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Systematic Review

Dietary Patterns and Mental Health Across the Lifespan: A Systematic Review of Randomized Clinical Trials

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Abstract

In a world increasingly characterized by rises in anxiety, depression, mood disorders and cognitive decline, our mental well-being often depends not only on our environment, but also on our food. In this systematic review, 25 clinical nutritional trials analyzed the relationship between dietary patterns and mental health across the lifespan. The PubMed-Medline, Web of Science, Scopus and Cochrane Library databases were searched for relevant articles from 2013 published up to June 2025 and included studies with a minimum 3-month follow-up and a minimum of 50 participants. The results showed that, in most studies, the Mediterranean diet reduces depressive symptoms by 32–45%. It works because it is rich in polyphenols, omega-3 fatty acids and fiber; lowers systemic inflammation; promotes gut diversity; and improves dopamine and serotonin modulation. On the other hand, five studies have shown that the MIND Diet (Mediterranean-DASH Intervention for Neurodegenerative Delay) (with daily leafy greens, berries at least twice a week, whole grains, legumes, olive oil and nuts) and a whole-food plant-based diet lower C-reactive protein and improve mood in patients with chronic stress and fatigue. Plants provide antioxidants and phytochemicals that neutralize oxidative stress in neurons. This report emphasizes the need to promote well-being and increase public demand for food that also improves quality of life and mental health.

Keywords: mental health; nutrition; psychology; diet patterns

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Academic Editor: Nicola Magnavita

Received: 19 August 2025
Revised: 10 September 2025
Accepted: 20 October 2025
Published: 23 October 2025

Citation: Dimopoulou, M., Dimopoulou, A., & Gortzi, O. (2025). Dietary Patterns and Mental Health Across the Lifespan: A Systematic Review of Randomized Clinical Trials. *Psychology International*, *7*(4), 87. https://doi.org/10.3390/psycholint7040087

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1. Introduction

Mental disorders are widespread and affect over 970 million people worldwide (Fan et al., 2025). In 2019, 1 in every 8 people, or 970 million people around the world, were living with a mental disorder, with anxiety and depressive disorders the most common. In 2020, the number of people living with anxiety and depressive disorders rose significantly because of the COVID-19 pandemic. While effective prevention and treatment options exist, most people with mental disorders do not have access to effective care. Many people also experience stigma, discrimination and violations of human rights (Mao et al., 2025). Depression and anxiety in particular contribute most to disability and disease burden (Fan et al., 2025).

A growing body of research has investigated the relationship between diet and mental health, with previous studies suggesting that high intakes of single nutrients, particularly saturated fats and free sugars, and low dietary fiber increase the risk of depression or

anxiety (Saghafian et al., 2023). Previous research on diet and mental health has also shown that sweetened beverages, meat, certain fruits and vegetables and fish can contribute to the risk of mental disorders (Godos et al., 2023; Gómez-Donoso et al., 2020). However, a major limitation of these studies is that they focus on individual nutrients, which means that the broader effects of whole diets—combinations of multiple nutrients consumed together—are not considered. The combined effects of a nutrient-rich diet on conditions such as depression and anxiety are therefore not yet fully understood (Yao et al., 2023).

Various factors can influence both our mental and emotional health (Puri et al., 2023). Although our physical and mental states appear to function separately, they are closely linked in several ways. Current research in the field of nutritional psychology is uncovering the complex relationship between nutrition and mental health. Studies are investigating how certain dietary habits can trigger or exacerbate mental health problems, while others can improve mood, emotional resilience and cognitive function (Firth et al., 2020). The link between dietary habits and mental well-being is largely based on the way different nutrients affect brain function (Gheonea et al., 2023).

Compounds such as omega-3 fatty acids, antioxidants (e.g., lycopene, resveratrol, selenium), zinc (Muscaritoli, 2021), B vitamins and even dietary fiber (Godos et al., 2020) have been found to play a critical role in the prevention and management of depression and anxiety. These nutrients help promote mental well-being by (1) inhibiting inflammation, fighting free radicals to reduce oxidative stress; (2) modulating the gut microbiota; (3) preventing hyperactivity of the hypothalamic–pituitary–adrenal (HPA) axis, e.g., the neuroendocrine mechanisms that control the body's reaction to stress; and (4) supporting healthy levels of monoamine neurotransmitters (serotonin, dopamine and norepinephrine), which play a key role in mood regulation (Muscaritoli, 2021). Imbalances in macronutrient and micronutrient intake, such as deficiencies in vitamin D and omega-3 fatty acids, can worsen mental health conditions (Doaei et al., 2021; Mazahery et al., 2019).

Dietary patterns are the umbrella that may lead health professionals to focus on specific nutrients that play a fundamental role in cognitive function (Adan et al., 2019). To our knowledge, there are gaps in the literature as few systematic review articles include randomized clinical trials as the gold standard in terms of methodology (Kao et al., 2008; Liu et al., 2021) or cohort studies in order to explore long-term results with more participants and also through childhood to third age.

This systematic review aims to analyze randomized clinical trials that investigate the relationship between dietary patterns and mental health across the lifespan. The findings will have particular value because they could be a facilitator of patients' choices, also improving their quality of life.

2. Material and Methods

2.1. Systematic Review Aim and Strategy

This systematic review was performed according to the Preferred Reporting Items for Systematic Reviews (PRISMA) 2020 guidelines and checklist (Page et al., 2021). This systematic review was registered with the International Prospective Register of Review (PROSPERO) (CRD420251067178). This systematic review focuses on investigating the relationship between different diet patterns and their impact on mental health. A complete checklist, according to the PRISMA statement, is reported in Appendix A.

2.2. Literature Search, Study Selection, Eligibility Criteria and Quality Assessment

The search strategy included articles published from 2013 to June 2025, with a comprehensive systematic review of the following databases: (1) The search on PubMed and Scopus involved the utilization of MeSH terms specifically focusing on "#Mental health,"

"#Diet," "#Mental disorders," "#Intervention," "#Psych dietetics," "#Nutripsychiatry," "#Depression," "#Lifestyle," "#Weight," and "#Obesity." The preliminary search produced 202 articles, with 57 duplicates excluded, resulting in 145 articles for further analysis. (2) The search strategy for the Web of Science database concentrated on identifying articles related to "#Mental health," "#Diet," "#Mental disorders," "#Psych dietetics," "#Nutripsychiatry," "#Depression," "#Lifestyle," "#Weight," and "#Obesity". Other terms such as "#Food" and "#Nutrition" were also included to ensure a broader scope. The objective was to explore dietary habits, nutritional interventions and the role of various diet patterns in modulating specific bioactive compounds and addressing related mental disorders. The initial search yielded 5 articles, and after eliminating 3 duplicates, 2 articles remained for detailed scrutiny. (3) For the Cochrane Library search, emphasis was applied to #Diet, #Interventions, #Nutrition, #Mental health, and #Diet pattern, with an additional keyword "#Supplementation". The primary aim was to identify articles examining the association between food consumption and mental health, with particular attention to the guidance provided by health professionals. The selection of these databases was based on their reputability, comprehensiveness, and relevance to healthcare and medical research (Table 1). The inclusion and exclusion criteria are shown in Table 2. The studies included in this systematic review are shown in Figure 1. We further used the following criteria of inclusion for the second part of the study as mentioned below:

- Population inclusion criteria: Studies involving individuals across all age groups, from infancy through late adulthood, that had diverse demographic characteristics, such as gender, socio-economic status, and cultural backgrounds, were used.
- Study design: Rigorous research methodologies, including randomized controlled trials (RCTs), cohort studies, cross-sectional studies and systematic reviews were also selected. Further exclusion of case reports, editorials and non-research articles was performed to ensure methodological rigor.
- Intervention and exposure variables: Studies evaluating the impact of nutritional interventions on mental health, exploring dietary factors, including macronutrient and micronutrient intake, dietary patterns and specific food items implicated in dental caries etiology, were additionally selected.
- Outcome measures: Studies reporting relevant outcome measures, such as the incidence, prevalence, severity and progression of mental disorders, were incorporated. Among them, only studies employing standardized diagnostic criteria and assessment tools for dental caries evaluation were finally used.
- Temporal considerations: Studies conducted over varying timeframes to capture longitudinal perspectives on the relationship between nutrition and mental health were also selected.
- Publication characteristics: Additionally, we only considered studies published in peer-reviewed journals to uphold scholarly rigor.
- Geographical variation: We also searched for potential variations in nutritional practices and mental health across different geographical regions; thus, we included studies conducted in diverse global settings to enhance generalizability.
- Finally, only articles written in English and published after 2013 were included.

If there was any doubt about the inclusion of an article, this was included for full-text review. Full articles were screened independently by two authors using Rayyan. Disagreements were resolved by returning to the original article along with a third senior author (O.G.), when required. One investigator (M.D.) screened all of the included studies for the risk of bias, with a separate investigator (A.D.) independently validating the risk of bias. The Cochrane risk of bias tool was used for randomized controlled trials, and the

ROBINS-I (risk of bias in non-randomized studies of interventions) tool was used for cohort studies (Higgins et al., 2011; Sterne et al., 2016). The last search occurred on 5 June 2025.

Table 1. Details regarding the search process and unique contributions of each database to this study.

Database	Keywords	MeSH Terms (PubMed)	Initial Articles	Duplicates Removed	Final Articles for Analysis	Contribution to Study	Reason for Inclusion
PubMed	"#Mental health," #Diet, #Mental disorders, #Psychodietetics," "#Nutripsychiatry," "#Depression," "#Lifestyle," "#Weight," and "#Obesity".	#Diet, #Intervention, #Mental health, #Nutrients, #Nutrition	190	48	142	Provided a broad understanding of the interplay between diet, food consumption, dietary interventions and mental health benefits; MeSH terms ensured precision in the search for relevant literature	Widely recognized as a premier biomedical database, frequently used for systematic reviews in healthcare research
Web of Science	"#Diet," "#Mental disorders," #Psy-chodietetics," #Neuropsy-chia-try," "#De-pression," "#Life-style," "#Weight," "#Obesity, "#Food," and "#Nutrition,"	N/A (Web of Science does not use MeSH terms)	5	3	2	Enhanced the overall coverage of literature related to dietary interventions, and their impact on mental health	Provides a multidisci-plinary approach, covering a wide range of scientific disciplines
Scopus	"#Diet," "#Mental disorders," "#Psy-chodietetics," #Neuropsychia-try, "#Depression," "#Lifestyle," "#Weight," and "#Obesity."	#Diet, #Inter-ventions, #Mental health	12	9	3	Strengthened the evidence base by focusing on diet interventions and their impact on mental health; MeSH terms ensured specificity in selecting relevant literature	Renowned for systematic reviews and emphasizing evidence-based interventions in healthcare research
Cochrane Library	"# Diet," "#Interventions," "#Nutrition," "#Mental health", "#Supplementation" and "#Diet"	#Diet, #Inter-ventions, #Mental health	30	28	2	Strengthened the evidence base by focusing on bioactive compounds in meals and snacks related to evidence-based interventions; MeSH terms ensured specificity in selecting relevant literature	Renowned for systematic reviews and emphasizing evidence-based interventions in healthcare research

Table 2. Inclusion and exclusion criteria.

Inclusion Criteria	Exclusion Criteria
Published in English	Non-original research (such as reviews, case reports and practical guidelines)
Randomized controlled trials or cohort studies	Not a human study
Participants aged 1–18 years old	No comparator group (i.e., control or alternative dietary intervention)
Healthy participants or patients with mental disorders (MD)	
Studies with a minimum 3-month follow-up and a minimum of 50 participants	Studies published before 2013

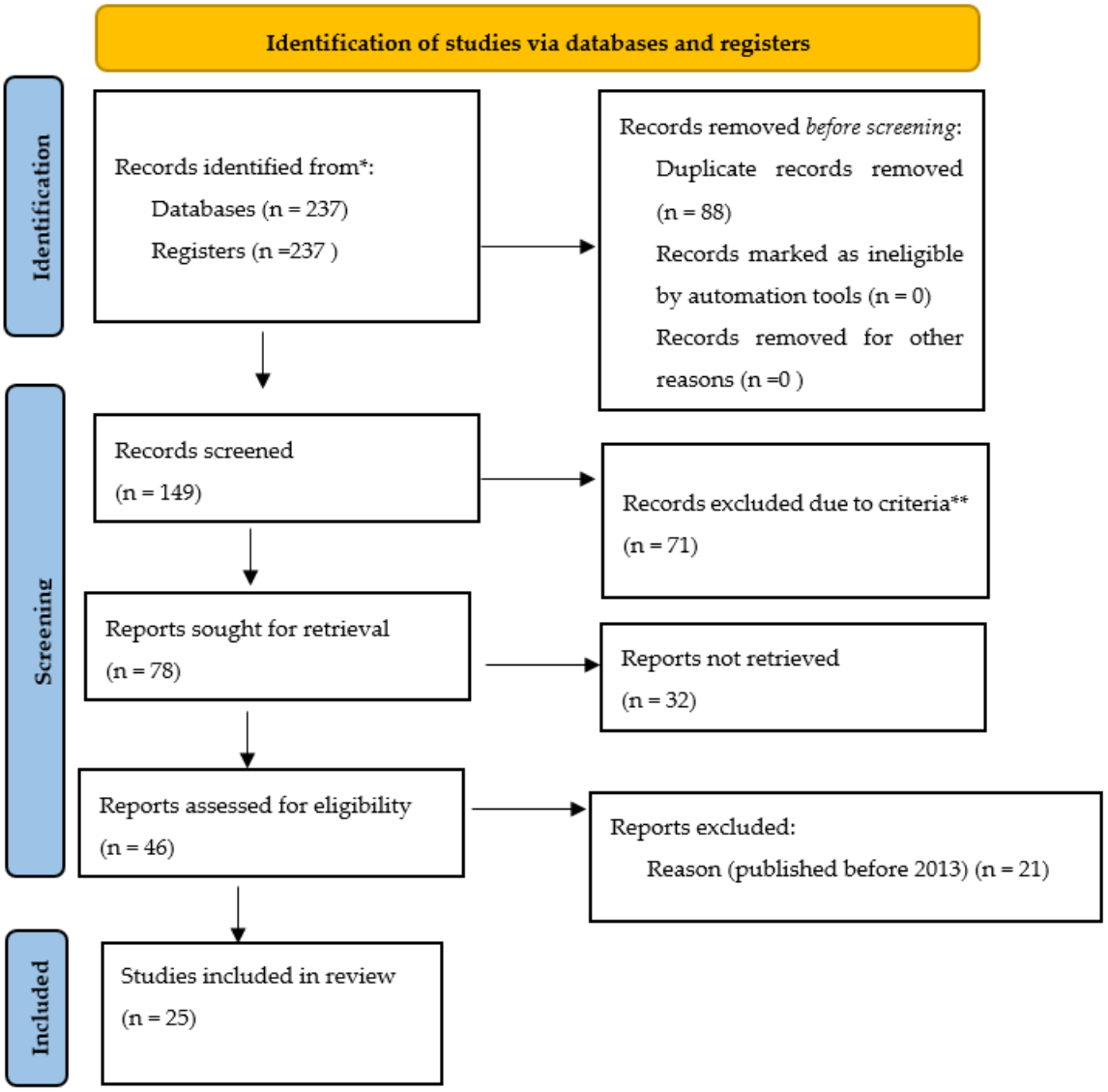


Figure 1. PRISMA flow chart of the study (version 2020) (studies included in Table 1). * PubMed 190, Web of Science 5, Scopus 12, Cochrane Library 30. ** Excluded by the researchers due to sample parameters (small sample) or examined/analyzed varieties that were not included in this systematic review. The selection criteria were interventions investigating the effects of mental health from inception to 21 July 2013.

3. Results

3.1. Mediterranean Diet and Depression

Depression and anxiety affect millions of people worldwide, and there is growing evidence that dietary habits can influence both the onset and treatment of these mental health conditions (Chen et al., 2023). Recent studies have found that a diet high in extremely processed foods may be associated with an increase in depressive symptoms, while a diet rich in vegetables, whole grains, healthy fats and lean proteins is often associated with a more stable mood (Godos et al., 2023; Gómez-Donoso et al., 2020).

On the other hand, the Med Diet has been increasingly studied for its potential positive effects on mental health, particularly its protective role against depression. We note one of the first randomized controlled trials showing that participants with moderate-to-severe depression who followed a Mediterranean-style diet for 12 weeks had significantly improved depression scores compared to those receiving social support (Jacka et al., 2017). A large, long-term Spanish study found that adherence to the Mediterranean diet was associated with a lower risk of developing depression (Sánchez-Villegas et al., 2015). A recent study in *Nutrients* found that adherence to a Mediterranean diet was associated with a 40–45% lower risk of depression (Oddo et al., 2022). A recent study supported these findings, suggesting that dietary patterns like the Mediterranean diet can prevent or reduce depressive symptoms (Carcelén-Fraile et al., 2024). The Mediterranean diet appears to reduce the risk of depression and may improve symptoms in those already diagnosed, likely due to its anti-inflammatory, nutrient-dense and gut-supportive nature (Parletta et al., 2019). The explanation is that the Med diet includes fiber-rich foods and fermented dairy, which enhance gut health, which in turn supports mood regulation via the gut–brain axis; includes whole grains and healthy fats, which help prevent blood sugar spikes, reducing mood swings and fatigue; and is rich in anti-inflammatory foods (e.g., olive oil, fatty fish, fruits and vegetables) and B-vitamins, omega-3 fatty acids, magnesium and polyphenols—all essential for brain health and neurotransmitter function (Wade et al., 2019).

3.2. MIND Diet and Cognitive Health

In addition, research suggests that nutrients such as magnesium, folate, zinc and vitamin D are associated with improved mood and cognitive function (Tardy et al., 2020). While attention to nutrition cannot replace therapy or medication, it can serve as a complementary tool in a comprehensive treatment plan (Grider et al., 2021). As everyone's nutritional needs are different due to factors such as genetics, allergies, preferences, culture and food availability, it is important to seek advice from a registered dietitian or nutritionist to develop an individualized approach (De Martinis et al., 2020). The different dietary patterns examined in the 25 studies in this systematic review (Table 3) offer valuable insights, with each approach offering different benefits. These diets can be tailored to individual needs, health conditions and cultural backgrounds.

One of these diet patterns, the MIND diet, specifically emphasizes foods and nutrients proven to support cognitive function and protect against neurodegeneration. Older adults who closely followed the MIND diet had up to a 53% reduced risk of Alzheimer's disease. Even moderate adherence was linked to a 35% lower risk (Morris et al., 2015). A long-term observational study found that better adherence to the MIND diet was associated with slower cognitive decline and better memory function (Smalls-Mantey et al., 2025). Participants scored the equivalent of 7.5 years younger in cognitive age when on the MIND diet (Arjmand et al., 2022). Recent studies suggest that the MIND diet may also reduce the risk of Parkinson's disease, stroke and vascular dementia, though more randomized trials are needed (Barnes et al., 2023a). This diet pattern works because it includes berries, leafy greens and olive oil, which help reduce oxidative stress and inflammation in the brain;

whole grains, fish and low sodium intake, which support cardiovascular function, crucial for maintaining blood flow to the brain; and high levels of vitamin E, B vitamins, omega-3 fatty acids and polyphenols—all linked to better brain function (Arjmand et al., 2022).

Table 3. Summary of the clinical trials we reviewed that provide statistically significant results pertaining to the beneficial effect of diet on mental health and well-being during the lifespan.

Authors	Year	Population	Intervention [1]	Outcomes and Results [2]	References
Hysing et al.	2018	N = 232 preschoolers	Randomized clinical trial. Duration = 16 weeks. Fish intervention; study kids were randomly assigned to lunch meals with fatty fish (herring/mackerel) or meat (chicken/lamb/beef) three times a week.	There was no significant statistical difference between changes in mental health and sleep for the fish-eating group compared with the meat-eating group, neither in the crude analysis nor after adjusting for intake of fish or meat.	(Hysing et al., 2018)
Li et al.	2021	N = 1334 preschoolers	A cross-sectional survey. Duration: 3 months. Child dietary diversity was assessed with the dietary diversity score (DDS), which was calculated based on nine food groups using a 24 h recall method.	A higher diet diversity was significantly associated with a lower likelihood of having symptoms of hyperactivity/inattention, peer relationship problems and prosocial behavior problems after adjustment for confounders.	(Li et al., 2021)
Adams et al.	2018	N = 67 children and adults with autism spectrum disorder (ASD) ages 3–58 years	Randomized clinical trial. Duration = 12 months. Treatment began with a special vitamin/mineral supplement, and additional treatments were added sequentially, including essential fatty acids, Epsom salt baths, carnitine, digestive enzymes, and a healthy gluten-free, casein-free, soy-free (HGCSF) diet.	The positive results of this study suggest that a comprehensive nutritional and dietary intervention is effective at improving nutritional status, non-verbal IQ, autism symptoms and other symptoms in most individuals with ASD. Parents reported that the vitamin/mineral supplements, essential fatty acids and HGCSF diet were the most beneficial.	(Adams et al., 2018)
Huberts-Bosch et al.	2025	N = 165 children with attention-deficit/hyperactivity disorder.	A prospective follow-up of a two-arm randomized, controlled study (TRACE study). Duration = 1 year. An elimination diet and healthy diet in children with attention-deficit/hyperactivity disorder.	13–15% of teachers, reported lower inattention, hyperactivity–impulsivity and emotion regulation problems after 5 weeks of the intervention compared to both dietary treatments.	(Huberts-Bosch et al., 2025)

Table 3. *Cont.*

Authors	Year	Population	Intervention [1]	Outcomes and Results [2]	References
Oddy et al.	2018	N = 843 adolescents at 14 and 17 years (y) of age.	The Western Australian Pregnancy Cohort (Raine) Study. 'Healthy' dietary pattern (high in fruit, vegetables, fish, whole-grains).	A 'Healthy' dietary pattern was associated with a minimized risk of mental health problems including depressive symptoms in adolescents, through biologically plausible pathways of adiposity and inflammation.	(Oddy et al., 2018)
Pearl et al.	2018	N = 137 adults with obesity who had lost $\geq$ 5% of initial weight in a 14-week intensive lifestyle intervention/low-calorie diet.	A randomized clinical trial. Duration = 52 weeks. A structured 1000 to 1200 kcal/d diet that included the daily consumption of four meal-replacement shakes, combined with an evening meal of a frozen-food (or shelf-stable), a garden salad, and two servings of fruit.	Larger weight losses ($\geq$10% of initial weight) were associated with greater overall improvements in physical function, self-esteem and total well-being in patients	(Pearl et al., 2018)
Dolatkhah et al.	2023	N = 60 overweight and obese women aged 40 years or older with mild-to-moderate osteoarthritis.	A randomized clinical trial. Duration: 24 weeks. An anti-inflammatory and low-calorie diet.	An anti-inflammatory and low-calorie diet resulted in greater weight loss and greater improvements in pain intensity, functional status, depression, anxiety and some dimensions of QoL.	(Dolatkhah et al., 2023)
Carcelén-Fraile et al.	2024	N = 116 older adults aged 65 or older	Randomized clinical trial. Duration: 12 weeks. Mediterranean diet (Med Diet) (an experimental group undergoing a combined resistance program and Med Diet program and a control group who did not receive any intervention).	Improvements were observed both within and between groups in anxiety, depression, perceived stress, sleep quality, sleep duration, sleep disturbances, use of medications, and the Pittsburgh Sleep Quality Index (PSQI) total score	(Carcelén-Fraile et al., 2024)
Tussing-Humphreys et al.	2017	N = 180 obese (BMI $\geq$ 30 kg/m^2 and $\leq$50.0 kg/m^2) older adults (55–85 years of age).	A randomized clinical trial. Duration = 8 months. (1) Typical Diet Control; (2) a Med Diet alone (Med Diet-A) lifestyle program; or (3) a Med Diet with lifestyle program to promote weight loss.	Moderate effect sizes on a composite score of executive function, memory and attention in the combined Med diet and weight management group were observed.	(Tussing-Humphreys et al., 2017)

Table 3. *Cont.*

Authors	Year	Population	Intervention [1]	Outcomes and Results [2]	References
Prats-Arimon et al.	2024	N = 141 adults with mild–moderate obesity, i.e., with a Body Mass Index (BMI) of 30–40.	Randomized control clinical trials. Duration = 6 months. Adherence to the Med Diet to promote positive mental health in patients with obesity and physical activity.	No significant differences were observed between the control and intervention groups for the following factors: prosocial attitude, self-control, self-esteem and interpersonal relationship skills. However, significant differences were observed in both groups for personal satisfaction, problem solving and updating, and the overall score of the Positive Mental Health (PMH) scale.	(Prats-Arimon et al., 2024)
Bayes et al.	2022	N = 72 young males (18–25 y) with depression	A randomized clinical trial. Duration: 12 weeks. Med Diet intervention in the treatment of moderate to severe depression.	Significant increases in Mediterranean Diet Adherence Score (MEDAS), decreases in Beck Depression Inventory—version II (BDI-II) score, and increases in Quality of life (QoL) scores.	(Bayes et al., 2022)
Wade et al.	2019	N = 55 participants aged between 45 and 80 years and at risk of cardiovascular disease.	A randomized clinical trial. Duration: 24 weeks. The MedPork trial was designed to evaluate the cardiovascular and cognitive effects of a Mediterranean diet supplemented with fresh, lean pork.	The modified Mediterranean diet would lead to greater improvements in cognitive functions associated with aging and dementia compared with the control diet.	(Wade et al., 2019)
Casas et al.	2023	N = 1221 pregnant women at high risk for stress and anxiety.	A randomized clinical trial. Duration = 34–36 weeks. Med diet intervention, Mindfulness-Based Stress Reduction program, or usual care.	A Mediterranean diet intervention during pregnancy is associated with a significant reduction in maternal anxiety and stress, and improvements in sleep quality throughout gestation.	(Casas et al., 2023)
Parletta et al.	2019	N = 152 adults with depression.	A randomized clinical trial. Duration = 12 weeks. Med diet intervention supplemented with fish oil can improve mental health in adults suffering depression.	There were some correlations between increased omega-3, decreased omega-6 and improved mental health.	(Parletta et al., 2019)

Table 3. *Cont.*

Authors	Year	Population	Intervention [1]	Outcomes and Results [2]	References
Schweren et al.	2021	N = 121.008 adults (age 18–93).	A cohort study. Duration = 3.5 years. Lifelines Diet Score is a food-based assessment of overall diet quality, based on international evidence for diet–disease relations and in line with the 2015 Dutch Dietary Guidelines.	Both stress and neuroticism were associated with diet quality, but diet quality in turn did not predict the development of depression/anxiety.	(Schweren et al., 2021)
Barnes et al.	2023	N = 604 overweight participants between the ages of 65 and 84 with suboptimal diets who are at risk for dementia.	A cohort study. Duration = 3 years. The effects of the Mediterranean-DASH Intervention for Neurodegenerative Delay (MIND) diet on a global measure of cognition based on 12 individual cognitive tests.	Pre-pandemic, researchers observed a significant, positive effect of MIND on change in cognition over two years compared to placebo/usual diet.	(Barnes et al., 2023a)
Meegan et al.	2017	N = 3043 participants.	Cross-sectional study conducted between 2010 and 2011. The DASH score was calculated to examine potential associations between dietary quality, dietary composition and compliance with food pyramid recommendations with depressive symptoms, anxiety and well-being.	Daily fruit and vegetable consumption was higher among those reporting well-being. Those with high dietary quality were more likely to report well-being.	(Meegan et al., 2017)
Daneshzad et al.	2022	N = 66 women with type 2 diabetes.	A randomized clinical trial. Duration = 12 weeks. The effect of DASH diet on sleep status, mental health and hormonal changes among Iranian women.	Significantly decreases testosterone, post-prandial glucose responses and advanced glycation end product (AGE) levels, as well as sleep, depression and anxiety scores in women with type 2 diabetes.	(Daneshzad et al., 2022)
Jacka et al.	2017	N = 166 adults with depression.	A randomized clinical trial. Duration = 12 weeks. A total of 21 were using psychotherapy and pharmacotherapy combined; 9 were exclusively using psychotherapy; and 25 were only using pharmacotherapy. There were 31 in the diet support group and 25 in the social support control group who had complete data at 12 weeks.	The dietary support group demonstrated significantly greater improvement between baseline and 12 weeks on the Montgomery–Åsberg Depression Rating Scale (MADRS).	(Jacka et al., 2017)

Table 3. *Cont.*

Authors	Year	Population	Intervention [1]	Outcomes and Results [2]	References
Arab et al.	2022	N = 102 women with migraine (20–50 years).	A randomized clinical trial. Duration = 12 weeks. A total of 51 followed the DASH diet, and 51 participated in the usual dietary advice (control) groups.	The QoL and anxiety outcomes remained comparable, but there were improved migraine health outcomes in reproductive-aged women with the DASH diet.	(Arab et al., 2022)
Caprio et al.	2023	N = 58 adults with a body mass index > 27 kg/m^2.	A randomized clinical trial. Duration: 24 weeks. A very low-calorie ketogenic diet (VLCKD) compared to a hypocaloric balanced diet (HBD).	Inflammatory indexes, namely C-reactive protein (CRP), neutrophil-to-lymphocyte ratio (NLR) and total white blood cell count (WBC), were significantly reduced ($p < 0.05$) in the VLCKD group at week 12. Aldosterone plasma levels were significantly increased in both groups at week 8.	(Caprio et al., 2023)
Longhitano et al.	2024	N = 100 non-hospitalized adult participants with a diagnosis of bipolar disorder, schizoaffective disorder or schizophrenia who were capable of consenting and willing to change their diets.	A randomized clinical trial. Duration = 14 weeks. Ketogenic diet compared to a diet following the Australian Guide to Healthy Eating.	Ketogenic metabolic therapy was well tolerated and resulted in improved psychiatric and metabolic outcomes as well as global measures of social and community functioning.	(Longhitano et al., 2024)
Brinkworth et al.	2016	N = 150 obese adults with type 2 diabetes.	A randomized controlled diet. Duration = 1 year. Effects of very low-carbohydrate and high-carbohydrate weight-loss diets on psychological health.	Both diets achieved substantial weight loss and comparable improvements in QoL, mood state and affect.	(Brinkworth et al., 2016)
Agarwal et al.	2015	N = 292 adults with body mass index $\geq$ 25 kg/m^2 and/or previous diagnosis of type 2 diabetes.	A randomized clinical trial. Duration = 18 weeks. Weekly instruction in following a vegan diet or no instruction was given.	A dietary intervention improves depression, anxiety and productivity.	(Agarwal et al., 2015)
Kahleov et al.	2020	N = 168 overweight adults aged 25 to 75 years.	A randomized clinical trial. Duration = 16 weeks. Low-fat vegan diet.	A low-fat vegan diet induced significant changes in gut microbiota, which were related to changes in weight, body composition and insulin sensitivity in overweight adults.	(Kahleova et al., 2020)

[1] DDS, dietary diversity score. Med Diet, Mediterranean diet. DASH diet, Dietary Approaches to Stop Hypertension diet. VLCKD, very low-calorie ketogenic diet. HBD, hypocaloric balanced diet. MIND, Mediterranean-DASH Intervention for Neurodegenerative Delay diet. [2] PSQI, Pittsburgh Sleep Quality Index. MEDAS, Mediterranean Diet Adherence Score. BDI-II, Beck Depression Inventory—version II. QoL, quality of life. MADRS, Montgomery–Åsberg Depression Rating Scale. AGEs, advanced glycation end products. CRP, C-reactive protein. NLR, neutrophil-to-lymphocyte ratio. WBC, total white blood cell count.

3.3. Plant-Based Diets and Stress, and Processed Food and Mental Health

Contrary to public health recommendations, processed foods tend to be high in sugar, unhealthy fats and artificial additives. Common examples include packaged snacks (such as crisps and crackers), sugary breakfast cereals, soft drinks and other sweetened beverages, processed meats (such as hot dogs and sausages) and fast food. In the short term, eating processed foods can lead to blood sugar fluctuations, which can cause irritability and fatigue. In the long term, studies suggest that regular consumption of fast food and packaged pastries can negatively impact brain function, disrupt gut health and increase inflammation (Rondinella et al., 2025; Song et al., 2023). These foods can also affect the gut microbiome in a way that hinders the production of serotonin, a neurotransmitter important for mood regulation (Zhang et al., 2018). Over time, the cumulative effects of such dietary habits can increase the risk of developing mental health problems (Song et al., 2023).

A plant-based diet focuses on foods derived from plants—vegetables, fruits, whole grains, legumes, nuts and seeds—with minimal to no animal products, and is naturally rich in anti-inflammatory compounds like polyphenols, flavonoids and omega-3s (from sources like walnuts and chia seeds) (Bizzozero-Peroni et al., 2025). A fiber-rich diet promotes diverse and healthy gut bacteria, which communicate with the brain via the gut–brain axis. This can help regulate mood, anxiety and stress responses (Mladenović et al., 2023). Some small studies and observational data suggest that plant-based eaters may have lower levels of cortisol, the stress hormone (Haghighatdoost et al., 2023). Nutrients like magnesium, folate, B-vitamins and zinc—all abundant in plant foods—support neurotransmitter function and stress regulation. A poorly planned plant-based diet can lead to deficiencies (e.g., B12, omega-3s, iron), which can negatively affect mood. Extremely low protein or fat intake may also impact hormonal and neurological health (Mladenović et al., 2023).

4. Discussion

While general guidelines can be useful, personalized nutrition is often the key (Figure 2). This systematic review emphasized the dietary factors to which people should pay attention for wellness, and it seems that observing how the body and mind respond after meals can be another valuable way to tailor eating patterns to individual needs (Adan et al., 2019). The bioactive compounds that have especially significant roles in wellness and mental health during the lifespan are shown in Figures 3 and 4 (Godos et al., 2020; Muscaritoli, 2021).

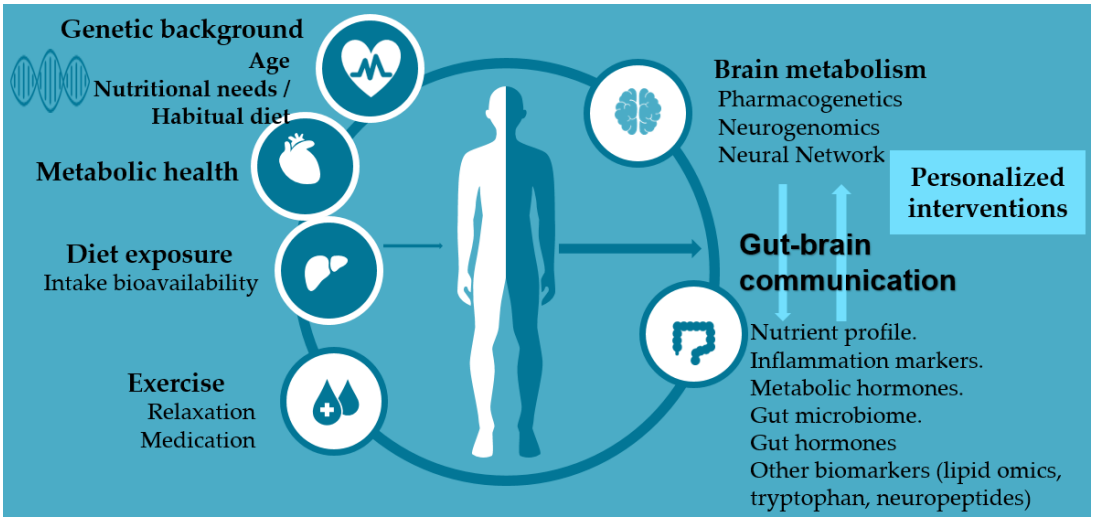


Figure 2. The link between the gut–brain axis, diet interventions and mental disorders after clinical assessment and neuroimaging, biomarkers and omics (Adan et al., 2019).

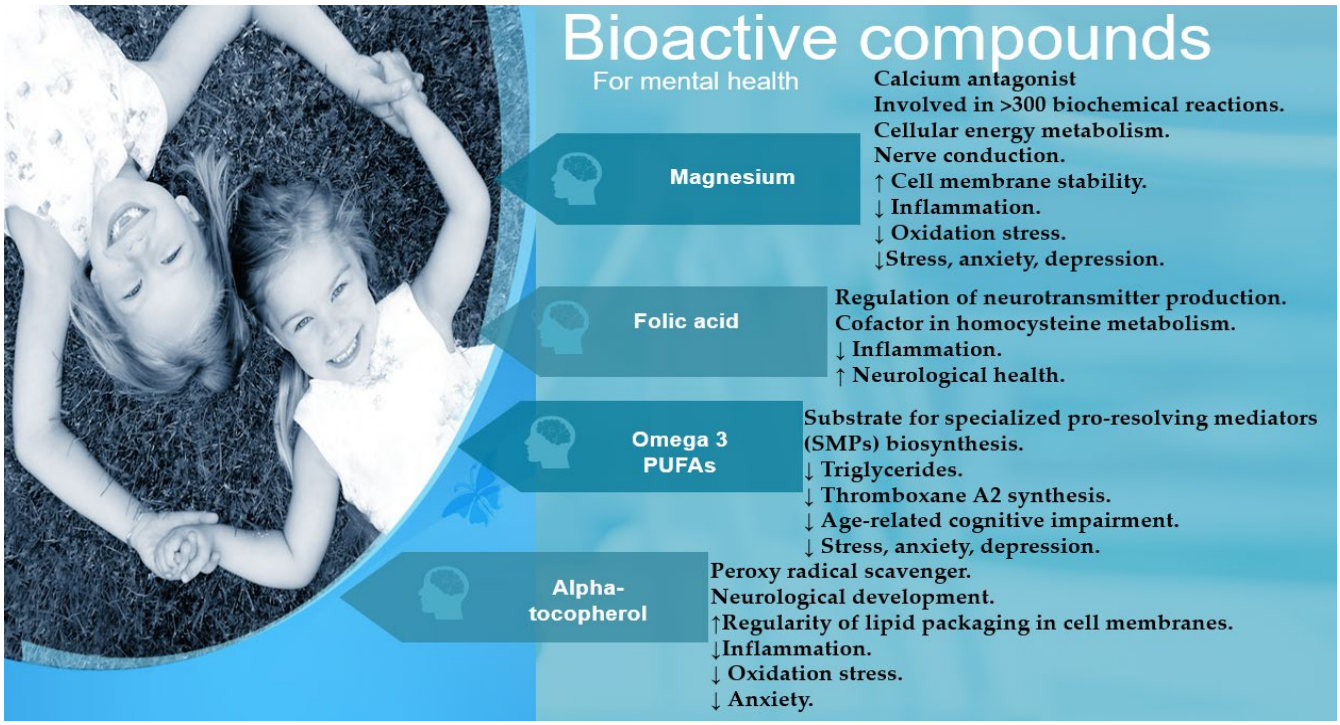


Figure 3. Description of bioactive compounds' mechanism of action for mental health (symbols meaning ↑ increase ↓ reduce) (Muscaritoli, 2021).

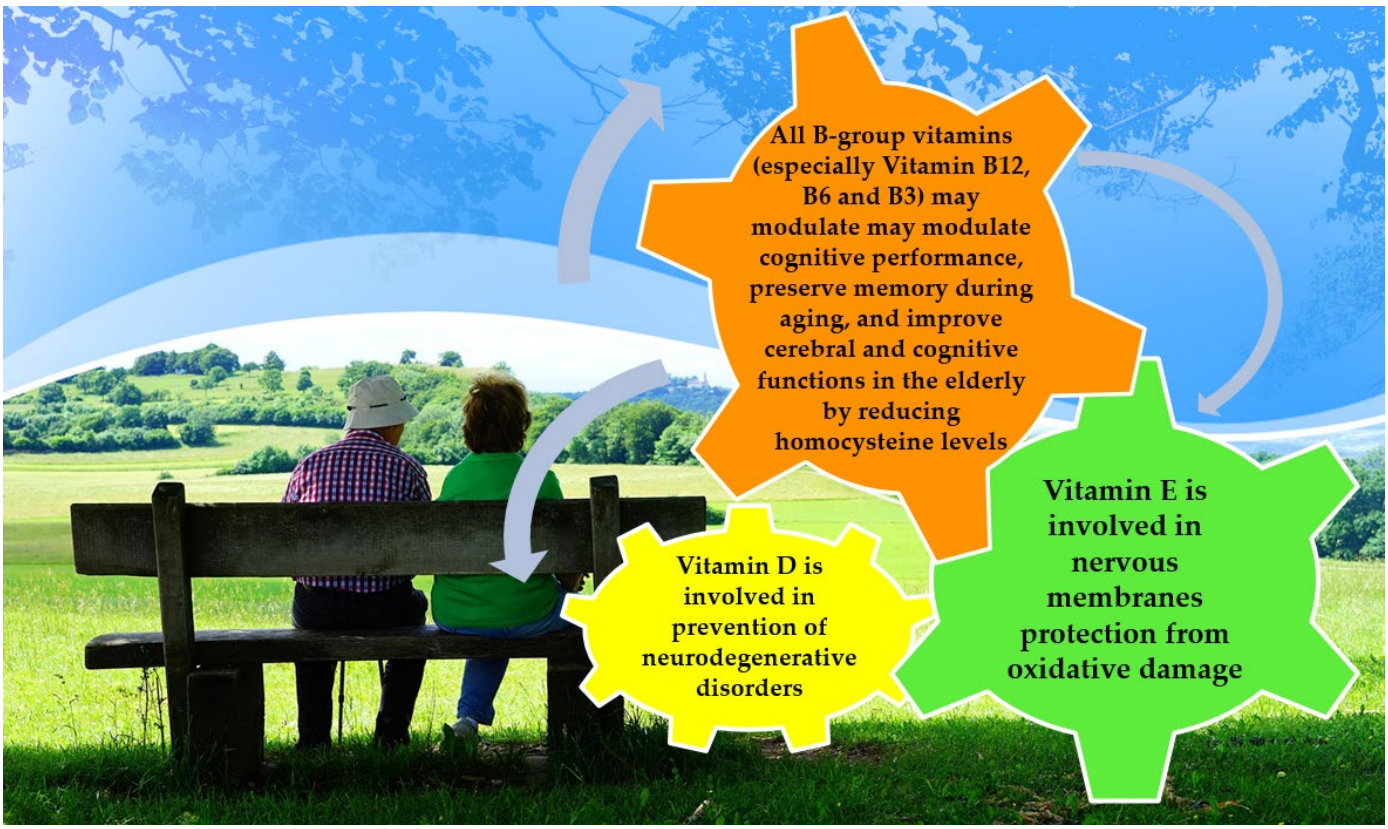


Figure 4. Vitamins are important for mental health during the lifespan (Godos et al., 2020).

4.1. Main Findings

By analyzing randomized clinical trials from major scientific databases, the systematic review identifies dietary patterns that support psychological well-being. Notably, the

Mediterranean diet has been shown to reduce depressive symptoms by up to 45%, thanks to its anti-inflammatory and neuroprotective properties. Similarly, the MIND diet and whole-food plant-based diets improve mood and reduce inflammation in individuals experiencing chronic stress. These diets are rich in antioxidants, phytochemicals and fiber, which help regulate neurotransmitters and reduce oxidative stress. The systematic review emphasizes the urgent need to incorporate nutritional strategies into public health policies to promote both physical and mental health. The key findings from 22 randomized clinical nutritional trials undertaken to identify dietary patterns most beneficial for mental health are that the Med Diet seems to be the most beneficial—representing 9 interventions, almost half of the studies—for mental health and well-being (Table 1) (Carcelén-Fraile et al., 2024; Tussing-Humphreys et al., 2017; Prats-Arimon et al., 2024; Bayes et al., 2022; Wade et al., 2019; Casas et al., 2023; Parletta et al., 2019; Dolatkhah et al., 2023; Oddy et al., 2018). Secondly, the MIND diet and whole-food plant-based diets showed positive effects on depressive symptoms, systemic inflammation and cognitive well-being in five clinical trials, but more studies with more participants and longer durations are needed.

Specifically, the most important finding of this systematic review (Figure 1) is the role of the Med Diet (Bayes et al., 2022; Carcelén-Fraile et al., 2024) and physical activity in improving psychological well-being and quality of life (Table 1). Secondly, it was found that eating more plant-based foods and less processed foods can reduce the risk of anxiety symptoms (Lee et al., 2025). The same results were found in a randomized controlled clinical trial in overweight participants (Kahleova et al., 2020). The study used data from the Australian Longitudinal Study of Women's Health, which examined over 20,000 women, to understand the relationship between diet and anxiety. Carcelén-Fraile et al. found an improvement in sleep quality and duration, which is likely related to the high dose of tryptophan and magnesium in the diet (Carcelén-Fraile et al., 2024). In addition to significant results for sleep quality, there were measurable improvements in anxiety, mood swings and perceived stress. In another diet based on the Med Diet, improvements were observed in psycho-emotional levels, personal satisfaction and problems due to the synergistic effect of exercise (Prats-Arimon et al., 2024). Since, according to a MedPork study, the sample has an increased risk of cardiovascular disease and thus also of dementia, cognitive changes may be less likely in younger participants who have not yet experienced age-related cognitive decline (Wade et al., 2019). The IMPACT-BCN study also suggested adjusting diet during pregnancy for well-being (Casas et al., 2023). The questionnaires or instruments most commonly used to assess changes in participants' daily lives were the PSQI (Carcelén-Fraile et al., 2024), QoL, BDI-II, World Health Organisation Quality of Life Assessment (Bayes et al., 2022; Longhitano et al., 2024), Visual Analogue Pain Scale (VAS), Beck Depression Inventory (BDI-II), Beck Anxiety Inventory (BAI-I) and Short Form 36 Health Survey Questionnaire (Dolatkhah et al., 2023). In recent years, migraine has also been investigated using the Headache Impact Test-6 (HIT-6) and the Short Form Health Survey-36 (SF-36) (Caprio et al., 2023), and a recent study suggested that the MIND diet may be key (Adan et al., 2019). According to the cohort study of 121,008 adults, diet quality plays no mediating role in the relationship between stress/neuroticism and common mental health problems (Schweren et al., 2021), but the SMILE clinical trial proposes a healthy diet for patients with major depression problems as a strategy to face comorbidities (O'Neil et al., 2013). On the other hand, during childhood, an elimination diet may trigger attention-deficit/hyperactivity disorder problems (Huberts-Bosch et al., 2025) but a gluten-free diet may help children with autism spectrum disorders, as shown in a 6-week trial (Ghalichi et al., 2016) and a longer randomized clinical trial (Adams et al., 2018). However, in another study, there were no differences between groups in autistic symptoms, maladaptive behaviors or intellectual abilities after the intervention

(Piwowarczyk et al., 2020), and diet diversity could improve child mental health (Li et al., 2021). During adulthood and adolescence, a 'Healthy' dietary pattern may protect against depression through reducing body mass index and associated inflammation (Oddy et al., 2018). Certain patterns (Mediterranean, MIND, plant-based) showed significant effects, but further research with larger samples and long-term follow-up is required.

4.2. Comparison with Previous Research

In society, food is often emphasized in the context of weight loss or appearance, but shifting the focus to nutrition and emotional well-being can help a person build a healthier relationship with food (Merino et al., 2024). Viewing food as fuel for mental and physical functioning, rather than as a means to achieve a particular body type, may lead to more sustainable, compassionate eating habits (Pretty et al., 2017). This systematic review of cohort and randomized controlled clinical trials (Tables 1 and 2) showed that greater adherence to healthy dietary patterns, including healthy (Dolatkhah et al., 2023), Mediterranean (Bayes et al., 2022; Carcelén-Fraile et al., 2024), vegan (with a higher proportion of plant-based foods compared to animal-based foods) (Agarwal et al., 2015) and low-fat diets, was associated with a lower likelihood of depression (Kahleova et al., 2020). Although high meat consumption was only associated with an increase in functionality in one study (Longhitano et al., 2024), the ketogenic diet is one of the most promising approaches to combating migraine (Caprio et al., 2023), as is the DASH diet, with a high proportion of vegetables, fruit, low-fat dairy products, lean meat and whole meal products (Arab et al., 2022; Arnoldy et al., 2025). The results have shown that the Med Diet reduces depressive symptoms by 32–45%, as this dietary pattern is rich in polyphenols, omega-3 fatty acids and fiber, lowers systemic inflammation, promotes gut diversity and improves dopamine and serotonin modulation (Bayes et al., 2022; Carcelén-Fraile et al., 2024). On the other hand, the MIND diet (with daily leafy greens, fish at least twice a week, whole grains, legumes, olive oil and nuts) and whole-food plant-based diets lower CRP and improve mood in patients with chronic stress and fatigue (Barnes et al., 2023b; Kamrani et al., 2024; Timlin et al., 2025). Plant-based diets provide antioxidants and phytochemicals that neutralize oxidative stress in neurons (Agarwal et al., 2015; Almuntashiri et al., 2025). These dietary patterns tend to be rich in fiber, which can support gut health and help regulate neurotransmitters (Petrut et al., 2025). Finally, anti-inflammatory diets counteract 'neuroinflammation', which affects cognition and memory, with recommended foods such as turmeric (curcumin), ginger, green tea, oily fish, dark fruits and vegetables (Dolatkhah et al., 2023).

According to the results of the diet interventions, it is necessary to create a healthy eating plan that suits patients' or healthy adults' bodies, their minds and their particular circumstances. Health professionals often need to approach the process with self-compassion. Focusing on nutrition rather than restriction is key to overall wellness, especially for people recovering from eating disorders or long-standing body image issues (Wiss & LaFata, 2024). Ideally, eating should not be a source of guilt or stress. Rather, it can be integrated into a broader mindfulness practice of tuning into the signals of hunger and satiety, appreciating flavors and letting go of perfectionism. This approach can contribute to better mental health and lay the foundation for healing by fostering a more conscious and mindful relationship with food (Nelson, 2017).

While the gut is processing food, it is also constantly communicating with the brain. Recent studies have increasingly emphasized the influence of the gut microbiome on mood regulation, ranging from serotonin production to neuronal inflammation (Damiani et al., 2023). An unhealthy or imbalanced gut can lead to mood disorders, cognitive fog and fatigue, while a healthy gut—nourished by fermented foods, prebiotics and probiotics—can support brain function and emotional stability (Alzubide & Alhalafi, 2024). Probiotics

include several well-researched compounds such as flavonoids (Park et al., 2020), docosahexaenoic acid (omega-3) (Ciappolino et al., 2019), lutein and astaxanthin (Nouchi et al., 2020), lycopene (Głąbska et al., 2025) and specific probiotic strains such as Lactobacillus helveticus R0052 and Bifidobacterium longum R0175 (Vaghef-Mehrabany et al., 2020).

4.3. Strengths and Limitations

This systematic review tried to include the most randomized clinical trials, taking into account follow-up duration One limitation is the heterogeneity of the interventions and the fact that most of these interventions did not include moderate, personalized calorie restriction or regular physical activity—both of which could massively improve metabolic and thus cognitive outcomes.

4.4. Practical Implications for Clinicians and Public Health

Supporting mental health with nutrient-rich foods can lead to improved mood and cognitive function (Kuroda et al., 2019). In addition, reducing sugar and highly processed foods can help restore balance and promote mental clarity (Wiss & LaFata, 2024). Again, health professionals should offer a personalized approach to nutrition, as everyone is different and the foods on this list may not align with each individual's preferences, culture, food restrictions or dietary goals (Adan et al., 2019). Some of the nutrient-rich foods included in the dietary interventions were as follows:

1. Fatty fish or fish oil supplements: Omega-3 fatty acids, found in salmon and mackerel, can improve brain function and mood stability (Parletta et al., 2019). Omega-3 treatment improved autism traits such as stereotypic behavior and social communication in children with autism in randomized clinical trials with or without vitamin D supplementation (Doaei et al., 2021; Mazahery et al., 2019).
2. Green leafy vegetables (spinach, kale lettuce and collard greens) are rich in folic acid and magnesium, which can help fight depression (Carcelén-Fraile et al., 2024; Sarma & TR, 2024).
3. Blueberries or other fruits (watermelon, grape, peach, pomegranate, banana, apple or even dried fig) are rich in antioxidants that can protect the brain from oxidative stress. Bananas also provide vitamin B6 and tryptophan for serotonin production (Kahleova et al., 2020; Tavakkoli-Kakhki et al., 2015).
4. Walnuts and almonds contain healthy fats and have been linked to improved cognitive performance (Jacka et al., 2017; Tavakkoli-Kakhki et al., 2015).
5. Oats help stabilize blood sugar and can provide long-lasting energy (Carcelén-Fraile et al., 2024). Thyroid hormones influence how the body processes glucose. Thyroid stimulating hormone (TSH) levels of 2 mIU/L promote good sleep and mood; higher levels (5.2 mIU/L) have been associated with fatigue, weight gain and constipation (Munipalli et al., 2022).
6. Yoghurt and kefir support gut health through probiotics (Dahiya & Nigam, 2023). Vitamin D supplementation also influences the treatment success for depressive symptoms (Föcker et al., 2018). People with vitamin D levels of 20 ng/mL showed symptoms such as constant fatigue and depressive mood, but higher levels in blood tests (70 mg/mL) were associated with strong immunity and mental health (Munipalli et al., 2022).
7. Avocados are rich in healthy fats and mood-boosting B vitamins (Chawla, 2018). In particular, a vitamin B12 level of 650 pg/mL or more than 400 pg/mL helps with brain fog, difficulty concentrating and forgetfulness (Munipalli et al., 2022).
8. Dark chocolate contains flavonoids that can improve mood and reduce stress hormones (Chawla, 2018). Several chemical compounds (tyramine, theobromine, pheny-

lalanine, caffeine, etc.) are present in dark chocolate, which are responsible for the stimulating effect on the brain (Samanta et al., 2022).

9. Chickpeas and other legumes are a source of fiber, protein and iron (Kahleova et al., 2020). A total protein content of 78 g/L can ensure good recovery and mental health, while a lower content of 61 g/L is associated with fatigue and weakness. Iron stores also play an important role in combating anxiety; a ferritin level of 75 mcg/L can lead to chronic fatigue and brain fog (Munipalli et al., 2022).
10. Extra Virgin Olive Oil (EVOO) consumption by patients with mild cognitive impairment attenuates oxidative and nitrative stress, as reflected by reductions in PARP levels and DNA damage (50 mcg/L EVOO for one year) (Tzekaki et al., 2021).
11. While sparkling water is not a primary source of lithium, it can be part of a person's overall fluid intake that contributes to daily lithium consumption. Studies suggest that higher levels of lithium in drinking water, even at trace levels, may be associated with lower suicide rates (Brown et al., 2018).
12. Aromatic and therapeutic plants such as basil, coriander, peppermint and dill have revealed preventive effects on depression or its complications (Tavakkoli-Kakhki et al., 2015).

Food plays an important role in influencing our physical, emotional and mental state. Although nutrition alone does not replace therapy or medication, it can be a valuable complementary aspect of mental healthcare (Chang de Pinho et al., 2024). The following points should be given special attention when treating depression or achieving wellness: (1) People should take anti-inflammatory agents that cross the blood–brain barrier and regulate/calm inflammation, as well as bioactive compounds such as apigenin and luteolin that cross the blood–brain barrier and regulate inflammation (Dolatkhah et al., 2023). (2) Special metabiotics, known as "psychobiotics" because they alter the psyche, in combination with specialized bacteria such as *L. rhamnosus* and *B. longum* with proven anxiolytic and antidepressant effects may be beneficial. In addition, special polyphenols such as quercetin and resveratrol reduce lipopolysaccharide toxins (lipopolysaccharides of dangerous bacteria) (Godos et al., 2020). (3) The main characteristics of people with resistant depression are a lack of energy, chronic fatigue, poor memory and brain fog because they have dysfunctional mitochondria. The use of enzymes—coenzymes and catalyzers—is proposed to restore mitochondrial function (Munipalli et al., 2022). (4) It is important to consider the regulation of insulin levels in the brain. One could suggest drugs such as metformin, but this has many side effects. The main role is played by elements such as BDNF and AMPK, along with proper diet and eating times (Steffens, 2024), which could be a solution with or without drugs such as metformin, as drugs have side effects.

Therapy can provide a safe space in which to explore emotional challenges related to eating and receive support for any mental health issues (Uscher-Pines et al., 2020). While in-person therapy is the traditional approach to mental healthcare, online treatment is also available (Bulkes et al., 2022). For many mental health patients, this newer method offers more convenience and affordability by providing the opportunity to connect with a licensed mental health professional from the comfort of home, at a cost that is less than that of most in-person sessions without insurance.

An online therapy provider can work with clients to address the role of eating in overall mental health and help someone take a more comprehensive and compassionate approach to well-being. Research suggests that online therapies are often as effective as traditional in-person treatments (Venkatesan et al., 2020). Future research is needed to better understand how nutrition and nutrition-related biological mechanisms impact behavioral health disorders. Although further research on mental health is needed to fully understand these relationships, this systematic review suggests that dietary choices may play a role in the long-term maintenance of cognitive and mental health (Figure 5).



Figure 5. Science and psychology of wellness (Cagigas et al., 2025).

5. Conclusions

This study showed a strong correlation between mental health, nutrition and general well-being. Eating nutrient-rich foods that help people feel better can have a variety of health benefits and potentially play an important role in self-care for the body and mind. By choosing the most nutrient-dense foods possible and adopting mindful eating habits, individuals can better support their mental and emotional health. The Med Diet could reduce depressive symptoms, thanks to its anti-inflammatory and neuroprotective properties; the MIND Diet and whole food plant-based diets lower inflammation and improve mood in patients with chronic stress and fatigue; and plant-based diets provide antioxidants and phytochemicals that neutralize oxidative stress in neurons. Integrating dietary changes with professional support can provide a more comprehensive path to emotional resilience and overall well-being. As concerns future research, integrated strategies focusing on psychobiotics, omega-3 fatty acids and antioxidants, including astaxanthin, and investigating the mechanisms of action and also understanding the impact of psychiatric medications on the gut microbiome are essential. However, it is important to realize that diet is only one of many factors that can influence mental health. Genetics, environment, stress and medical conditions can also contribute to individual outcomes. Nutrition can play a helpful role as part of a broader strategy to promote physical and mental health. This systematic review emphasizes that certain patterns (Mediterranean, MIND plant-based) showed significant effects, but further research with larger samples and long-term follow-up is required and there is an urgent need to incorporate nutritional strategies into public health policies to promote both physical and mental health.

Author Contributions: Conceptualization, O.G., M.D. and A.D.; methodology, M.D. and A.D.; software, M.D.; validation, O.G., M.D. and A.D.; formal analysis, M.D.; investigation, O.G., M.D. and A.D.; resources, M.D. and A.D.; data curation, O.G., M.D. and A.D.; writing—original draft preparation, M.D. and A.D.; writing—review and editing, O.G., M.D. and A.D.; visualization, O.G.; supervision, O.G. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Not available.

Acknowledgments: The authors have reviewed and edited the output and take full responsibility for the content of this publication.

Conflicts of Interest: Author Olga Gortzi was employed by the company POSS—Driving Innovation in Functional Foods PCC. The remaining authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Appendix A

Table A1. PRISMA checklist (Page et al., 2021).

Section/Topic	#	Checklist Item	Reported on Page
INFORMATION SOURCES AND METHODS			
Database name	1	Name each individual database searched, stating the platform for each.	2–5
Multi-database searching	2	If databases were searched simultaneously on a single platform, state the name of the platform, listing all of the databases searched.	2–5
Study registries	3	List any study registries searched.	3–4
Online resources and browsing	4	Describe any online or print source purposefully searched or browsed (e.g., tables of contents, print conference proceedings, web sites), and how this was done.	3
Citation searching	5	Indicate whether cited references or citing references were examined, and describe any methods used for locating cited/citing references (e.g., browsing reference lists, using a citation index, setting up email alerts for references citing included studies).	3–5
Contacts	6	Indicate whether additional studies or data were sought by contacting authors, experts, manufacturers, or others.	3
Other methods	7	Describe any additional information sources or search methods used.	3
SEARCH STRATEGIES			
Full search strategies	8	Include the search strategies for each database and information source, copied and pasted exactly as run.	2–5
Limits and restrictions	9	Specify that no limits were used, or describe any limits or restrictions applied to a search (e.g., date or time period, language, study design) and provide justification for their use.	2–5
Search filters	10	Indicate whether published search filters were used (as originally designed or modified), and if so, cite the filter(s) used.	3
Prior work	11	Indicate when search strategies from other literature reviews were adapted or reused for a substantive part or all of the search, citing the previous review(s).	3
Updates	12	Report the methods used to update the search(es) (e.g., rerunning searches, email alerts).	3
Dates of searches	13	For each search strategy, provide the date when the last search occurred.	2, 3
PEER REVIEW			
Peer review	14	Describe any search peer review process.	3
MANAGING RECORDS			
Total Records	15	Document the total number of records identified from each database and other information sources.	5
Deduplication	16	Describe the processes and any software used to deduplicate records from multiple database searches and other information sources.	3

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