

Can Probiotics Ease Major Depressive Disorder?

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✓ Fact Checked

July 20, 2023

STORY AT-A-GLANCE

- › Research published in JAMA Psychiatry adds more support to the importance of probiotics for mental health
- › The study found supplementing with probiotics led to greater improvements in symptoms of depression compared to placebo, along with relieving anxiety symptoms as well
- › While depression symptoms improved in both groups, by week four there was a greater improvement among the probiotics group
- › Bacterial imbalances in the gut have been found in people with mental health conditions, which in turn have been linked to several biomarkers of depression, such as increases in cortisol and proinflammatory cytokines and lower levels of brain-derived neurotrophic factor (BDNF)
- › Eating a diet rich in fermented foods helps relieve stress, which is also linked to depression

Research published in JAMA Psychiatry¹ adds more support to the importance of probiotics for mental health. The study, by researchers with the Institute of Psychiatry, Psychology & Neuroscience (IoPPN) at King's College London, found supplementing with probiotics led to greater improvements in symptoms of depression compared to placebo, along with relieving anxiety symptoms as well.²

The beneficial results were achieved after just eight weeks of daily supplementation, showing the microbiota-gut-brain axis remains an important target in depression. As it stands, about 60% of people with major depressive disorder (MDD) don't respond to first-line treatments like antidepressants, while one-third still experience symptoms even with treatment.³

By supporting gut health with beneficial bacteria, more people with depression may be able to find effective, natural relief.

Probiotics Relieve Depression Symptoms

The study involved 50 patients with major depressive disorder who were taking an antidepressant. They were randomly assigned to take either four capsules daily of probiotic or a placebo. The probiotics contained 14 different strains that had previously shown antidepressant effects:⁴

Bacillus subtilis	Bifidobacterium bifidum
Bifidobacterium breve	Bifidobacterium infantis
Bifidobacterium longum	Lactobacillus acidophilus
Lactobacillus delbrueckii subsp bulgaricus	Lactobacillus casei
Lactobacillus plantarum	Lactobacillus rhamnosus
Lactobacillus helveticus	Lactobacillus salivarius
Lactococcus lactis	Streptococcus thermophilus

While depression symptoms improved in both groups, by week four there was a greater improvement among the probiotics group. "It has been suggested that probiotics may be beneficial as adjunctive treatment as they may help alleviate presentations that

antidepressants are less effective against (e.g., anxious, somatic)," the researchers wrote.⁵

They added that the improvements to anxiety – a symptom often experienced by those with depression, were particularly noteworthy:⁶

"In addition to the greater effects on clinician-rated anxiety, our exploratory analyses suggested that anxious-somatic symptoms may have been particularly improved by the probiotic. If confirmed in larger trials, these findings could provide an indication of which patients may benefit most from probiotic treatment."

In addition to being effective for symptom relief, the probiotic was well tolerated with no serious adverse reactions reported. Study author James Stone, who is now with Brighton and Sussex Medical School, told Medical Xpress:⁷

"Non- or partial response to antidepressants is a huge problem and this study is an important first step in exploring the therapeutic potential of probiotics as a treatment for depression."

"We found that probiotics were an acceptable and tolerable supplement in people already taking antidepressant medications. This now paves the way for studies looking at whether we see these beneficial effects of probiotics on depression and anxiety in larger populations of patients."

Meta-Analysis Shows Probiotics Work for Depression

Previously, the team conducted a review and meta-analysis involving seven studies to examine the use of probiotics for the treatment of clinical depression. They found probiotics effectively relieved depressive symptoms when given along with antidepressants, noting, "Potential mechanisms of action may be via increases in brain-derived neurotrophic factor (BDNF) and decreases in C-reactive protein (CRP)."⁸

Bacterial imbalances in the gut – known as gut dysbiosis – have been found in people with mental health conditions, which in turn have been linked to several biomarkers of depression, such as increases in cortisol and proinflammatory cytokines and lower levels of brain-derived neurotrophic factor (BDNF).⁹ According to the team:¹⁰

"Our updated analysis demonstrates that probiotics are effective in reducing depressive symptoms when administered in addition to antidepressants ... The evidence summarized here supports the clinical use of probiotics in depressed populations and provides an insight into the mode of administration more likely to yield antidepressant effects."

Is High-Dose Probiotic Supplementation the Answer?

As for the best dose of probiotics for mental health, the researchers noted, "In terms of optimal probiotic supplement content and dosage, there is little consensus at present."¹¹ However, a separate randomized controlled trial demonstrated that high-dose probiotic supplementation is beneficial for people with depression.

In a four-week study published in *Translational Psychiatry*,¹² 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). For comparison, the *JAMA Psychiatry* study used a probiotic with 8 billion colony-forming units per day.¹³

"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."¹⁴

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.¹⁵

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.¹⁶ *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,¹⁷ in animal studies,¹⁸ while also reducing depression-related behavior.¹⁹

It's likely that some of probiotics' antidepressant effects are related to increases in *Lactobacillus* strains. The team explained:²⁰

"The antidepressant effect of the probiotics could be related to the abundance increase of these species, which is congruent with previous reports. For instance, the Lactobacillus genus can produce GABA in mouse studies, and it has been shown to reduce stress-induced corticosterone and anxiety- and depression-related behavior. Indeed, the increase of the genus was associated with reduced depressive symptoms ..."

The potential of species of the Lactobacillus genus as add-on therapy has been demonstrated in different works by its capacity to enhance the integrity of the intestinal barrier, improve immune tolerance, reduce the bacteria translocation and bring beneficial effects on anxiety and depression-related behaviors.

Strains of the Lactobacillus genus are able to produce short-chain fatty acids (SCFA) such as acetate, butyrate, and propionate, which play an important role in maintaining host health and exert beneficial effects without inducing remodeling of the gut microbiome."

Do Probiotics Influence the Brain?

The Translational Psychiatry 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.²¹ According to the study:²²

"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."

Another study involving adults diagnosed with irritable bowel syndrome (IBS) and depression found the probiotic *Bifidobacterium longum* provided depression relief. At six weeks, 64% of the treatment group had reduced depression scores compared to 32% of the control group that received a placebo.^{23,24}

Those receiving the probiotic also reported fewer symptoms of IBS and improved overall quality of life. At the end of 10 weeks, approximately twice as many in the treatment group were still reporting lower levels of depression.

Interestingly, functional MRI scans revealed a link between reductions in depression score and actual changes in brain activity, specifically in areas involved in mood regulation, such as the amygdala. As noted by Dr. Roger McIntyre, professor of psychiatry and pharmacology at the University of Toronto, who was not involved in the study:²⁵

"We know that one part of the brain, the amygdala, tends to be red-hot in people with depression, and it seemed to cool down with this intervention. It provides more scientific believability that something in the brain, at a very biological level, seems to be affected by this probiotic."

Fermented Foods Help Relieve Stress

Long-term stress can play a role in depression, so strategies that relieve stress are important. Fermented foods, which also boost gut health, are among them. Your daily dietary patterns influence the microbes in your gut,²⁶ so researchers with APC

Microbiome Ireland at University College Cork (UCC) investigated the influence of a psychobiotic diet on the microbial profile and mental health of 45 adults.²⁷

Participants were randomized to eat either a psychobiotic diet or a control diet for four weeks. The psychobiotic diet included fruits and vegetables high in prebiotic fiber, including onions, leeks, cabbage, apples and bananas, along with fermented foods, such as sauerkraut and kefir.²⁸

After four weeks, those following the psychobiotic diet had a reduction in perceived stress. Those who followed the psychobiotic diet the most had the greatest decreases in stress. Further, significant changes were found in 40 different chemicals, along with subtle changes in microbial makeup. Professor John Cryan, one of the study's lead authors, said in a UCC news release:²⁹

"Although the microbiome has been linked to stress and behavior previously, it was unclear if by feeding these microbes demonstratable effects could be seen. Our study provides one of the first data in the interaction between diet, microbiota and feelings of stress and mood.

Using microbiota targeted diets to positively modulate gut-brain communication holds possibilities for the reduction of stress and stress-associated disorders, but additional research is warranted to investigate underlying mechanisms."

Try Vitamin B12, Other Nutrient Deficiencies for Depression

In addition to probiotics, other dietary factors and nutrient deficiencies may also play a role in mental health. A study published in the British Journal of Nutrition, for instance, found an association between vitamin B12 deficiency and the incidence of depression in older people living in the community.³⁰

Older adults with low vitamin B12 levels had a 51% increased risk of developing depression during the study.³¹ Low levels of vitamin B12 may result from poor diet, or poor absorption related to lower levels of pepsin secretion that releases vitamin B12

from food. Other nutrient deficiencies associated with depression include vitamin D³² and omega-3 fats.³³

Individuals with depression are also known to have lower magnesium levels in the blood,³⁴ brain³⁵ and cerebral spinal fluid.³⁶ Only magnesium L-threonate, as opposed to magnesium chloride or magnesium gluconate, increases cerebrospinal fluid magnesium levels in animal models.³⁷

So, 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 optimizing their vitamin D levels, consuming more omega-3 fats and supplementing with magnesium L-threonate.

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