

Diet: A Method to Maintain Neurotransmitter Stability Void of Pharmaceuticals

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ABSTRACT

Mental health in America has been exacerbating as the country is forming what is known as the "American Mental Health Crisis." During this dreadful period, it is pivotal to develop a sustainable and methodical form of treatment that causes less dependency on pharmaceuticals such as antidepressants and mood stabilizers and even prevents Americans from entertaining an addiction while self-medicating with controlled substances and narcotics such as marijuana, amphetamines and opioids (which are being consumed at an alarmingly expanding rate). One solution being proposed to maintain neurotransmitter stability is dietary discipline, as Depression and Anxiety, along with many other mental illnesses, are attributable to imbalances in neurotransmitters such as serotonin, norepinephrine, and GABA. Even though many people rush to use medications to control this neurotransmitter secretion, a biomedical approach is not suitable for everyone. Since food assists in releasing specific neurotransmitters, where foods either directly contain these neurotransmitters or guide the brain to secrete them, It is suggested to develop a diet that contains a high amount of neurotransmitters to help treat mental disorders such as Depression and Anxiety without medication. This paper aims to assemble the best combination of foods to create an optimal diet for treating mental disorders like Depression and Anxiety.

Introduction

Food is a fundamental requirement for almost all living organisms. It not only nourishes them but also plays a significant role in shaping specific cultures around the world. Food plays a crucial role in influencing our emotions by affecting the synthesis and release of neurotransmitters in the brain. Depression, an example of the many mental disorders caused by neurotransmitter imbalance, is caused by a deficiency in serotonin and norepinephrine. Although there are many different treatments for Depression, some ignore the biological origin of mental disorders, such as psychotherapy, while other treatments utilizing medication aim to control the amount of neurotransmitters being secreted. While many people rush to use medications to control neurotransmitter secretion, it is essential to note that a biomedical approach is not suitable for everyone. This is due to growing medication dependency and the fact that medication may not work for specific individuals. This poses the question: What is the diet that is most optimal for the synthesis and secretion of certain neurotransmitters like serotonin or norepinephrine to help treat people with mental disorders such as Depression and Anxiety? Depression and Anxiety are two of the most prevalent mental disorders affecting millions of people worldwide. Therefore, almost every country strives to develop effective pharmaceuticals and therapy methods to address these conditions, as they can significantly impair their citizens' ability to thrive.

Preventing mental disorders in individuals with a high genetic predisposition by consuming sufficient neurotransmitters can help prevent mental wear, overbearing negative thoughts, or, in severe cases, suicide. According to researchers from Société Francophone de Nutrithérapie et de Nutrigénétique Appliquée in Villeurbanne, France, "Most NTs, including dopamine (DA), gamma-aminobutyric acid (GABA), serotonin, and endocannabinoids, are synthesized within the gut and in the brain. About 95% of the body's serotonin comes

from the gut, where it behaves both as a paracrine messenger and as an NT [5,6]" (Gasmi et al., 2022). Serotonin is a major neurotransmitter that is associated with Depression and assists in processes such as mood, sleep, digestion, and sexual desire. Since most serotonin is produced in the gut from food, consuming serotonin-rich foods and maintaining robust microfloral health may be the best way to promote serotonin synthesis. Gut health can be improved by avoiding food high in trans and saturated fat, such as fast food, pizza, and processed foods like chips. Due to foods high in harmful fats depleting serotonin levels, individuals with Depression or a predisposition to Depression could be devastated.

The United States has a reputation for unhealthy eating habits and limited access to nutritious food options. According to USDA ERS, in 2022, approximately 12.8% of households in the United States struggle with food insecurity each year, indicating limited resources for certain people (Martin, 2023). This shortage of nutrient-rich food leads to poor gut health, resulting in a lack of neurotransmitter synthesis, demonstrating that the problem lies in the lack of access to sustainable healthy foods over a long period. The excessive production of unhealthy and low-nutrient food in America has caused a rise in mental health issues such as Depression and Anxiety. This is due to the absence of essential neurotransmitters and chemicals necessary for their production in such food. As a result, millions of people across America are now more vulnerable to these severe mental disorders.

Furthermore, California has high levels of food insecurity, with over 5.4 million Californians not having access to a healthy food supply (Teresa, 2016). Food insecurity is a significant issue in California, leading to nutrient deficiencies that worsen mental health. California also has a high population of individuals with mental disorders, where around 5.9 million Californians are currently diagnosed with mental disorders (Mental Health America, 2022). Likely, the high levels of food insecurity and mental disorders in California are linked because food insecurity can increase the prevalence of mental disorders. In people with food insecurity, the unhealthy microfloral environment in the gut can slow down the synthesis of neurotransmitters, making them more susceptible to mental health issues.

It is mainly unknown that food intake affects mental health in people with mental disorders. Therefore, a diet should be formed and highly publicized for people who have mental illness. Mental disorders are prevalent among individuals experiencing food insecurity, and modifying their diets can assist with treatment. According to Suniya Luthar of APA (The American Psychological Association), "American teens from upper-middle-class families are more likely to have higher rates of Depression, Anxiety, and substance abuse than any other socioeconomic group of young people" (Luthar, 2022). The majority of people from the upper-middle class have access to healthy foods, which they should utilize to treat mental disorders that they are predisposed to but unfortunately do not. However, after a mental health diagnosis, one of the most popular forms of treatment is the use of medication. Although it is a more convenient form of treatment, medication does not work for every person, and it can cause dependency, which can be very harmful for a person over time. Another possible treatment is psychoanalytic therapy, which may help treat a person's mental disorder but is not always guaranteed to work and can be too expensive for some people. Therefore, adjusting one's diet to contain more neurotransmitters is a sustainable treatment for mental and physical health. This study has the potential to develop a new treatment or, at the very least, pave the way for further research on such treatment for mental illness. This is crucial given the current state of mental health in America, which has been worsening over the past decade and is projected to continue to do so.

Methodology

This research aimed to develop a diet that is suitable for individuals who are dealing with mental illnesses such as Depression and Anxiety. The goal is to create a more universal and convenient form of treatment for people struggling with mental health compared to traditional methods such as pharmaceuticals and therapy. This study was conducted as a correlational secondary literature review, which reviewed literature and primary studies

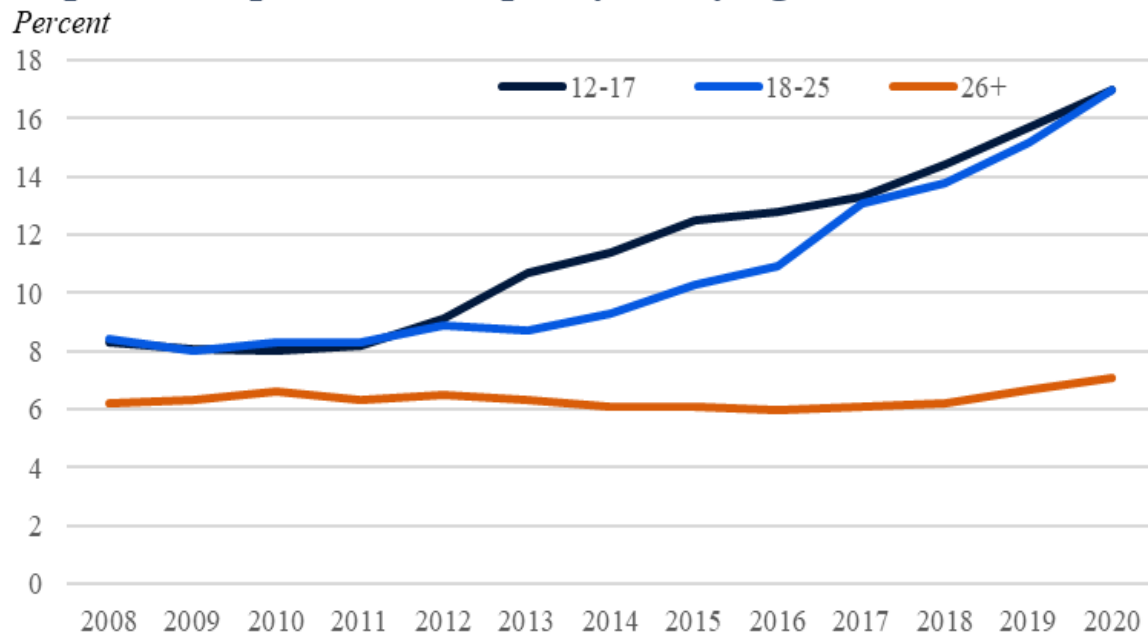
relating to the topic. After examining various blogs, articles, and other published papers, information was compiled regarding the topic, and correlations were established from the extracted data. A qualitative analysis method was utilized, and literature was analyzed to form correlations. Multiple primary and secondary sources were studied to draw conclusions and form correlations from an extensive literary review.

Furthermore, conclusions were formed based on correlations drawn from different media and literature to support the hypothesis and to curate a diet that is most beneficial to people living with mental illness. To gather further information, interviews were conducted with a psychiatrist, physician, and dietician to gain insight into their clinical experiences and how their experience relates to this research. Information was obtained by interviewing these professionals, which helped establish further correlations. No experimentation or physical tests were employed to support the hypothesis, as this paper is essentially a secondary literature review analyzing primary and secondary literature.

America's Mental Health

The mental health crisis in America is worsening with each passing year. As a result, it is crucial to establish a sustainable form of treatment for common mental health issues like Depression and Anxiety. These problems increasingly affect both American youth and adults, making it even more imperative to address them. Depression in these groups (ages 10-24) accounts for 15% of all suicides, which has increased by more than 50% since 2000 (Insel, 2023). As seen in Figure 1, the rates of depressive episodes have risen severely in youth from ages 12-25 since 2008, indicating that youth mental health is initiating a decline at a near exponential level. This rise of Depression and Anxiety without treatment or proper care is leading to these high rates of suicidal tendencies, self-harm, and even homicidal tendencies being presented in America's youth. This uncontrolled growth of psychiatric disability is sparking what is called the "mental health crisis" in the USA. Mental illness rates have reached an all-time high, with Depression and Anxiety affecting around 20% of Americans, which is approximately 50 million people (MHA, 2022). With 20% of the country stricken by poor mental health, other essential aspects of the country, such as the economy, the workforce, the job market, violence in schools and public areas, and the rise of drug usage have also been affected.

Figure 1. Percent of the population with a major depressive episode in the past year by age, 2008-2020



Source: Substance Abuse and Mental Health Services Administration

Figure 1. Percent of the population with a major depressive episode from 2008-2020 by age. Source: Substance Abuse and Mental Health Services Administration (The White House, 2022). Description: In the figure, the amount of adolescents and young adults with a major depressive episode from 2008-2020 has steeply increased, indicating the worsening of general mental health amongst young Americans. This graph illustrates what is known as the "American Mental Health Crisis," as cases of mental illness, such as Depression, have been increasing at an alarming rate.

Effects of Diet on Neurotransmitter Secretion

Neurotransmitters have long been proven to be synthesized by food habits, with foods either directly containing neurotransmitters or promoting the synthesis of neurotransmitters. Neurotransmitters can, therefore, be affected by one's diet and the nutritional choices they make (Gasmi et al., 2022). Neurotransmitter imbalance can lead to mental health issues such as Depression and Anxiety as neurotransmitters help one perceive emotions such as happiness, sadness, stress, and relaxation. Although medicines such as antidepressants and mood stabilizers usually control neurotransmitter imbalance, they take long periods to prove their effect, and sometimes they do not work at all, leaving a long, grueling process of finding the proper medication to treat their mental disorder (Sutherby, 2021). Rather than enduring long periods of time to conclude the proper medication necessary to treat someone's mental illnesses, another aspect that influences neurotransmitter secretion can be concentrated upon. One way to improve mood and mental health is by fixing one's diet, which has been proven to have a significant impact. Therapeutic diets have already been implemented in hospitals and nursing homes, as described by Karen Kutcka, a registered dietician practicing in Southern California. However, these diets are used to treat health problems such as diabetes, hypertension, obesity, and more. Therapeutic diets already maintain a giant role in healthcare, treating chronic illness, so therefore, it is possible to use diet as a natural approach to

treating mental illness instead of relying solely on biomedical resources such as antidepressants and mood stabilizers.

Issue with the Creation of a Diet for People with Depression

Food with large amounts of fat or oil causes neurotransmitter secretion rates to fall, leading to poorer mood and mental health. Consumption of trans fats and other unsaturated fats is known to cause lower levels of cognition and other mental ailments that slow the brain's overall function (Freeman et al., 2013). In the United States of America, there is easy access to food filled with trans fats, saturated fats, and high sugar contents, as it is cheaper to produce and purchase than a healthy meal. Most of the US population, including over 92% of American children and 86% of American adults, consume "junk food" daily (Liu et al., 2021). This consumption of unhealthy food as a primary source of nutrition is concerning as it not only leads to chronic disease but can also worsen one's mental health.

Dr. Wenkat Alapati, a psychiatrist practicing in Southern California, explained that the first aspect of the patient's life that he analyzes is the environment around the patient, including academics, family problems, social pressure, and drug usage. This information is valuable for how Dr. Alapati will advance with treatment since if a patient struggles with an external factor, he guides the patient on how to cope with this problem or even fix it. If a patient is not struggling with an external factor and is suffering with no apparent cause, or if fixing/avoiding external factors does not work, he starts the patient on medication. This medication takes time to work, however, and once it does start working, patients start to become dependent on the prescription to cope with their mental illness. Dr. Alapati states that dependency and addiction are some of the reasons that an alternative to pharmaceuticals must be found, as removing a patient from medication can be challenging. Dr. Alapati also depicts the class gap in his patients as he treats mostly lower and middle-class individuals. This gap is mainly prevalent since lower-class individuals struggle to pay for medication, and they tend to compensate by self-medicating using street drugs like marijuana and methamphetamine. However, whenever he treats individuals from an upper-class background, they also usually suffer from substance abuse as it is a more robust method of treating stress from family, work, finances, etc. The use of drugs to treat mental illnesses has increased significantly, and drugs end up damaging neurotransmission in the brain by building tolerance to high doses of neurotransmitters, worsening mental illnesses. Once drug use is provoked, diet is a complicated way to treat mental illness as even medical-grade pharmaceuticals struggle to have an impact on treating mental illness in users of narcotics. These individuals would have to undergo drug detoxification if illicit substances are present in their systems to restart treatment. Nevertheless, once an individual is under the influence of controlled or scheduled substances, it is challenging to start regular treatment for mental illness.

In poorer communities, more convenience stores and fast food services are available as they offer various affordable nutrition. However, in exchange, these foods are usually healthier and contain substances harmful to one's physical and mental well-being (Hilmers et al., 2012). Food insecurity is the lack of access to nutritious food, which affects over 5.4 million Californians, especially in poor areas like South Los Angeles, where fast food restaurants are present thoroughly (Teresa, 2016). The lack of food security in poorer areas leads to a substandard neurotransmitter supply, which fuels mental illnesses such as Depression and Anxiety. This is a significant problem as 13% of American households face food insecurity, limiting access to healthy food options. This results in the consumption of unhealthy foods, which are high in fats and oils, which, in turn, depletes neurotransmitter levels and slows the synthesis of the neurotransmitters (Martin, 2023).

Despite being able to access many nutritious foods, few people still choose healthy snacks and meals, which leads to a decrease in neurotransmitter secretion, where people who make around \$32,000 per annum eat 32% more fast food than usual. People who make about \$113,000 annually eat 10% more fast food than usual (Limitone, 2018). This easier and higher access to fast food depletes neurotransmitter levels in the brain. It causes imbalance, which leads to mental disorders such as Depression and Anxiety, which are higher in upper-

middle-class families as compared to any other class (Luthar, 2022). This prevalence of fast food being consumed in America, despite being able to afford nutritious meals and snacks, leads to higher levels of Depression and Anxiety within the upper-middle class, and the high costs of nourishing foods cause lower-class individuals to purchase fast food, leading to a poor diet.

Dr. Sreedhar Chava, a family care physician practicing in Southern California, stated, "Once patients become more overweight or eat more unhealthy food, they come in feeling more depressed or anxious." Dr. Chava encounters many patients with both Depression/Anxiety and obesity/dietary problems daily. In an interview, he correlated the effects of unhealthy food habits with poor cognitive health with the many patients he sees. He noted that he has seen many of his patients with dietary problems who disobey nutritional counseling usually also have mental illnesses such as Depression and Anxiety and that they reinforce these issues by eating more and more unhealthy food, causing a "vicious cycle of worsening Depression."

The significance of "junk food" in American culture makes it difficult for people to change their diets to improve mental health, where the vast majority of Americans, from low to high class, consume these products. Many people also depend on unhealthy food products as they cannot afford to incorporate more nutritious meals and snacks. Switching diets from unhealthy foods to healthy foods can be difficult for many people, as fast foods and processed snacks are more accessible and time-efficient/cost-effective while also appealing. The importance of a healthy diet for individuals with Depression and Anxiety cannot be overstated, as it significantly affects mental health, as demonstrated by Dr. Sreedhar Chava's patients.

The Gut-Brain Axis

The Gut-Brain Axis is a phenomenon that states that the health of the gut microbiome affects a person's neurotransmitter synthesis, which can dictate whether or not a mental illness is present. It is shown that many significant neurotransmitters, such as melatonin, acetylcholine, serotonin, GABA, and histamine, are produced in the gut and hence lead to a gut-brain connection (Appleton, 2018). As Karen Kutcka described in an interview, trans fats and saturated fats kill good bacteria in the gut, disturb the gut-brain axis, and affect mental health, so it is best to ignore foods high in these fats. The production of these neurotransmitters leads to significant changes in mood and behavior, dictating mental health issues from bad moods to severe Depression. Therefore, neurotransmitters can be replenished or synthesized by maintaining a healthy gut, which can be handled by supervising one's diet.

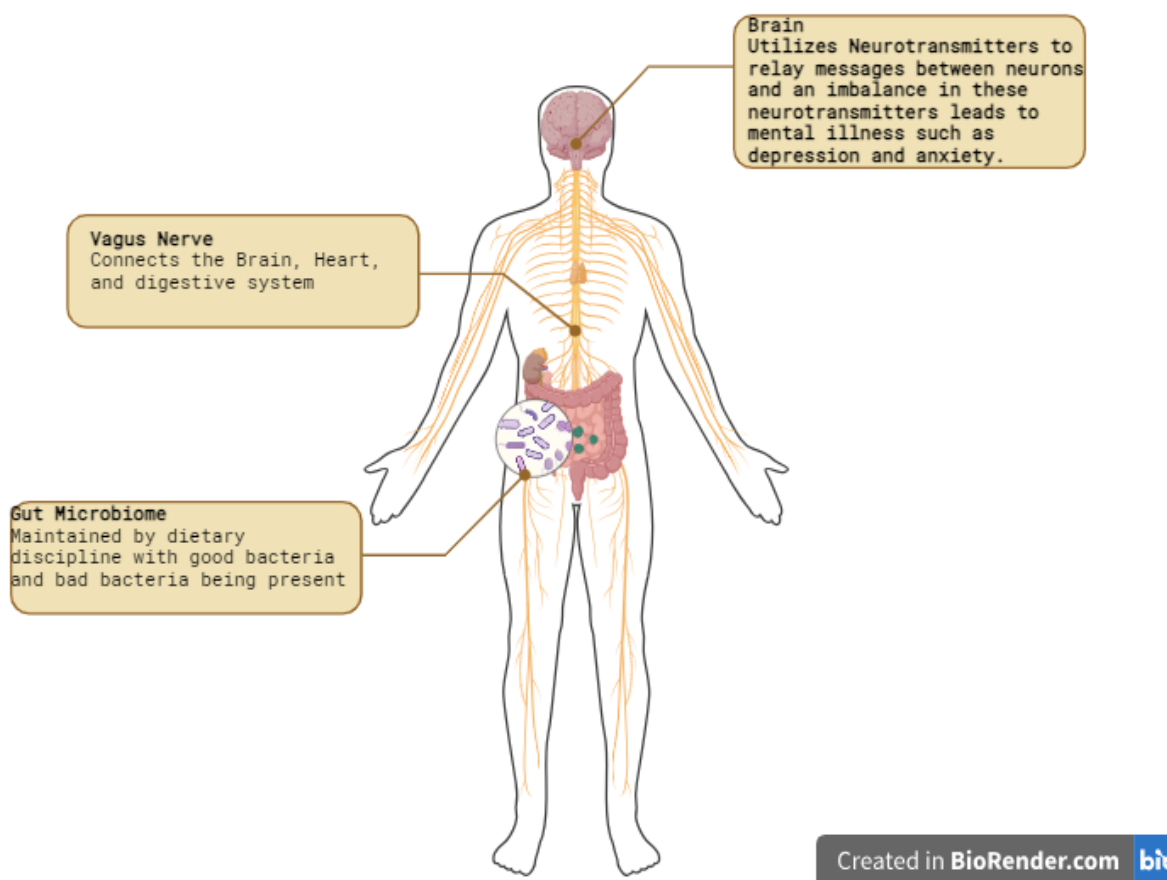


Figure 2. Diagrammatic representation of the Gut-Brain axis and its connection via the Vagus nerve. Source: Sushant Donadi, 2024 (Created with BioRender.com). Description: The Gut-Brain Axis is depicted in the image above, where the Vagus nerve connects the brain and the gut. The health of the gut (balance of good/harmful bacteria in the gut) is relayed to the brain by the Vagus nerve, which sends signals within nerves to relay information about the gut's health.

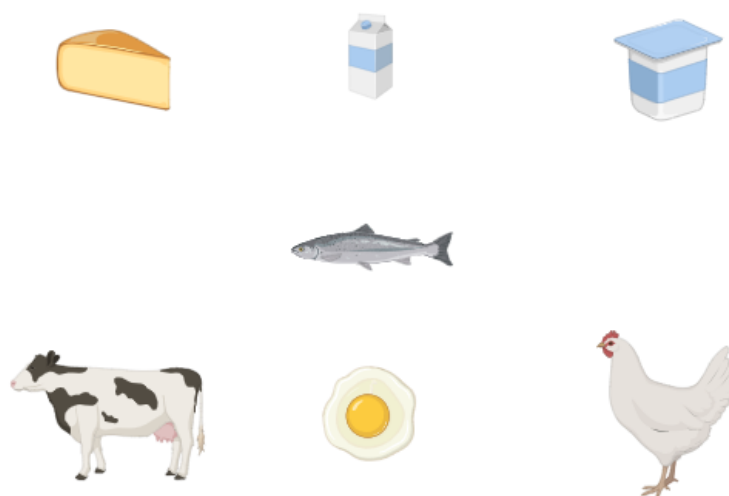
Analyzing the Foods That Affect Neurotransmitter Secretion

One fat type highly regarded amongst dieticians, including Karen Kutcka, is Omega-3. Omega-3 is a fatty acid often associated with learning, memory, and other cognitive procedures. Omega-3 helps individuals maintain a healthy brain environment by providing fats that change membrane fluidity and increase neurotransmitter release, providing more efficient neurotransmission (Dighriri et al., 2022). This can help speed the therapy process via diet by making neurotransmitter synthesis from diet more effective on neurotransmission. Karen Kutcka stressed the importance of Omega-3 and how she tries to naturally assign Omega-3 to her patients through fish consumption or supplements. The natural sources of Omega-3 come from fish, flaxseed, walnuts, and edamame. To compensate for the lack of Omega 3, some people consume supplements such as fish oil capsules to increase their Omega-3. Although these supplements can work for individuals who do not enjoy eating fish, it is best to consume Omega-3 by eating fish such as salmon, mackerel, tuna, herring, anchovies, and sardines (National Institutes of Health, 2022). By consuming these fish, the efficiency of neurotransmission can be increased in one's brain, allowing for more efficient therapy when regulating diet.

Norepinephrine is one of two possible factors that lead to Depression while being the least frequently targeted neurotransmitter in biomedical therapy. Norepinephrine is synthesized solely based on tyrosine, an

amino acid, so eating foods high in protein to gain more tyrosine from protein breakdown benefits the production of norepinephrine (Minich, 2022). Tyrosine is a nonessential amino acid produced from another amino acid, phenylalanine. Although the body already produces tyrosine, it can also be harvested from protein-rich foods, especially poultry and red meat. The foods high in protein that should be eaten to increase norepinephrine levels are dairy, eggs, fish, beef, and chicken, as they influence an increase in tyrosine and, in turn, synthesize norepinephrine (Minich, 2022). Red meat and poultry are likely most efficient at producing norepinephrine as they are amongst the highest on this list for containing the most protein. Eating more protein exposes one to a higher likelihood of consuming tyrosine, leading to higher levels of norepinephrine production. However, by consuming foods such as fish, Omega 3 is gained, as mentioned earlier, to help speed up neurotransmission, making norepinephrine secretion more efficient. Fish such as salmon and tuna are also high in protein and tyrosine, showing that these fish are the most efficient to consume. SNRIs (Serotonin-norepinephrine reuptake inhibitors) are the primary treatment for norepinephrine deficiency. Like SSRIs, SNRIs block serotonin and norepinephrine reuptake channels and force these neurotransmitters to pass through the synaptic cleft without reuptake, forcing more norepinephrine to be absorbed by the receiving neuron. Norepinephrine that is produced due to natural consumption can either boost the effects of SNRIs if being used or can promote healthy norepinephrine levels for the prevention of Depression. With a higher level of norepinephrine stored, healthy levels can be promoted to prevent an individual from developing norepinephrine deficiency.

Norepinephrine



Created in BioRender.com bio

Figure 3. Foods that promote norepinephrine production. Source: Sushant Donadi, 2024 (Created with Bio-Render.com). Description: Diagram containing foods that promote norepinephrine synthesis. Cheese, Milk, Yogurt, Fish, Beef, Eggs, and Chicken (Going from left to right, up to down).

Serotonin is the primary neurotransmitter that is associated with Depression, which is the first neurotransmitter that is targeted in biomedical therapy for Depression through the use of SSRIs (Selective Serotonin

Reuptake Inhibitors). Most serotonin is produced in the intestines, so the best way to increase serotonin production is to keep the gut healthy (Minich, 2022). To do so, most foods should be healthy, high in fiber, or high in probiotics. Fermented foods such as yogurt, sauerkraut, kimchi, sourdough bread, kombucha, cheese (in moderation), and probiotic drinks like Yakult (Beneden, 2018). In theory, foods promoting probiotic gut health should be consumed as they target the gut-brain axis, simultaneously promoting gut and mental health. As foods like yogurt and pickled foods culture bacteria to preserve the structure of the food, the amount of probiotics in these foods is the best to promote gut health. Serotonin is also directly found in various fruits, vegetables, legumes, grains, and nuts. Foods containing serotonin that should be consumed are papaya, bananas, pineapples, passion fruit, pomegranate, strawberries, kiwis, and plums.

The vegetables, legumes, and grains that should be consumed for serotonin increase are velvet beans, spinach, tomatoes, wild rice, chicory, Chinese cabbage, coffee, hazelnuts, green onion, lettuce, paprika, and potatoes (Briguglio, 2018). Consuming foods that directly have serotonin in them can treat Depression since Depression is usually due to a deficiency of serotonin. Therapy by ingesting serotonin can help promote natural serotonin treatment. The most commonly used form of treatment for serotonin deficiency is SSRI medication. SSRIs aim to inhibit serotonin reuptake channels, forcing serotonin secreted to pass on to the following neuron as reuptake cannot lower serotonin volume in the synaptic cleft. This treatment, however, does not always work on every person, and it usually takes around a month for effects to show, which can be detrimental to severely mentally ill individuals. Therefore, higher storage of serotonin can help treat Depression if on SSRIs or not and may have the ability to speed up the process.

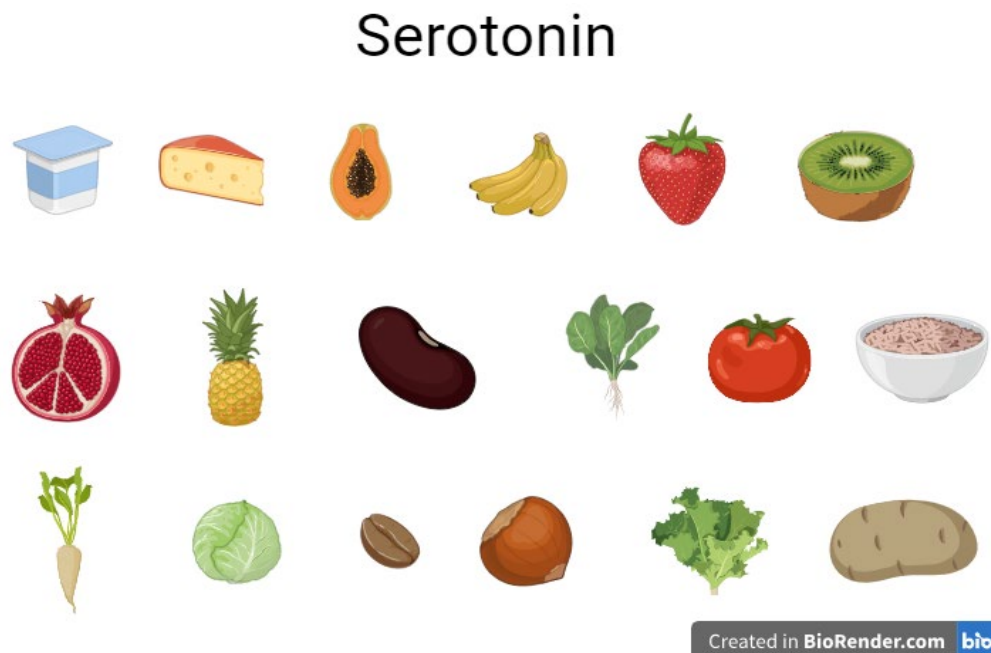


Figure 4. Foods that promote serotonin production. Source: Sushant Donadi, 2024 (Created with BioRender.com). Description: Diagram containing foods that promote serotonin synthesis. Yogurt, Cheese, Papayas, Bananas, Strawberries, Kiwis, Pomegranates, Pineapples, Velvet Beans, Spinach, Tomatoes, Wild Rice, Chicory, Cabbage, Coffee, Hazelnuts, Lettuce, and Potatoes (Going from left to right, up to down).

GABA, or gamma-aminobutyric acid, is a neurotransmitter that helps with relaxation and calming, and a deficiency in GABA leads to Anxiety and other Anxiety disorders. The gut also produces GABA, and certain bacteria present in the intestines produce the neurotransmitter (Minich, 2022). The main foods that should be

consumed to improve GABA are cruciferous vegetables (broccoli, cabbage, cauliflower, arugula, brussels sprouts, and kale), soybeans, adzuki beans, common beans, lupin beans, peas, tomatoes, spinach, mushrooms, buckwheat, oats, wheat, barley, rice, potatoes, sweet potatoes and chestnuts (Briguglio, 2018). Cruciferous vegetables, known as "leafy greens," contain much fiber, promoting gut health. They also introduce helpful bacteria into the gut, which leads to a more diverse gut microbiome and, in turn, a healthier gut fit for more neurotransmitter synthesis (HRI, 2024). Furthermore, grains are known to be good for the gut as they are high in fiber and also contain prebiotic characteristics, which are a source of food to helpful gut bacteria, bolstering the health of the "good" bacteria, aiding in the synthesis of more robust yields of GABA and other neurotransmitters (Jennings, 2019).

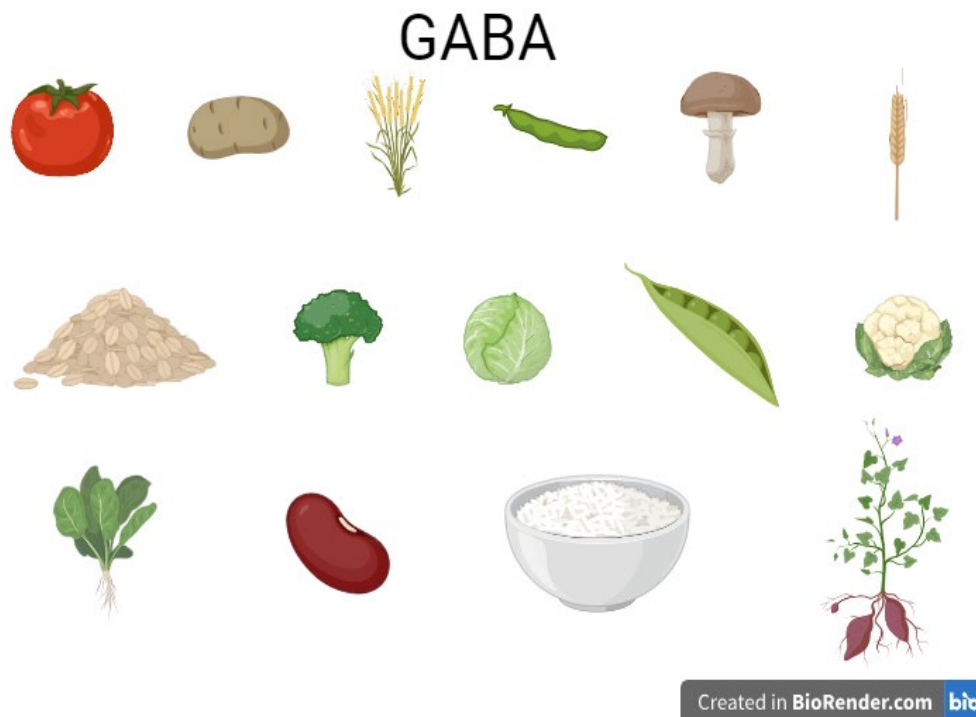


Figure 5. Foods that promote GABA production. Source: Sushant Donadi, 2024 (Created with BioRender.com). Description: Diagram containing foods that promote GABA synthesis. Tomatoes, Potatoes, Wheat, Soy Beans, Mushrooms, Barley, Oats, Broccoli, Cabbage, Peas, Cauliflower, Spinach, Common Beans, Rice, Sweet Potatoes (Going from left to right, up to down).

Creating a Diet Best Fit for Depression or Anxiety

In the search for the best diet for Depression or Anxiety, factors that biologically lead to these mental illnesses need to be considered. For Depression, either serotonin or norepinephrine is the most likely neurotransmitter deficiency, while a deficiency in GABA usually causes Anxiety. Looking at the foods formulated in the last section, a proper diet can be deduced for both Depression and Anxiety. It is beneficial to eat the foods mentioned in the lists and incorporate these foods into one's diet in whatever way they please (as long as saturated and trans fats, along with high sodium and sugar, are avoided). Recommendations on how to fit some of these foods into one's diet are stated below.

A deficiency in norepinephrine or serotonin could cause Depression, and it is not possible to tell which neurotransmitter is causing the illness, so it is best to consume food for both neurotransmitters. To maintain norepinephrine, much protein is needed in one's food. To do this, meat needs to be eaten daily, such as beef, chicken, fish, or eggs. If an individual is vegetarian, it is best to eat cheese, yogurt, and milk as these contain protein but are not as high as meat, so incorporating meat into one's diet will be most beneficial. Chicken and wild rice or white rice can be a good combination of food containing both serotonin and norepinephrine to target both neurotransmitters. This meal can contain grilled or steamed chicken (no fried chicken since it is high-fat) with rice.

Furthermore, smoked or baked salmon can be eaten to improve norepinephrine and omega-3 fatty acid levels, as salmon is known to have a lot of protein and omega-3. Smoked and baked salmon tend to be the most popular forms of preparation for salmon to consume, and they retain a large amount of amino acids and omega-3 fatty acids. Salads are highly packed with serotonin, as serotonin is primarily found in vegetables. Salads with lettuce, tomatoes, shredded cheese, avocado, peanut/almonds, beans, spinach, sesame seeds, protein such as grilled chicken, and maybe even fruits like strawberry or pineapple can be very high in serotonin (and norepinephrine as well from the chicken) and give a boost of the neurotransmitter when needed. Each ingredient in the salad proposed can help with serotonin deficiency and increase norepinephrine levels by containing a good source of protein from chicken and plant protein. It is essential to eat fruit for serotonin as fruits and vegetables tend to be higher in the neurotransmitter, so it is perfect for someone prone to Depression to snack on fruits such as strawberries, bananas, pineapple, kiwi, pomegranate, and papaya whenever the urge to snack arises.

A deficiency in GABA causes Anxiety, so diets for Anxiety must contain food that is good for the gut. Foods high in probiotics must be consumed to maintain a healthy microfloral environment. Foods such as yogurt can aid in maintaining gut health, and drinking probiotic beverages such as Yakult, which contains the live probiotic *L. Paracasei* strains Shirota, according to their website, can help bolster the diversity in the gut microbiome. By consuming such probiotics, the environment of one's gut becomes healthier with more flourishing bacteria that aid in digestion, maintaining a healthy gut-brain axis. The previous section also states that foods like white rice, broccoli, cabbage, and beans are good for health. Kimchi and rice with sides of broccoli or other cruciferous vegetables (like cauliflower or brussels sprouts) can be a very efficient meal for individuals suffering from Anxiety. Kimchi has probiotic content as it is fermented, and rice and cruciferous vegetables are proven to help boost GABA levels, as stated in the previous section. Beans, peas, and soy are good for GABA production; meals should have sides of these vegetables. Soy can be challenging to ingest, so eating soy fermented in foods such as tofu and miso soup is most likely.

Although junk foods should generally be omitted from one's diet, it is acceptable to have unhealthy foods occasionally. Unhealthy foods high in sugar, sodium, or fat content temporarily increase dopamine production, accessing the reward system in the brain. This allows people to feel temporary satisfaction, which is suitable for people following diets occasionally as it encourages them to keep following their diet.

Results

The purpose of this study is to create a form of treatment or prevention of mental illnesses such as Depression and Anxiety as an alternative method to biomedical therapy. This paper proposes a hypothetical dietary plan for individuals with mental illnesses, which requires further experimentation in a clinical setting to verify its efficacy. Diet is proposed as a method to combat neurotransmitter deficiency in individuals with Depression or Anxiety to substitute the need for drugs like antidepressants and mood stabilizers, as both have the same intended effect. With the growing rates of Depression and Anxiety in the United States, a new method of treatment must be established that is more feasible for mass practice and less addictive to lower dependency.

Despite the potential viability of prevention by following the diet, Karen Kutcka, a registered dietician, has remarked in an interview with her regarding how preventative measures via dietary intervention are superior

to niche-oriented solutions. She added that despite the potential of the power of diet in psychiatric treatment, some people cannot afford the high cost of healthy foods causing diet to be a difficult treatment to use uniformly amongst individuals living with mental illness.

In an interview with psychiatrist Dr. Wenkat Alapati, he notes that prior to commencing psychiatric-biomedical therapy, external factors that may be the root cause of mental illness are typically investigated. This diet does not consider environmental factors that lead to depression and focuses mainly on the deficiency of neurotransmitter that occurs in individuals with mental illness, so mental illness may not be affected by diet if external factors are affecting one's mood.

Speaking with Dr. Sreedhar Chava, he correlates the effect of obesity/poor food habits with depression in his patients, as he sees many of his patients with obesity also end up having poor mental health or vice versa, showing that there is a connection between diet and mental health. He described this relationship between diet and mental health as a "vicious cycle of worsening mental health" as patients tend to eat more unhealthy meals/snacks to cope with their depression, leading to poorer physical health and mental health.

After compiling data from numerous primary and secondary articles along with conducting interviews with professionals in the healthcare field, it can be concluded that diet remains a method that could be established amongst many people as it is crucial for survival and it is a practice that every human follows, so it can be more widely distributed amongst the general population that suffers from mental illness than medication, which only a portion of the population can afford and wants to take.

Conclusion

To alleviate Depression and Anxiety, it is vital to consume foods that promote gut health and avoid unhealthy foods with saturated fats that can deplete gut health. Recall the gut-brain axis while consuming food or beverages, as certain foods such as yogurt can promote gut health while other foods like pizza can ruin gut health. Diet can potentially prevent and treat Depression and Anxiety, but more research is needed for dietary treatment. Diet can have a significant impact if taken alongside professional advice, which can help people suffering from mental illness by possibly replacing pharmaceuticals. Although experimentation needs to be done to calculate the extent to which diet can be used to treat mental illness, it is safe to say that diet does affect one's mental health. Maintaining a healthy mind and body in the long run is crucial to monitoring daily food intake. As Dr. Alapati stated, food is similar to drugs, where short-term satisfaction is gained mentally while endangering physical health. Diet can be an extremely effective method for solving mental illness if correctly followed or completed alongside another form of treatment, as more experimentation and research are needed to understand the true efficacy of diet as a mental health treatment.

Depression and Anxiety have many factors that could contribute to it, from environment to genetics. Nevertheless, to maintain a baseline neurotransmitter stability to mimic the effects of prescription pharmaceuticals in order to prevent mental illness, diet can be a crucial method to doing so. Prescriptions have many negatives, including dependency, addiction, and the ability not to work. Finding the right prescription is a long and grueling process, and individuals with mental illnesses such as Depression and Anxiety cannot afford to waste this time. Diet is universal to all humans, as everyone consumes food, so controlling food habits has the potential to affect every person. If it cannot work as a method of treatment, it can function as a method of prevention for mental illness as it serves to maintain neurotransmitter levels in the brain by controlling the gut-brain axis.

All in all, diet has not been a proven method to treat mental illness. However, with further experimentation, either in a longitudinal or cross-sectional study amongst individuals with a high genetic likelihood of Depression or Anxiety, the effects of diet on mental illness can be understood further as more than a preventative procedure.

Limitations

The hypothesis has not been established through clinical trials but through correlation and literary examination. As a result of lacking experimental testing in clinical trials, this correlational hypothesis cannot be proven. Until further experimentation is conducted, this diet should be regarded as primarily theoretical and not a proper form of treatment. A significant hurdle must be overcome is the need for more access to healthy food for numerous individuals. In America, food insecurity acts as a significant impediment to improving diets for mental health purposes. This concept can only be implemented within populations that possess the financial resources necessary to purchase healthy foods and the willpower to make dietary adjustments to accommodate their mental well-being.

The cost of maintaining the diet proposed is out of some people's budgets so this diet can not be sustained by an individual suffering from food insecurity. Furthermore, few individuals may be too debilitated by severe mental illness to adhere to this diet, necessitating more intensive forms of therapy. Moreover, many individuals are unable to consume certain items due to dietary restrictions, whether for religious or allergy-related reasons, which may prevent them from ingesting foods that could aid in the prevention of mental illness, as per the proposed diet. It is crucial to adhere to dietary restrictions while attempting to follow the diet to the best of one's ability.

One more limitation of this research is the failure to account for external factors that may contribute to Depression or Anxiety. To add on, this diet is not appropriate for individuals who use street drugs or narcotics such as marijuana, methamphetamine, cocaine, heroin, or opioids, as such individuals likely already possess a high tolerance to large amounts of neurotransmitters. As a result, they must first undergo detoxification or drug rehabilitation before resuming treatment.

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