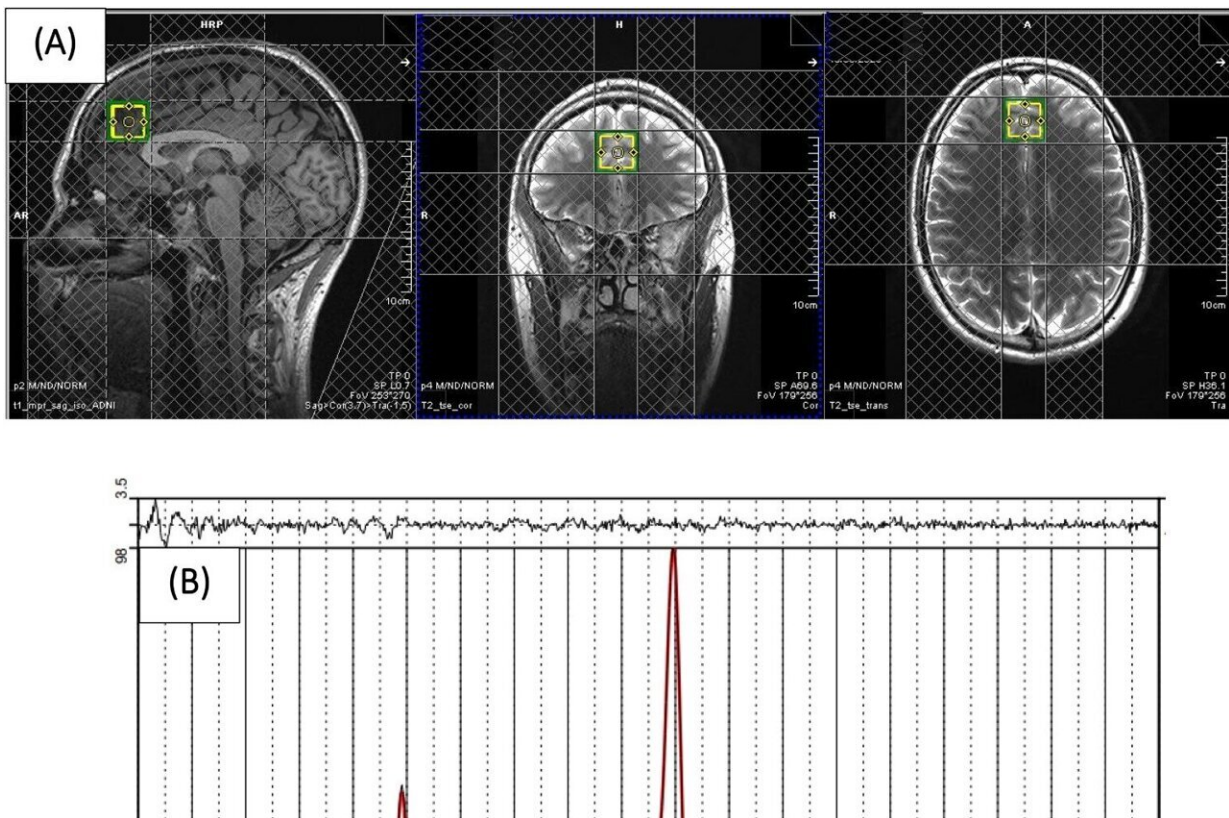


Researchers find a poor quality diet may lead to brain changes associated with depression and anxiety

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(A) Example of 1H-MRS voxel placement in the mPFC (sagittal, coronal, and axial orientations) (B) ^1H -MRS spectrum obtained from the voxel in A (black line) and the overlay of the spectral fit (red line). Credit: *Nutritional Neuroscience* (2024). DOI: 10.1080/1028415X.2024.2355603

A first-of-its-kind study into brain chemistry and structure and diet quality of 30 volunteers shows that eating a poor quality diet might lead to brain changes that are associated with depression and anxiety.

Brain scans show changes in neurotransmitters and gray matter volume in people who have a poor diet, versus those who adhere to a Mediterranean style diet, which is considered very healthy. The researchers also found that these changes are associated with rumination, a part of the diagnostic criteria for conditions affecting mental health, such as depression and anxiety.

This research was carried out by the University of Reading, Roehampton University, FrieslandCampina (Netherlands), and Kings College London, and is [published](#) in *Nutritional Neuroscience*.

When someone eats a poor quality diet, there is reduced gamma aminobutyric acid (GABA) and elevated glutamate—both neurotransmitters, along with reduced gray matter volume—in the frontal area of their brain. This could explain the association between what we eat, and how we feel.

Dr. Piri Hepsomali, University of Reading, said, "We can eat ourselves well! Ultimately, we see that people who have an unhealthy diet—high in sugar and saturated fat—have imbalanced excitatory and inhibitory neurotransmission, as well as reduced volume of gray matter in the frontal part of the brain. This part of the brain is involved in [mental health issues](#) such as depression and anxiety."

The exact reason that diet affects the brain in this way is still under investigation. It's possible that obesity and dietary patterns that are high in saturated fats cause changes in glutamate and GABA metabolism and neurotransmission, as has been shown in animal studies.

Distinct alterations of the gut microbiome, due to [dietary patterns](#) that are high in saturated fats, is thought to have an impact on cell machinery that drives both GABA and glutamate production.

A high saturated fat, high sugar, diet has also been shown to reduce the number of parvalbumin interneurons, which perform the role of delivering GABA to where it is needed.

Unhealthy diets also have an impact on glucose, making [blood glucose](#) and insulin higher. This increases glutamate in the brain and plasma, thus reducing GABA production and release. Having a diet high in fat and cholesterol can cause changes in cell membranes that alter the release of neurotransmitters, too.

These changes in [brain chemistry](#) might lead to changes in the brain gray matter volume, as observed in this study.

Dr. Hepsomali continued, "I would like to note that GABA and glutamate are intimately involved in appetite and [food intake](#), too. Reduced GABA and/or increased glutamate might also be a driving factor in making unhealthy food choices. So, there may be a circular relationship between eating well, having a healthier brain and better mental well-being, and making better food choices to eat well."

More information: Piril Hepsomali et al, Adherence to unhealthy diets is associated with altered frontal gamma-aminobutyric acid and glutamate concentrations and grey matter volume: preliminary findings, *Nutritional Neuroscience* (2024). [DOI: 10.1080/1028415X.2024.2355603](https://doi.org/10.1080/1028415X.2024.2355603)

Provided by University of Reading

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