

We Are What We Eat: The Connection Between the Brain and Nutrition

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Abstract

Nutrition profoundly impacts both physical and mental health, influencing everything from immune function and chronic disease prevention to mood regulation and cognitive processes. This paper explores the intricate relationship between diet and human health, particularly the interplay between nutrition and mental well-being. Through an analysis of physiological processes, neuropsychiatric mechanisms, and evidence-based dietary interventions, this paper illustrates the essential role of nutrition in maintaining holistic health. Furthermore, it highlights how specific nutrients, such as vitamins, minerals, and antioxidants, directly influence brain health and mitigate mental health disorders, including depression and anxiety. By examining contemporary strategies for dietary improvement and intervention, the paper underscores the importance of integrating nutrition into comprehensive healthcare frameworks.

Over 100 million Americans are affected by obesity, a condition linked to a wide range of health complications, including cardiovascular disease, diabetes, high blood pressure, high cholesterol, breathing difficulties, gallstones, joint pain, and reduced fertility. Despite the importance of preventative care, many low-income individuals lack access to nutritious, additive-free foods, perpetuating the cycle of poor health. Alarming, many foods commonly available in the U.S. fail to meet regulatory standards in Europe, underscoring the need for stricter food policies and greater equity in access to healthy options. Obesity also impacts bone density and contributes to gastrointestinal issues, highlighting the interconnected nature of its effects on the body. Addressing these challenges through early intervention and promoting healthier dietary habits is essential to reducing obesity's far-reaching consequences on public health.

Introduction

Nutrition provides the foundation for human survival, supplying the body with essential macronutrients, micronutrients, and other bioactive compounds necessary for growth, development, and daily functioning. The primary components of a healthy diet include carbohydrates, fats, proteins, vitamins, and minerals, which collectively maintain energy levels, support immune defense, and regulate bodily processes (World Health Organization, (n. d.)). Beyond these physiological roles, nutrition significantly affects mental well-being by modulating neurotransmitter production, brain structure, and gutmicrobiota (Grajek et al., 2022). As such, dietary choices directly shape both physical and psychological health, influencing the trajectory of human life.

Poor nutrition has been linked to increased rates of chronic diseases such as diabetes, cardiovascular disease, and obesity, which burden healthcare systems worldwide (Liese et al., 2015). Simultaneously, an inadequate diet is a contributing factor to mental health disorders, with research consistently demonstrating links between diet quality and conditions such as depression, anxiety, and schizophrenia (Harvard Medical School, 2015). Understanding these connections is vital for the

development of dietary strategies that promote holistic health. This paper delves into the physiological and mental health implications of nutrition, with an emphasis on actionable interventions for improved outcomes.

Nutrition and Physiological Health

The physiological health of an individual is intricately linked to the quality and composition of their diet. A balanced diet ensures the proper functioning of bodily systems and mitigates the risk of chronic illnesses. Conversely, poor dietary habits disrupt homeostasis, leading to a cascade of health issues. For instance, excessive consumption of refined sugars and unhealthy fats contributes to impaired glucose metabolism, a hallmark of diabetes mellitus (Liese et al., 2015). This chronic condition not only affects blood sugar levels but also leads to systemic complications such as neuropathy, nephropathy, and retinopathy.

Diets high in sodium and low in potassium exacerbate hypertension, which is a precursor to cardiovascular diseases. Over time, this imbalance can lead to atherosclerosis, characterized by the narrowing and hardening of arteries,

thereby increasing the risk of heart attack and stroke (World Health Organization, (n. d.)). Furthermore, metabolic strain caused by poor nutrition contributes to liver and kidney dysfunction, with these organs struggling to process excess fats, sugars, and toxins. The digestive system is also affected, as imbalanced diets disrupt gut microbiota, impairing nutrient absorption and promoting inflammation (Grajek et al., 2022). These examples underscore the central role of nutrition in maintaining physiological health and preventing chronic diseases.

The Interplay Between Nutrition and Mental Health

In addition to its impact on physical health, nutrition plays a pivotal role in mental health by influencing neurotransmitter function, gut-brain axis communication, and inflammatory pathways. Serotonin, a key neurotransmitter involved in mood regulation, sleep, and appetite, is heavily influenced by dietary intake. Foods rich in tryptophan, such as dairy products, nuts, and seeds, enhance serotonin synthesis, while diets deficient in these nutrients may exacerbate mood disorders (Grajek et al., 2022).

The gut microbiota, often referred to as the “second brain,” is another critical mediator of mental health. A diet rich in fiber and prebiotics fosters the growth of beneficial gut bacteria, which produce short-chain fatty acids that influence brain function (Harvard Medical School, 2015). Conversely, diets high in refined sugars and processed foods disrupt the gut microbiome, leading to increased inflammation and oxidative stress. This disruption has been linked to higher rates of depression, anxiety, and cognitive decline.

Epidemiological studies have demonstrated the protective effects of traditional diets, such as the Mediterranean diet, against mental health disorders. Rich in vegetables, fruits, whole grains, and healthy fats, this diet reduces the risk of depression by 25% to 35% (Grajek et al., 2022). These findings highlight the importance of nutrient-dense, unprocessed foods in supporting mental well-being and preventing mood disorders.

Neuropsychiatric Connections of Nutrition

The neuropsychiatric impact of nutrition is increasingly recognized as a critical area of research. Nutritional deficiencies and imbalances have been implicated in the development and progression of psychiatric disorders. For example, low levels of vitamin D have been consistently associated with depression and schizophrenia (Grajek et al., 2022). Vitamin D supports the production of neurotrophic factors, such as brain-derived neurotrophic factor (BDNF) and nerve growth factor (NGF), which are essential for synaptic plasticity and neuronal survival. Supplementation with vitamin D has been shown to improve mood and cognitive function, particularly in individuals with existing deficiencies (Harvard Medical School, 2015).

Antioxidants, including vitamins C and E, play an important role in mitigating oxidative stress, a contributing factor to neurodegenerative and psychiatric conditions. By neutralizing free radicals, these compounds protect neurons from damage and preserve brain function. Minerals such as magnesium, zinc, and selenium also support mental health by regulating neurotransmitter activity and inflammatory pathways. For instance, magnesium supplementation has been shown to reduce symptoms of anxiety and depression, emphasizing the therapeutic potential of targeted dietary interventions (Grajek et al., 2022).

Strategies for Dietary Improvement

Improving dietary habits is a practical and effective way to enhance both physical and mental health. The adoption of a balanced diet rich in vegetables, fruits, whole grains, and healthy fats is a foundational step (World Health Organization, (n.d.)). Nutrient-dense dietary patterns, such as the Mediterranean and DASH diets, provide an optimal balance of macronutrients and micronutrients, supporting overall well-being.

Reducing the intake of refined sugars and processed foods is equally important, as these items contribute to inflammation, insulin resistance, and mental health issues (Harvard Medical School, 2015). Instead, individuals are encouraged to incorporate complex carbohydrates, such as oats and quinoa, which provide sustained energy and support gut health. Adequate hydration and portion control further contribute to the effectiveness of dietary interventions.

Research highlights the benefits of specific nutrients for mental health. Vitamin D supplementation, for example, has been shown to alleviate depressive symptoms when administered over a three-month period (Grajek et al., 2022). Similarly, minerals such as zinc and selenium, along with antioxidants like carotenoids, enhance cognitive and emotional resilience. These findings underscore the importance of personalized dietary strategies that address individual nutritional needs.

Conclusion

Nutrition is an indispensable component of comprehensive health, influencing everything from chronic disease prevention to emotional well-being. A balanced diet not only protects against physical ailments such as diabetes and cardiovascular disease but also mitigates the risk of mental health disorders, including depression, anxiety, and schizophrenia. By emphasizing the interconnectedness of physical and mental health, this paper highlights the need for integrated dietary interventions in healthcare.

As research in nutritional psychiatry continues to evolve, the potential for dietary strategies to enhance brain health and improve quality of life becomes increasingly apparent. Healthcare providers, policymakers, and individuals alike must recognize the profound impact of nutrition and prioritize its role in promoting holistic well-being.

Conflicts of Interest

We have no known conflicts of interest.

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