

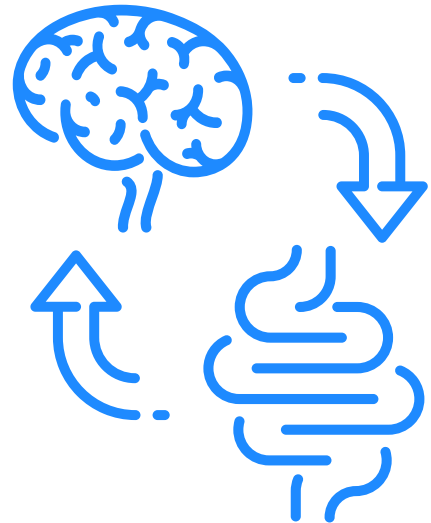
NUTRITION BASICS *for* MENTAL HEALTH

IN PARTNERSHIP WITH UK COLLEGE OF MEDICINE

THE GUT BRAIN AXIS

The gut-brain axis refers to the bidirectional communication between the central and enteric nervous systems, linking emotional and cognitive centers of the brain with peripheral intestinal functions. This interaction is facilitated by the vagus nerve, microbial metabolites, and the immune system, influencing mood, stress response, and overall mental health. Key points include:

- **Neurotransmitter production:** The gut microbiota produces neurotransmitters like serotonin and dopamine, which affect mood and cognitive function. About 90% of the body's serotonin is produced in the gut, which significantly impacts mood regulation.
- **Inflammation regulation:** A healthy gut microbiota helps regulate inflammation, which is linked to mental health disorders. Chronic inflammation is associated with conditions such as depression and anxiety, highlighting the importance of maintaining gut health.
- **Immune function:** The gut plays a significant role in the immune system, influencing brain health and mental well-being. A large proportion of the body's immune cells are located in the gut, where they interact with gut microbiota to maintain homeostasis and protect against pathogens.
- **Vagus Nerve Communication:** The vagus nerve serves as the primary route for gut-brain communication. It transmits signals from the gut to the brain, affecting mood and stress levels. Stimulation of the vagus nerve has been shown to alleviate symptoms of depression and anxiety, indicating its critical role in mental health.



Appleton J. (2018). *The Gut-Brain Axis: Influence of Microbiota on Mood and Mental Health. Integrative medicine (Encinitas, Calif.)*, 17(4), 28–32.

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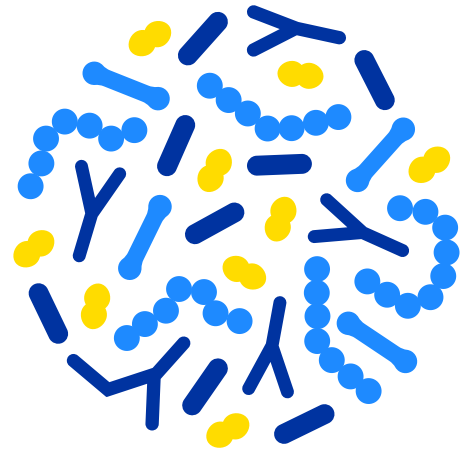
ROLE OF GUT MICROBIOTA

Gut microbiota are the trillions of microorganisms living in the intestines, crucial for digestion, immunity, and mental health.

They:

- **Produce short-chain fatty acids (SCFAs):** These have anti-inflammatory properties and play a role in maintaining the integrity of the gut barrier, preventing harmful substances from entering the bloodstream.
- **Modulate stress response:** Imbalance in gut microbiota (dysbiosis) can lead to increased stress and anxiety. Studies have shown that certain probiotics can reduce cortisol levels, a key stress hormone, and improve stress-related symptoms.
- **Synthesize Vitamins and Neurotransmitters:** Gut bacteria produce essential vitamins, such as B vitamins and vitamin K, which are important for brain health. They also synthesize neurotransmitters like GABA, which has a calming effect on the brain and can help reduce anxiety.
- **Influence Appetite and Eating Behaviors:** Gut microbiota affect the production of hormones that regulate appetite, such as ghrelin and leptin. Dysbiosis can lead to disruptions in these hormones, contributing to overeating or loss of appetite, which can affect mental health.
- **Impact Cognitive Function:** Emerging research suggests that gut microbiota may influence cognitive processes, including memory and learning. This is thought to occur through the modulation of neuroinflammation and the production of neuroactive compounds.

**Gut microbiota make up
1-3% of body weight**



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BEYOND THE GUT

While the microbiome and gut-brain axis play crucial roles in mental health, there are several other ways our diet can influence our mental well-being. Here are some key aspects to consider:

- **Nutrient Deficiencies:** Nutrient deficiencies can have significant impacts on mental health. Vitamins and minerals are essential for brain function and emotional regulation. Deficiencies in nutrients like vitamin D, B vitamins (especially B6, B12, and folate), iron, magnesium, and zinc have been linked to mood disorders and cognitive decline.
- **Blood Sugar Balance:** Fluctuations in blood sugar levels can affect mood and energy levels. Diets high in refined sugars and simple carbohydrates can lead to rapid spikes and crashes in blood sugar, which can cause irritability, anxiety, and fatigue.
- **Omega-3 Fatty Acids:** These fats, found in fatty fish (like salmon and mackerel), flaxseeds, chia seeds, and walnuts, are crucial for brain health. These essential fats help build cell membranes in the brain and have anti-inflammatory properties. Studies have shown that omega-3s can help reduce symptoms of depression and anxiety.
- **Amino Acids:** Amino acids, the building blocks of protein, are vital for neurotransmitter production. Neurotransmitters like serotonin, dopamine, and norepinephrine play key roles in mood regulation.
- **Hydration:** Staying hydrated is essential for overall health, including mental health. Dehydration can lead to impaired cognitive function, mood swings, and increased stress levels.



Firth, J., Gangwisch, J. E., Borisini, A., Wootton, R. E., & Mayer, E. A. (2020). Food and mood: how do diet and nutrition affect mental wellbeing?. *BMJ (Clinical research ed.)*, 369, m2382.

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DIETARY INTERVENTIONS FOR MENTAL HEALTH

INCREASE FIBER INTAKE

Prebiotic fiber helps promote beneficial bacteria and the production of SCFAs. Aim for at least 25-30 grams of fiber per day from diverse sources including fruits, vegetables, whole grains, and legumes.

INCLUDE PROBIOTICS

Foods like yogurt, kefir, and fermented vegetables can help promote the growth of beneficial bacteria and inhibit the development of harmful ones. Consider probiotic supplements if dietary sources are insufficient.

LIMIT PROCESSED FOODS

A diet high in processed foods, sugars, and unhealthy fats is associated with decreased microbial diversity and negative mental health effects. This diet can lead to increased inflammation, insulin resistance, and oxidative stress, which negatively impact mental health.

INCLUDE POLYPHENOL-RICH FOODS

Foods like berries, tea, coffee, and dark chocolate are rich in polyphenols, which have prebiotic properties and can enhance gut microbiota diversity. Polyphenols also have neuroprotective effects and can improve cognitive function and mood.

FOCUS ON HYDRATION

Adequate water intake is essential for maintaining gut health and supporting the digestive process. Aim for at least 8 cups of water daily.

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BANANA NUT MUFFINS

MAKES 12 SERVINGS

INGREDIENTS

- 2 ripe bananas, mashed
- 1 cup Greek yogurt
- ⅓ cup honey or maple syrup
- 2 large eggs
- 1 tsp vanilla extract
- 1½ cups whole wheat flour
- 1 tsp baking soda
- 1 tsp baking powder
- ½ tsp salt
- ½ tsp cinnamon
- ½ cup chopped walnuts



INSTRUCTIONS

1. Preheat oven to 350°F.
2. Line a muffin tin with paper liners or grease with cooking spray.
3. In a large bowl, mix mashed bananas, Greek yogurt, honey (or maple syrup), eggs, and vanilla extract until well combined.
4. In another bowl, whisk together flour, baking soda, baking powder, salt, and cinnamon.
5. Gradually add dry ingredients to the wet mixture, stirring until just combined.
6. Fold in chopped walnuts.
7. Divide the batter evenly among the muffin cups.
8. Bake for 18-20 minutes or until a toothpick inserted into the center comes out clean.
9. Allow muffins to cool in the tin for 5 minutes, then transfer to a wire rack to cool completely.

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NUTRITION INFORMATION

Banana Nut Muffins with Greek yogurt are not just delicious but also packed with ingredients that support mental health.

BRAIN FRIENDLY INGREDIENTS

Bananas are rich in vitamin B6, which aids in the synthesis of neurotransmitters like serotonin and dopamine, crucial for mood regulation. Additionally, they are high in potassium, which supports nerve function and muscle contraction, helping to reduce stress and anxiety. Walnuts are a significant source of omega-3 fatty acids, which are essential for brain health and known to reduce symptoms of depression and anxiety. They also contain antioxidants that protect the brain from oxidative stress. Lastly, cinnamon helps regulate blood sugar levels, assisting in the prevention of mood swings, and its anti-inflammatory properties contribute to overall brain health.

GUT FRIENDLY

Greek yogurt, another key ingredient, contains probiotics that promote gut health. These muffins also use whole wheat flour, which is high in prebiotic rich fiber that provides nourishment for beneficial bacterial to flourish.

CHECK THE LABEL

Nutrition Facts	
12 servings per container	
Serving size	1 Muffin
Amount Per Serving	
Calories	160
% Daily Value*	
Total Fat 6g	8%
Saturated Fat 1g	5%
Trans Fat 0g	
Cholesterol 35mg	12%
Sodium 130mg	6%
Total Carbohydrate 25g	9%
Dietary Fiber 3g	11%
Total Sugars 9g	
Includes 4g Added Sugars	8%
Protein 5g	10%
Vitamin D 0.4mcg	2%
Calcium 52mg	4%
Iron 1.08mg	6%
Potassium 282mg	6%
<small>*The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.</small>	