

Trust Your Gut:

The Second Brain Within Our Digestive Tracts

About 40% of people worldwide have some form of gastrointestinal disorder.¹ The prevalence of gastrointestinal problems is visible on social media, where new probiotic supplements are marketed as the “key” to gut health, and in supermarkets and coffeeshops, where kombucha fills refrigerated shelves and is sold on tap.² In 2022, for instance, the global probiotics dietary supplements market size was valued at 18.4 billion dollars, and that number is only growing.³ Many of these products, and the influencers that promote them, claim to improve not just gut health but also higher-order functions, like memory and academic performance.⁴ There has not been, however, enough research done to prove these advertised benefits, and supplements are generally unregulated by the Food and Drug Administration.⁵ Nevertheless, that does not mean that these claims are entirely false. The enteric nervous system (ENS), one of the least understood aspects of human biology, is often regarded as humans’ second brain and is located within the gastrointestinal tract.⁶ The ENS is crucial to maintaining both gut health and mental health, as it regulates immunity, metabolism, and behavior.⁷

The gut-brain axis refers to the communication between the brain and the ENS. There are an estimated 100 million neurons in the small intestine alone working along this axis, communicating via neurotransmitters - including dopamine and serotonin, the chemicals that control basic human emotion.⁸ That means the microbiomes in our guts really do contribute to memory, mood, and cognition, and there is some truth in the saying “trust your gut.” Scientists are still researching how to work within the ENS to manage specific disorders and diseases.⁹ There is, however, one serious threat emerging to universal ENS health: plastic. On average, a recent study by the World Wildlife Fund International (WWF) determined that a person could be consuming the equivalent of a credit card of plastic per week through ingestion, inhalation, or skin contact.¹⁰ These particles are small but mighty and can latch onto the vagus nerve, the core of the gut-brain axis.¹¹ Recent studies prove that plastic nano-particles can impact the digestive and nervous system in various ways, from minor inflammation to behavioral irregularity, but the possible extent of these impacts are unknown.¹²

Although research on the ENS is relatively uncharted territory, continued research on the ENS’s functionality could play a role in the future of public health and medicine. While limited, there have been some small-scale studies that show specific probiotic interventions can help manage symptoms of anxiety and depression, which could be the beginning of a new era for mental health treatment.¹³ Additionally, research on the ENS could revolutionize the way doctors understand both neurodegenerative diseases, like Alzheimer’s, and neurodevelopmental disorders.¹⁴

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¹ A. Sperber, S. Bangdiwala, D. Drossman, U. Ghoshal, M. Simren, J. Tack, W. Whitehead, et al, “Worldwide Prevalence and Burden of Functional Gastrointestinal Disorders, Results of Rome Foundation Global Study,” *Gastroenterology* 160, no. 1 (2021): 2

² Dani Blum, “Why is Gut Health Taking Over TikTok?” *New York Times*, April 20, 2022, [nytimes.com/2022/04/20/well/eat/tiktok-gut-health.html](https://www.nytimes.com/2022/04/20/well/eat/tiktok-gut-health.html)

³ “Probiotics Dietary Supplements Market Size, Share and Trends Analysis Report Form (Chewables and Gummies, Capsules, Powders, Tablets, and SoftGels, By End-Use, By Application, By Region, and Segment Forecasts, 2023-2030,” Grand View Research, accessed March 5, 2024, [grandviewresearch.com/industry-analysis/probiotics-dietary-supplements-market](https://www.grandviewresearch.com/industry-analysis/probiotics-dietary-supplements-market).

⁴ Siddhi Camila Lama, “Why is Activa Yogurt Good For You?” *Livestrong*, May 28, 2019, [livestrong.com/article/455009-why-is-activia-yogurt-good-for-you/](https://www.livestrong.com/article/455009-why-is-activia-yogurt-good-for-you/)

⁵ Blum “Why is Gut Health Taking Over TikTok?”

⁶ S. Kulkarni, J. Ganz, J. Bayrer, L. Becker, M. Bogunovic, and M. Rao, “Advances in Enteric Neurobiology: The ‘Brain’ in the Gut in Health and Disease,” *The Journal of Neuroscience* 38, no. 44 (2018): 9351

⁷ *Ibid*; 9347

⁸ Blum, “Why is Gut Health Taking Over TikTok?”

⁹ Leo Galland, "The Gut Microbiome and the Brain," *Journal of Medicinal Food* 17, no. 12 (2014): 1

¹⁰ "A Plateful of Plastic: Visualizing the Amount of Microplastics We Eat," Reuters Graphics, December 31, 2019, [reuters.com/graphics/ENVIRONMENT-PLASTIC/0100B4TF2MQ/index.html](https://www.reuters.com/graphics/ENVIRONMENT-PLASTIC/0100B4TF2MQ/index.html).

¹¹ W. Grodzicki, K. Dziendzikowska, J. Gromadzka-Ostrowska, and M. Kruszewski, "Nanoplastic Impact on the Gut-Brain Axis: Current Knowledge and Future Directions," *International Journal of Molecular Sciences* 22, no. 23 (2021): 7

¹² *Ibid.*; 4

¹³ S. Forssten, A. Ouwehand, S. Griffin, and E. Patterson, "One Giant Leap from Mouse to Man: The Microbiota-Gut-Brain Axis in Mood Disorders and Translational Challenges Moving towards Human Clinical Trials," *Nutrients* 14, no. 3 (2022): 6

¹⁴ W. Grodzicki, K. Dziendzikowska, J. Gromadzka-Ostrowska, and M. Kruszewski, "Nanoplastic Impact," 6