

# Could Fixing Your Gut Health Help Treat Your Depression?

A high-dose probiotic supplement led to significant improvements in mood among people with depression, highlighting the importance of gut health for optimal mental health.



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## STORY AT-A-GLANCE

- For the first time, a randomized controlled trial demonstrated that high-dose probiotic supplementation is beneficial for people with depression
- An improvement in mood was noted among all of the patients, but those in the probiotic group had significantly greater improvements, along with an increased abundance of beneficial *Lactobacillus* in their gut
- An increase in grey matter volume was also noted in the people taking probiotics, along with changes in brain activity
- Targeting the microbiota-gut-brain (MGB) axis, which plays a role in the physiological and behavioral functions that are often affected in depression, may be key to improving depression

Depression is among the most common mental health conditions in the U.S., with 21 million Americans — or 8.4% of adults — experiencing at least one major depressive episode in 2020.<sup>1</sup>

Antidepressant medications remain a first-line treatment for depression,<sup>2</sup> even though two-thirds of depressed patients don't respond well to them.<sup>3</sup>

In the U.S., a mental health crisis is underway, with so many people struggling with depression and/or anxiety that there aren't even enough practicing psychiatrists to handle it. To treat everyone affected, each of the 33,000 practicing psychiatrists in the U.S. would have to see approximately 3,000 patients a year, which simply isn't feasible.<sup>4</sup>

It's being increasingly recognized that more is needed to resolve this complex condition, including targeting the microbiota-gut-brain (MGB) axis, which plays a role in the physiological and behavioral functions that are often affected in depression. It's known, for instance that your gut microbiota impacts brain function and depressive behavior, while people with depression have been found to have altered gut microbiota composition.<sup>5</sup>

For the first time, a randomized controlled trial has also demonstrated that high-dose probiotic supplementation is beneficial for people with depression,<sup>6</sup> further highlighting the importance of tending to your gut for optimal mental health.

## **Probiotics Benefit People With Depression**

In a four-week study, 21 people receiving medical help for depression received probiotics along with antidepressants, while 26 received a placebo containing maltose along with an antidepressant. The probiotic supplement contained eight different strains, amounting to a high daily dose of 900 billion colony forming units (CFUs).

“As there is still no clear evidence which specific bacteria improve depressive symptoms,” they explained, “we decided to use a probiotic supplement that is

easily accessible in drug stores and, thus, easy to implement in clinical practice.”<sup>7</sup>

Stool samples, brain imaging and depression assessments were used to evaluate the patients before, during and after the probiotics or placebo. An improvement in mood was noted among all of the patients, but those in the probiotic group had significantly greater improvements, along with an increased abundance of beneficial *Lactobacillus* in their gut.<sup>8</sup>

Past studies have found that *Lactobacillus rhamnosus* supplementation during pregnancy and postpartum led to significantly lower scores for depression and anxiety in women during the postpartum period.<sup>9</sup>

*Lactobacillus* has also been found to produce the gamma aminobutyric acid (GABA) neurotransmitter, which inhibits excessive neuronal firing, helping to induce a natural state of calm<sup>10</sup> in animal studies,<sup>11</sup> while also reducing depression-related behavior.<sup>12</sup>

The featured study also revealed an increase in grey matter volume in the people taking probiotics, along with changes in brain activity. While people with depression tend to perceive photos of neutral faces as negative, those taking probiotics were more likely to view them as neutral.<sup>13</sup>

According to the study:<sup>14</sup>

*“Our data imply that an add-on probiotic treatment ameliorates depressive symptoms (HAM-D) along with changes in the gut microbiota and brain, which highlights the role of the MGB axis in MDD and emphasizes the potential of microbiota-related treatment approaches as accessible, pragmatic, and non-stigmatizing therapies in MDD.”*

## **How Beneficial Bacteria May Help Depression**

The study revealed several mechanisms by which beneficial bacteria may be useful for depression, including by altering gut microbiota with a favorable increase in *Lactobacillus*. Certain *Lactobacillus* strains have been found to

produce short-chain fatty acids, including acetate, butyrate and propionate, which benefit health and play a role in building the gut barrier, making it less permeable to disease-causing microorganisms.<sup>15</sup>

Increased levels of Lactobacillus may also reduce anxiety symptoms.<sup>16</sup>

Considering their findings that the probiotics helped to shift the emotional reaction to neutral faces, the researchers also suggested that probiotics “modify the negativity bias in emotional face processing and meet the main requirement of a successful treatment in depression defined by altering negative affective biases.”<sup>17</sup>

The primary information highway between your gut and your brain is your vagus nerve, which connects the two organs. Your gut also communicates with your brain via the endocrine system in the stress pathway (the hypothalamus, pituitary and adrenal axis) and by producing mood-boosting neurotransmitters like serotonin, dopamine and GABA,<sup>18</sup> helping to explain why your gut health has such a significant impact on your mental health.

## **Junk Food Linked to Depression in Children and Teens**

The other major clue of the importance of your gut health to your mental health is the powerful role that food plays in depression. Adolescents who eat a lot of processed foods high in salt and low in potassium, such as fast foods, are more likely to have symptoms of depression.<sup>19</sup>

It’s possible that eating foods high in sodium and low in potassium may lead to depression by negatively influencing neurotransmitters and neural function during a time that is particularly vulnerable.

“Given the substantial brain development that occurs during adolescence, individuals in this developmental period may be particularly vulnerable to the effects of diet on the neural mechanisms underlying emotion regulation and depression,” researchers with the University of Alabama at Birmingham wrote.

In addition, poor diet could influence depression by disturbing the gut microbiome, which could further influence brain function.<sup>20</sup>

Past studies have also confirmed the diet-depression link among children and teens. When researchers systematically reviewed 12 studies involving children and adolescents, an association was revealed between unhealthy diet and poorer mental health, as well as between a good-quality diet and better mental health.<sup>21</sup>

The consumption of junk food has also been associated with psychiatric distress and violent behaviors in children and adolescents, which includes worry, depression, confusion, insomnia, anxiety, aggression and worthless feelings, as well as physical fighting, being a victim and bullying.<sup>22</sup>

## **Your Eating Habits Play a Role in Depression**

Adults, too, are more likely to be depressed if they eat an unhealthy diet. Research found seniors who followed the DASH diet, which is low in sugar and high in fresh fruits and vegetables, were 11% less likely to develop depression over the following six years, whereas those following a standard Western diet had the highest rates of depression.<sup>23</sup>

In 2018, a systematic review and meta-analysis with a total of 101,950 participants also found an association between a proinflammatory diet and risk of depression.<sup>24</sup>

People who ate a proinflammatory diet were 1.4 times more likely to suffer from depression.<sup>25</sup>

“Thus, adopting an anti-inflammatory diet may be an effective intervention or preventative means of reducing depression risk and symptoms,” according to the study.<sup>26</sup>

Sugar intake, a known inflammatory food, is also specifically linked to common mental disorders and depression. Research published in 2002 also found a “highly significant correlation between sugar consumption and the annual rate of depression.”<sup>27</sup>

Meanwhile, if your diet is focused on ultraprocessed foods, it's likely lacking in nutrients that are essential for mental health, including vitamin B12.

Researchers from Ordu University in Turkey revealed that low vitamin B12 and vitamin D levels, along with increased homocysteine, may play a role in depression among children and adolescents.<sup>28</sup>

In their study of 89 children and adolescents with depression, along with 43 subjects without depression to serve as controls, 11.23% of those with depression also had low levels of folate. Both vitamin B12 and folate have previously been described as antidepressant nutrients.<sup>29</sup>

Folate, found in dark leafy greens like spinach, avocados and other fresh vegetables, is involved in your body's production of mood-regulating neurotransmitters. In one study, people who consumed the most folate had a lower risk of depression than those who ate the least.<sup>30</sup>

It's widely known that people with a vitamin B12 deficiency are at an increased risk of depression,<sup>31</sup> which could be, in part, due to resulting alterations in the level of DNA methylation in the brain, leading to neurologic impairment.<sup>32</sup>

Vitamin B12 also helps regulate homocysteine levels, and increased homocysteine is linked to B12 deficiency as well as depression. In one study, older adults with low levels of vitamin B12 had a 51% increased risk of developing depression.<sup>33</sup>

## **Eating Healthy Reduces Depression**

While junk foods can mess with your mood, eating healthy whole foods can boost it. Researchers from Macquarie University, Australia, studied 76 students between the ages of 17 and 35 who followed a poor diet and had moderate to high levels of depression symptoms.<sup>34 35</sup>

One group of participants was asked to improve their diet by cutting back on refined carbohydrates, sugar, processed meats and soft drinks, while eating

more vegetables, fruits, dairy products, nuts seeds, healthy fats and anti-inflammatory spices such as turmeric and cinnamon.<sup>36</sup>

After only three weeks of healthier eating, those in the healthy diet group had significant improvements in mood and their depression scores went into the normal range. Likewise, the researchers noted, “Several systematic reviews and meta-analyses show a relationship between diet quality and depression.

A meta-analysis showed that healthy diet regardless of pattern (e.g. Mediterranean, vegetarian, Tuscan) was linearly associated with reduced incidence of depression.”<sup>37</sup>

Fermented foods, which are naturally rich in probiotics, should also be consumed regularly to support gut health and corresponding mental health. In addition, researchers compiled a list of five key dietary recommendations for the prevention of depression, based on current published evidence. The basic premise is to eat real food. The five strategies include:<sup>38</sup>

1. Follow “traditional” dietary patterns
2. Increase consumption of fruits, vegetables, nuts and seeds
3. Eat lots of foods rich in omega-3 fats
4. Replace unhealthy foods with wholesome nutritious foods
5. Limit your intake of processed foods, fast foods, commercial bakery goods and sweets

## **Consider Magnesium Deficiency if You’re Depressed**

Approximately 50% of American adults are not getting the estimated average requirement for magnesium (around 400 milligrams a day).<sup>39</sup>

Subclinical magnesium deficiency is common and leads to numerous mental health issues, while symptoms of magnesium deficiency may include depression, confusion and agitation.<sup>40</sup> Individuals with depression are also

known to have lower magnesium levels in the blood,<sup>41</sup> brain<sup>42</sup> and cerebral spinal fluid.<sup>43</sup>

Only magnesium L-threonate, as opposed to magnesium chloride or magnesium gluconate, increases cerebrospinal fluid magnesium levels and improves cognition in animal models,<sup>44</sup> while a randomized equivalent trial found that oral magnesium supplementation was just as effective as an antidepressant for improving mood.<sup>45</sup>

This suggests that boosting magnesium levels, particularly with the use of magnesium L-threonate, may therefore have profound benefits on mood. In addition to tending to your gut health via a healthy, whole foods diet rich in fermented foods — and possibly a probiotic supplement — people with depression may also want to consider supplementing with magnesium L-threonate — in an amount of 150 to 200 mg per day.

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