

The impact of GABA and psychobiotics on mental wellness

Mental wellness is a major concern for Americans, with a rising focus on addressing symptoms of stress, anxiety, depression, and other mental health challenges.

This is particularly true for women and young adults aged 18–24, who report experiencing high levels of stress and mental health symptoms ¹.

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Mental wellness in the US

More than

25%

of Americans live with diagnosable mental health conditions, and about 50% will face a mental health episode at some point in their lives¹.

Mental health disorders are prevalent, being one of the leading causes of disability, with depression alone costing over

\$50 billion

annually in treatment and lost wages¹.

In 2023, according to the US Census Bureau,

1/3 of adults

in the US report symptoms of anxiety and depression, but it's higher for young adults aged 18 to 24, at 50% reporting these symptoms².

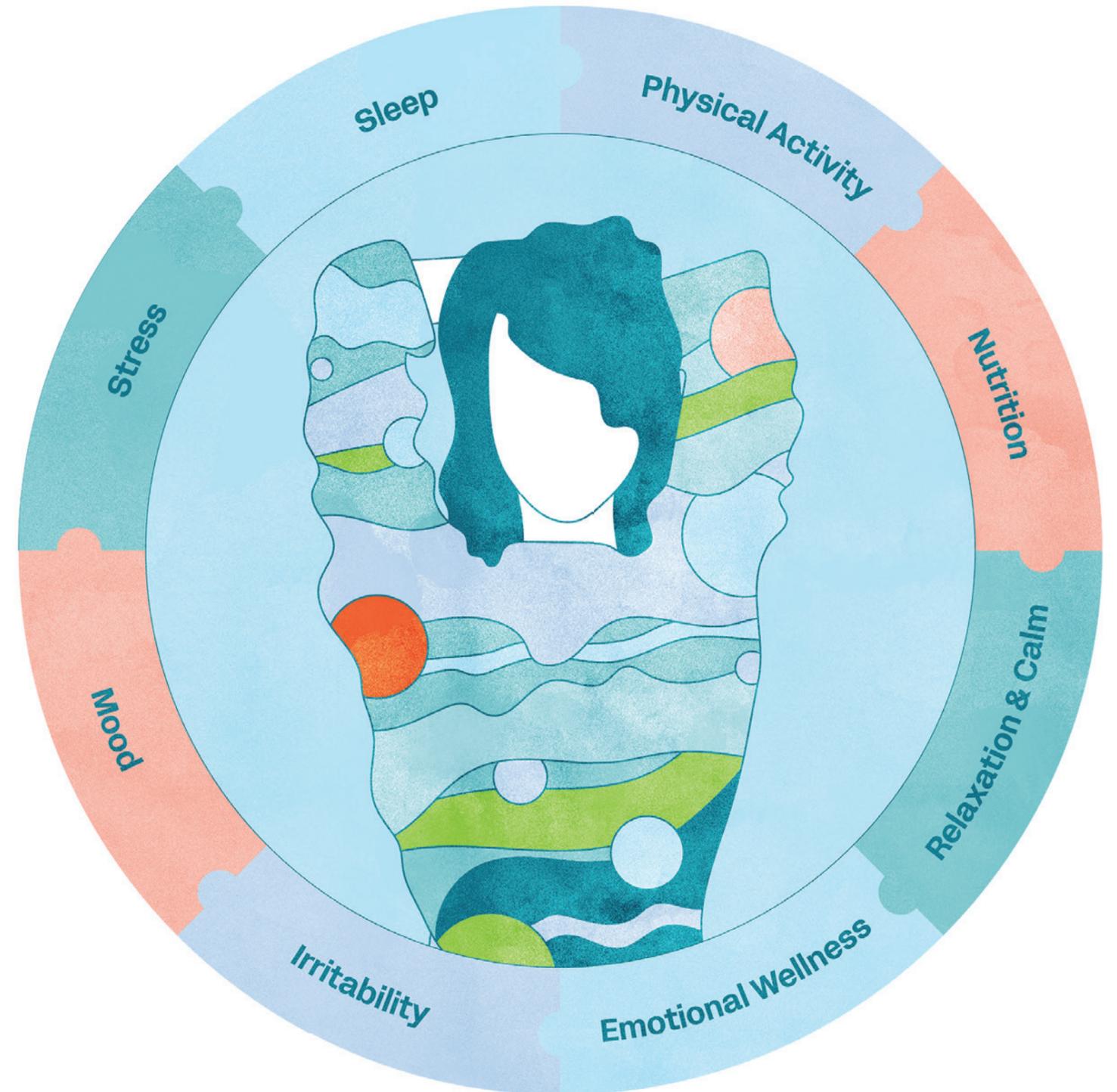
Due to these concerns about mood and mental health, sales of supplements addressing these challenges are projected to reach **\$1.73B by 2027.**¹

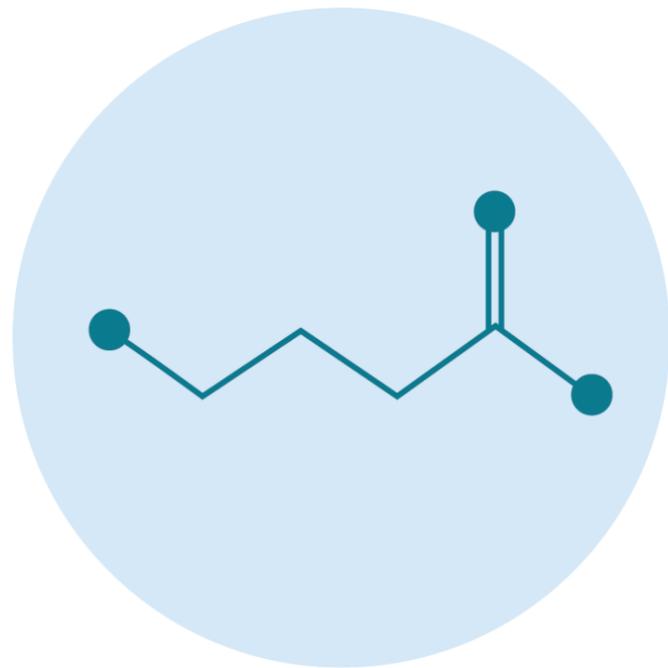


The interconnected nature of mental wellness

Mental wellness is multifaceted and involves factors such as stress, sleep, physical activity, and nutrition, all of which can affect mood, emotional wellness, irritability, and the general feeling of calm and relaxation.

These elements are deeply interconnected, each influencing the others in significant ways. Improving one area often leads to positive effects in others, underscoring the importance of a holistic approach to mental health.





The impact of GABA on mental wellness factors

One key player in the interconnectedness of mental wellness factors is Gamma-Aminobutyric Acid (GABA), which performs vital functions in the nervous system ³.

Research suggests GABA can impact the body in many ways. Studies have indicated its involvement in regulating sleep and feelings of anxiety, memory, mood, and even pain perception. Furthermore, low GABA levels or its dysfunction are associated with stress, feelings of anxiety, and sleep problems ⁴.

In fact, feelings of anxiety and sleep issues are often treated with prescription drugs that enhance GABA's ability to bind receptors and calm the body.

TAKEAWAY

Mental health is multi-faceted and depends on lifestyle choices, nutrition, activity, and stress levels. GABA is clearly involved in many aspects of our well-being, all of which are connected to the multifaceted functioning of our mental wellness.

GABA CAN IMPACT:



Irritability



Anxiety



Sleep



Mood



Memory



Pain



What is GABA?

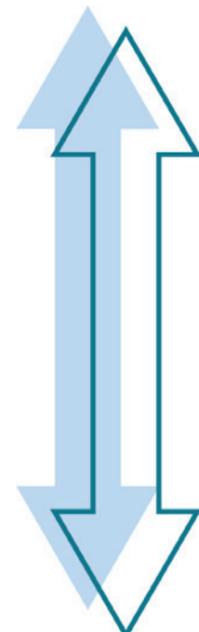
GABA is a major inhibitory neurotransmitter and functional metabolite with a fundamental role in signaling the nervous system. Studies suggest its main mechanism of action is to help slow the stimulation of certain nerve signals in the brain³.

This means it can prevent nerve cells (neurons) from firing and regulate how quickly neurons react, thereby providing a calming effect.



How does GABA work?

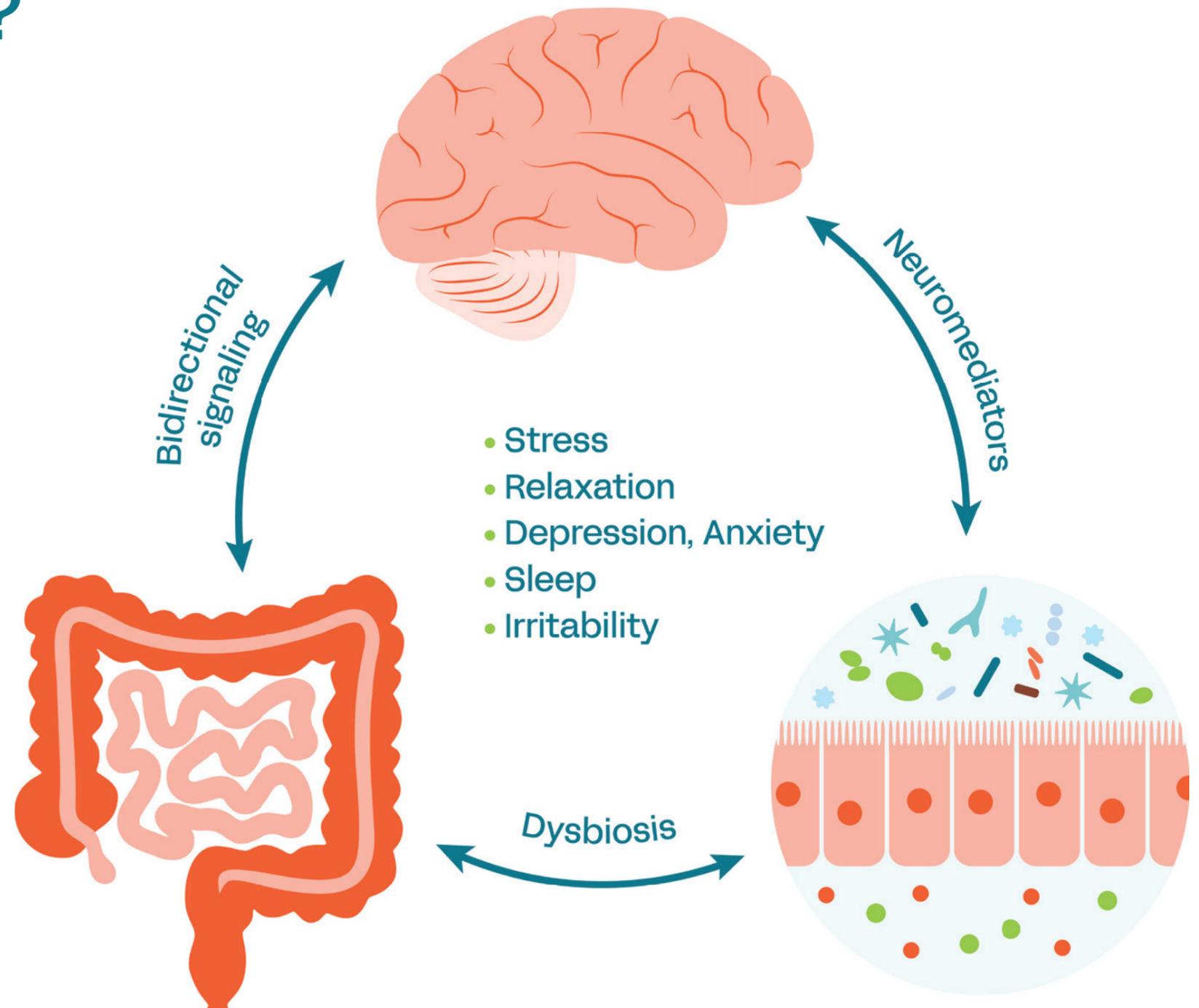
Think of GABA as part of a dimmer switch, turning down the stimulation of specific nerve signals in the brain.



When the dimmer switch is turned all the way up (the lights are too bright), nerve cells react too quickly, which results in the problems that occur when there is a GABA deficit or deficiency: mood and sleep disorders.

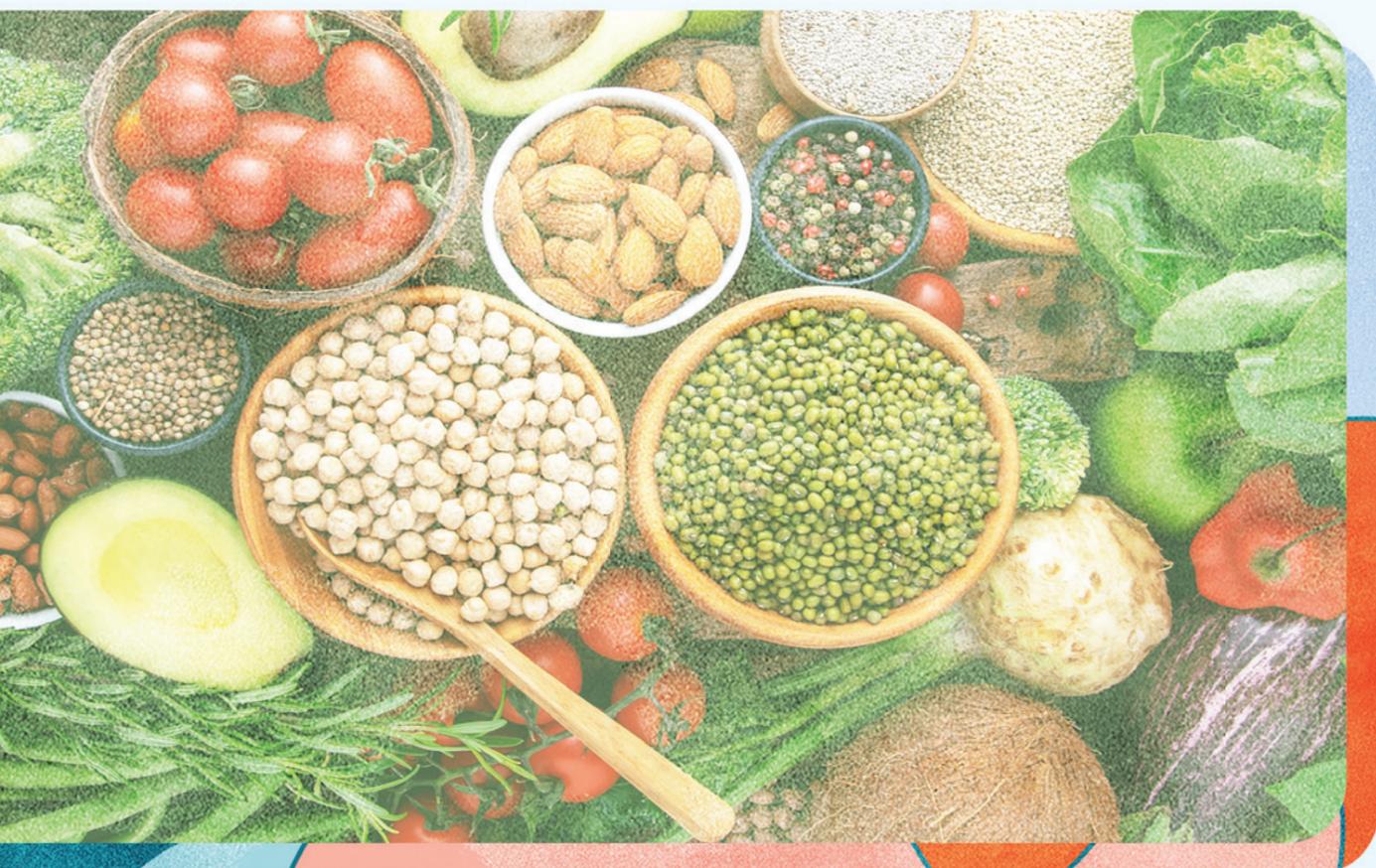
When the dimmer switch is set to the right level, GABA functions properly or is available in the right quantities, and nerve cells fire as they should, supporting mood and stress regulation.

GABA, an inhibitory neurotransmitter, helps regulate the nervous system and provides a calming effect. Sources of GABA include our body's cells, our diet, and certain microorganisms in the gut.



Where does GABA come from?

GABA is produced in the central nervous system by our own cells. It is also available in certain foods and beverages, such as vegetables, fruits, legumes, mushrooms, and tea ⁵.



Our bodies have an additional source of GABA: microbes in the gut produce this neurotransmitter. *Bifidobacterium*, *Bacteroides*, *Parabacterioides*, and *Escherichia* species are known for this ability ⁶. Their production of GABA could affect brain function and mood. One example of this is that GABA-producing microbes were reduced in depression ⁷.

Microbes in the gut not only produce GABA, but they have other ways of modulating this neurotransmitter. Studies indicate that gut microbes may also consume GABA ⁸, alter GABA levels via SCFAs ⁸, and modulate the expression of GABA receptors in the brain in mice ⁹. Research will likely continue to reveal more ways gut microbes can modulate GABA. For now, clearly, the relationship is significant and complex.

TAKEAWAY

GABA supports our mental wellness and comes from our bodies, our food, and our gut microbiome.

The microbes in the gut also have other ways of modulating GABA that are complex and actively under investigation.



Mental wellness and the gut-brain connection

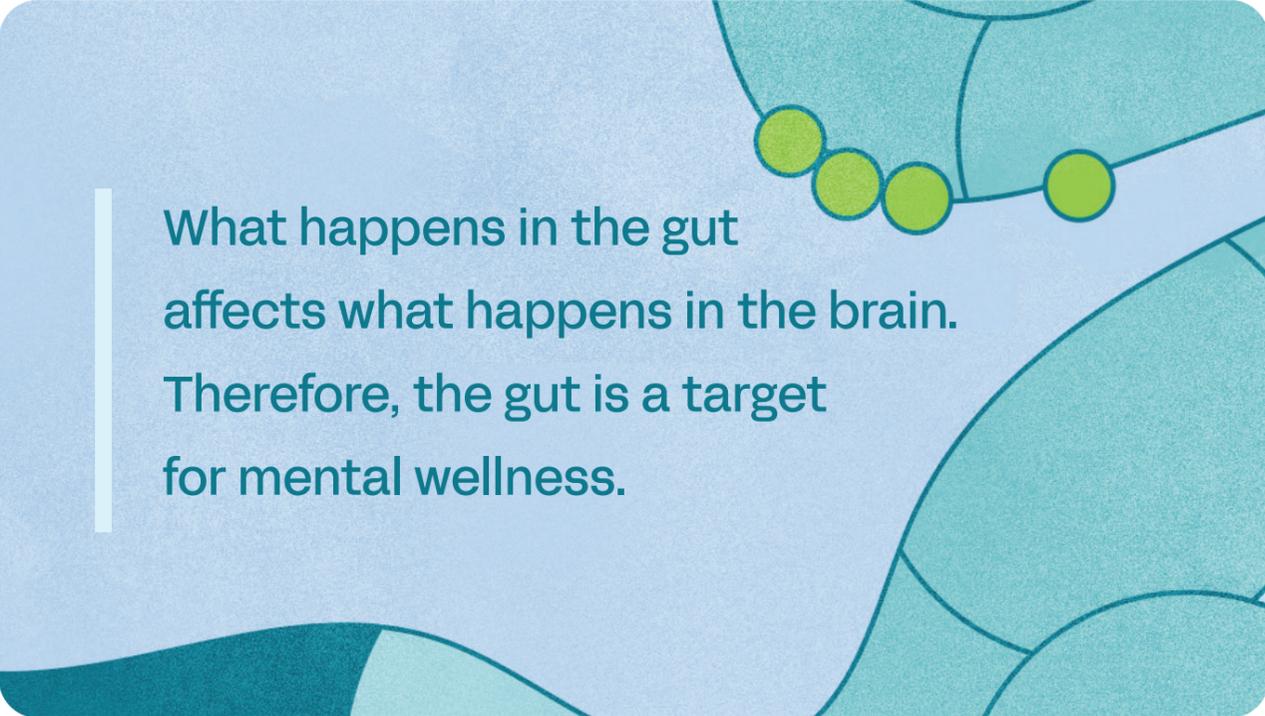
Microbes in the gut influence mental wellness through modulating GABA, but how does this communication from the gut to the brain occur?

The gut and the brain are able to influence one another and communicate through the gut-brain axis. In this bidirectional communication, the brain “talks” to the gut, and the gut “talks” to the brain.



TAKEAWAY

It's clear that mental wellness requires considering the health of the gut and its microbes.



What happens in the gut affects what happens in the brain. Therefore, the gut is a target for mental wellness.

This gut-brain axis involves our own cells communicating with one another and the microbes in the gut communicating along this axis. GABA-modulating gut microbes play a crucial role in this gut-brain axis communication and influence mental wellness.



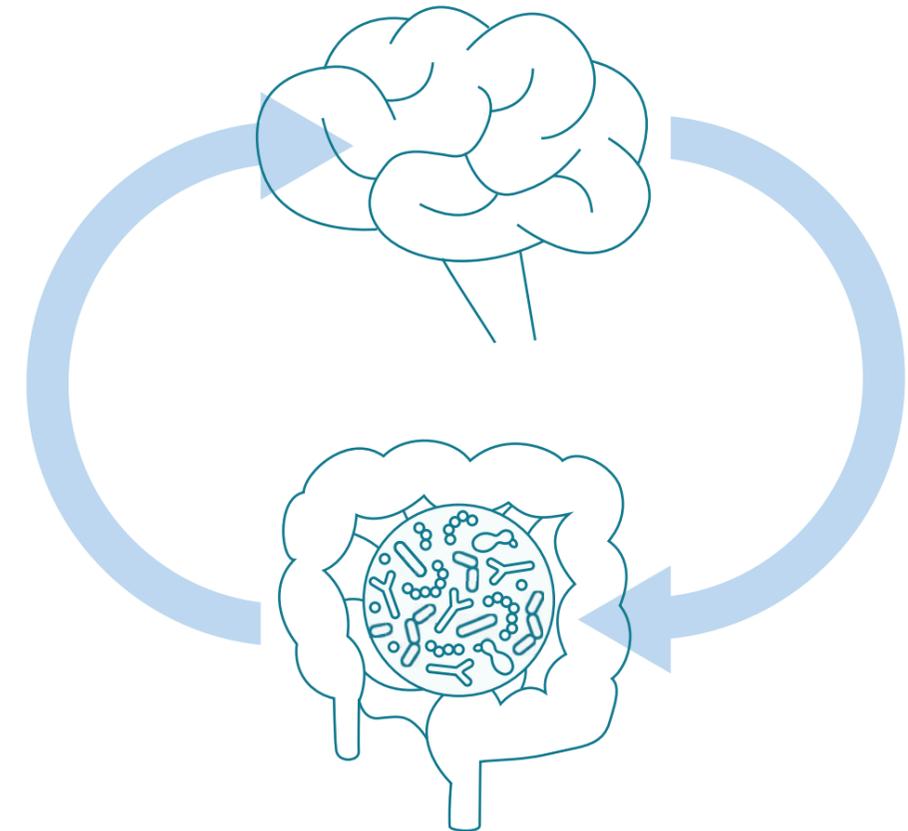
How microbes of the gut communicate with the brain

GABA produced by microbes in the gut has significant effects on the body. Studies suggest these effects are mediated through the vagus nerve and through crossing the blood-brain barrier.

Understanding exactly how the microbes of the gut communicate via the gut-brain axis, modulate GABA, and impact mental wellness is a research area of intense interest. This field is new, and the studies are still accumulating, but the evidence suggests GABA produced by microbes in the gut exerts its effects through:

1. Communication via the vagus nerve:
The gut and brain are physically linked by various channels for information exchange. One of those channels, the vagus nerve (aka vagal nerves as it consists of two nerves), mediates the signaling of neurotransmitters, including GABA ⁶.

2. Crossing the blood-brain barrier:
Our bodies have a strong gatekeeper to prevent the passage of potentially harmful substances called the blood-brain barrier. Even harmless substances cannot cross this barrier. However, there is evidence that GABA produced by gut microbes may reach the brain, possibly through transporters. How exactly this happens is still unclear at this point ⁸.



TAKEAWAY

Microbes in the gut may influence our mental wellness through their modulation of GABA. The exact mechanisms by which this occurs remain an active area of research.



Psychobiotics: Probiotics that affect the brain

Knowing the influence of GABA-modulating microbes begs the question: are there ways to harness their powerful effect through the gut-brain axis?

Pharmacological treatments for mental health issues often come with debilitating side effects. So, there is a need for effective nonpharmaceutical therapies to support mental health. One nonpharmaceutical therapy that consumers have recently become interested in is probiotics.

The ISAPP definition for probiotics is “live microorganisms which when administered in adequate amounts confer a health benefit on the host”¹⁰. And there are probiotics that affect the brain and have a positive impact on mental wellness. These are called psychobiotics.



Psychobiotics are probiotics that function across the gut-brain axis.

Of these psychobiotics, evidence suggests that some produce the neurotransmitter GABA¹¹. These organisms differ from those in the gut microbiome that produce GABA, discussed earlier, in that they are administered rather than already existing as a member of the gut microbiome. Due to their ability to confer a mental health benefit, they are promising interventions for improving mental wellness.

As with microbes living in the gut that produce GABA, it's unclear at this point how GABA produced by psychobiotics exerts its effects on the body and mental wellness, but research in this area is actively developing. The vagus nerve seems to be involved, at least in mice: when the vagus nerve was severed, psychobiotics administered lost their calming effects⁹. It is also possible GABA from psychobiotics crosses the blood-brain barrier; however, there is yet to be evidence supporting this with regard to probiotic bacteria that modulate GABA.

TAKEAWAY

Psychobiotics that produce GABA are promising nonpharmaceutical mental health therapies.



GABA Probiotic, LP815™ to support calming and relaxation*

GABA Probiotic, LP815™ provides GABA production over a sustained period of time for calming and stress modulation.

HOW DOES GABA PROBIOTIC WORK?

LP815™ delivers GABA while working with one's existing gut microbiota to produce additional GABA.

BENEFIT AREAS OF GABA PROBIOTIC, LP815™*

- Helps reduce feelings of irritability
- Promotes a calm mood
- Supports healthy stress management

*Human clinical studies are underway to support these claims.

Proprietary Strain LP815™

Lactiplantibacillus plantarum, LP815™, a proprietary strain of lactic acid bacteria, was isolated for its ability to provide GABA production.

By utilizing advanced computational modeling and high-throughput screening, we benchmarked against the top strains in the industry to select a superior psychobiotic GABA producer.



TAKEAWAY

The ability of LP815™ to produce GABA itself can be thought of as enabling a GABA factory in the gut.



Add Verb in your products

Partner with us to see how GABA Probiotic, LP815™ can expand your mental wellness dietary supplement product line.



Let's Talk



GABA Probiotic can be used in your mood, stress, sleep, and relaxation dietary supplements.

GABA Probiotic can be used in several different applications and health categories. For example: Gut/Brain Axis, Women's Health, Sports Nutrition and can be stacked with other biotics in a "bouquet" for a robust symbiotic offering (i.e. postbiotic + probiotic).

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microbiome innovation

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Sources

1. Mood and Mental Health Report. New Hope Network <https://store.newhope.com/products/mood-and-mental-health-report>.
2. Mar. Latest Federal Data Show That Young People Are More Likely Than Older Adults to Be Experiencing Symptoms of Anxiety or Depression. KFF <https://www.kff.org/mental-health/press-release/latest-federal-data-show-that-young-people-are-more-likely-than-older-adults-to-be-experiencing-symptoms-of-anxiety-or-depression/> (2023).
3. Jewett, B. E. & Sharma, S. *Physiology, GABA*. (StatPearls Publishing, 2023).
4. Hepsomali, P., Groeger, J. A., Nishihira, J. & Scholey, A. Effects of Oral Gamma-Aminobutyric Acid (GABA) Administration on Stress and Sleep in Humans: A Systematic Review. *Front. Neurosci.* 14, 923 (2020).
5. Hou, D. et al. Gamma-aminobutyric acid (GABA): a comprehensive review of dietary sources, enrichment technologies, processing effects, health benefits, and its applications. *Crit. Rev. Food Sci. Nutr.* 1–23 (2023).
6. Morais, L. H., Schreiber, H. L., 4th & Mazmanian, S. K. The gut microbiota-brain axis in behaviour and brain disorders. *Nat. Rev. Microbiol.* 19, 241–255 (2021).
7. Strandwitz, P. et al. GABA-modulating bacteria of the human gut microbiota. *Nat Microbiol* 4, 396–403 (2019).
8. Miri, S., Yeo, J., Abubaker, S. & Hammami, R. Neuromicrobiology, an emerging neurometabolic facet of the gut microbiome? *Front. Microbiol.* 14, 1098412 (2023).
9. Bravo, J. A. et al. Ingestion of *Lactobacillus* strain regulates emotional behavior and central GABA receptor expression in a mouse via the vagus nerve. *Proc. Natl. Acad. Sci. U. S. A.* 108, 16050–16055 (2011).
10. Hill, C. et al. Expert consensus document. The International Scientific Association for Probiotics and Prebiotics consensus statement on the scope and appropriate use of the term probiotic. *Nat. Rev. Gastroenterol. Hepatol.* 11, 506–514 (2014).
11. Tette, F.-M., Kwofie, S. K. & Wilson, M. D. Therapeutic Anti-Depressant Potential of Microbial GABA Produced by *Lactobacillus rhamnosus* Strains for GABAergic Signaling Restoration and Inhibition of Addiction-Induced HPA Axis Hyperactivity. *Curr. Issues Mol. Biol.* 44, 1434–1451 (2022).

