J. & Waller, G. Early response to psychological treatment for eating disorders: A systematic review and meta-analysis. *Clin. Psychol. Rev.* **86**, 102032 (2021).
5. NIMH » Eating Disorders. <https://www.nimh.nih.gov/health/topics/eating-disorders/>.
6. Willcox, M. & Sattler, D. N. The Relationship Between Eating Disorders and Depression. *J. Soc. Psychol.* **136**, 269–271 (1996).
7. Strother, E., Lemberg, R., Stanford, S. C. & Turberville, D. Eating Disorders in Men: Underdiagnosed, Undertreated, and Misunderstood. *Eat. Disord.* **20**, 346–355 (2012).
8. Schmidt, U. *et al.* Eating disorders: the big issue. *Lancet Psychiatry* **3**, 313–315 (2016).
9. Zerwas, S. *et al.* Eating Disorders, Autoimmune, and Autoinflammatory Disease. *Pediatrics* **140**, e20162089 (2017).
10. Virupakshaiah, A., Consolini, D., Bean, C. & Elia, J. When Autoimmune Encephalitis masquerades as an Eating Disorder, two case reports on unique presentation of anti - NMDAR Encephalitis. (P2.2-016). *Neurology* **92**, P2.2-016 (2019).

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11. Mechelhoff, D. *et al.* Anti-NMDA receptor encephalitis presenting as atypical anorexia nervosa: an adolescent case report. *Eur. Child Adolesc. Psychiatry* **24**, 1321–1324 (2015).
12. Perogamvros, L., Schnider, A. & Leemann, B. The Role of NMDA Receptors in Human Eating Behavior: Evidence From a Case of Anti-NMDA Receptor Encephalitis. *Cogn Behav Neurol* **25**, 5 (2012).
13. Hughes, E. G. *et al.* Cellular and Synaptic Mechanisms of Anti-NMDA Receptor Encephalitis. *J. Neurosci.* **30**, 5866–5875 (2010).
14. Bednar, I. *et al.* Glutamate Inhibits Ingestive Behaviour. *J. Neuroendocrinol.* **6**, 403–408 (1994).
15. Stanley, B. G., Urstadt, K. R., Charles, J. R. & Kee, T. Glutamate and GABA in lateral hypothalamic mechanisms controlling food intake. *Physiol. Behav.* **104**, 40–46 (2011).
16. Hung, C.-Y., Covasa, M., Ritter, R. C. & Burns, G. A. Hindbrain administration of NMDA receptor antagonist AP-5 increases food intake in the rat. *Am. J. Physiol.-Regul. Integr. Comp. Physiol.* **290**, R642–R651 (2006).
17. Lee, S. W. & Stanley, B. G. NMDA receptors mediate feeding elicited by neuropeptide Y in the lateral and perifornical hypothalamus. *Brain Res.* **1063**, 1–8 (2005).

