Mental Health and Lifestyle Medicine Journal

Year 2024
Volume 2
Issue 2

Unhealthy Diet and Inconsistent Sleep as Predictors of Mood Disorders in Adults

Aman Ullah. Chaudhary[1*]

1 Department of Psychology, Haripur University, Islamabad, Pakistan (Email: amanullah@uoh.edu.pk)

Article type:
Original Research

Article history:
Received 21 February 2024
Revised 12 March 2024
Accepted 26 March 2024
Published online 01 April 2024

ABSTRACT

This study aimed to investigate the predictive relationship between unhealthy dietary habits, inconsistent sleep patterns, and mood disorders in a sample of Pakistani adults. A correlational descriptive design was employed with a sample of 388 adult participants selected based on the Krejcie and Morgan sample size table. Standardized instruments were used to assess the variables: the Depression Anxiety Stress Scales-21 (DASS-21) measured mood disorders, the Dietary Screening Tool (DST) assessed diet quality, and the Pittsburgh Sleep Quality Index (PSQI) evaluated sleep consistency. Data were analyzed using SPSS version 27, with Pearson correlation used to examine bivariate relationships and standard multiple linear regression applied to assess the combined predictive power of unhealthy diet and inconsistent sleep on mood disorder symptoms. Pearson correlation analysis revealed significant positive associations between mood disorders and both unhealthy diet ($r = .48$, $p < .01$) and inconsistent sleep ($r = .55$, $p < .01$). The regression model was statistically significant, $F(2, 385) = 110.32$, $p < .001$, with an R^2 value of .37, indicating that 37% of the variance in mood disorder symptoms was explained by the combined effect of the two predictors. In the multivariate model, both unhealthy diet ($\beta = .31$, $t = 6.42$, $p < .001$) and inconsistent sleep ($\beta = .42$, $t = 7.54$, $p < .001$) emerged as significant predictors of mood disorders. The findings suggest that both poor dietary habits and irregular sleep patterns are strong, independent predictors of mood disorder symptoms in adults. These modifiable lifestyle factors should be prioritized in preventive mental health strategies, especially in low-resource settings where formal psychological support may be limited.

Keywords: Mood disorders, unhealthy diet, inconsistent sleep, lifestyle predictors, adult mental health.

How to cite this article:
Chaudhary, A. U. (2024). Unhealthy Diet and Inconsistent Sleep as Predictors of Mood Disorders in Adults. *Mental Health and Lifestyle Medicine Journal, 2*(2), 35-44. https://doi.org/10.61838/mhfmj.2.2.4

Introduction

Mood disorders, including major depressive disorder and generalized anxiety disorder, have emerged as leading contributors to global disability and disease burden, affecting hundreds of millions of individuals worldwide. These conditions are characterized by persistent disturbances in emotional regulation, energy levels, and cognitive functioning, and they often lead to significant impairments in social and occupational life. Recent estimates suggest a sharp rise in mood-related diagnoses among adults, especially in low- and middle-income countries, where public health infrastructure is still evolving to adequately respond to the psychological needs of the population (1, 2). While genetics, neurochemistry, and environmental stressors

have traditionally been emphasized in the etiopathology of mood disorders, a growing body of research highlights lifestyle-related factors—particularly diet quality and sleep regulation—as critical yet underexplored determinants (3, 4).

The bidirectional relationship between mental health and nutrition has gained significant scholarly interest in recent years, giving rise to the emerging field of nutritional psychiatry. Evidence indicates that poor dietary habits—characterized by high intake of processed foods, refined sugars, and saturated fats—are associated with greater risk for depression and anxiety (5, 6). Diets that lack essential micronutrients such as omega-3 fatty acids, B vitamins, magnesium, and tryptophan can disrupt neurotransmitter synthesis, leading to mood dysregulation (7, 8). For instance, tryptophan—a precursor to serotonin—is heavily influenced by dietary intake, and studies show that enhancing tryptophan consumption improves mood and cognitive performance, particularly among elderly adults (7). Moreover, nutrient deficiencies are known to exacerbate inflammation and oxidative stress, both of which are implicated in the neurobiology of depression (6, 9).

Empirical data further suggests that the composition and quality of one's diet not only affect mental health directly but also indirectly through mechanisms involving gut-brain axis communication. Disruption of the gut microbiota due to unhealthy eating patterns can alter immune responses and increase vulnerability to psychiatric conditions (10, 11). For example, chronic consumption of pro-inflammatory foods has been linked to depressive symptoms due to its effect on inflammatory cytokine production and HPA axis dysregulation (6). Conversely, interventions focused on anti-inflammatory diets, Mediterranean-style patterns, and neuronutrition have demonstrated promising outcomes in alleviating depressive symptoms and enhancing emotional stability (5, 8, 12). Culinary medicine workshops have even been implemented as adjunctive treatments for inpatients with mood and eating disorders, reporting substantial improvements in mood regulation and nutritional literacy (13, 14).

In parallel with nutritional influences, sleep quality plays a critical role in emotional regulation and psychological resilience. Sleep is fundamental for neuroplasticity, hormonal balance, and affective processing. Yet, adults today face growing challenges in maintaining consistent and restorative sleep due to lifestyle demands, technology use, and psychosocial stressors. Research shows that poor sleep quality, irregular sleep schedules, and insufficient sleep duration are strongly linked to higher levels of psychological distress, particularly anxiety and depression (15, 16). Sleep disruptions alter the functioning of key brain areas such as the prefrontal cortex and amygdala, impairing emotional control and increasing susceptibility to negative affect (15, 17). Moreover, sleep disorders often co-occur with psychiatric conditions, suggesting a bidirectional and potentially reinforcing relationship (2).

The effect of sleep on mental health is particularly prominent among university students and working-age adults, where erratic sleep schedules and sleep hygiene neglect are commonplace (16, 18). Recent findings reveal that poor sleep hygiene—including exposure to screens before bed, inconsistent bedtimes, and caffeine use—predicts mood instability and anxiety symptoms (16). These patterns are often compounded by nutritional inadequacies, creating a lifestyle environment conducive to the development of mood disorders (9, 19).

Importantly, diet and sleep do not operate in isolation; they interact synergistically to influence mental health. A nutritionally inadequate diet can impair sleep quality, while sleep disturbances can alter appetite

regulation and food choices, creating a feedback loop of emotional and physiological imbalance (4, 20). A recent study on culinary nutrition workshops for psychiatric inpatients demonstrated that improvements in dietary behavior coincided with better sleep outcomes and enhanced mood scores (14). Similarly, anti-inflammatory dietary patterns have been shown to enhance sleep efficiency and mood resilience in clinical and subclinical populations (6). These findings point toward an integrated biopsychosocial model where lifestyle factors—particularly diet and sleep—serve as modifiable predictors of mental well-being.

In addition to physiological mechanisms, socio-environmental factors also influence how diet and sleep affect mental health. For example, low energy availability and irregular eating patterns, particularly in high-performing athletes and working professionals, contribute to emotional fatigue and dysregulation (21). Gender, age, and socioeconomic status further mediate these associations, with vulnerable groups such as the elderly and postmenopausal women experiencing more severe impacts due to metabolic and hormonal vulnerabilities (18, 22, 23). Meanwhile, community-based interventions and education on nutritional literacy and sleep hygiene have shown promise in reducing depression prevalence, especially among older adults and individuals with chronic illnesses (23, 24).

Although existing literature underscores the significant roles of nutrition and sleep in mental health, empirical studies that examine their combined predictive power on mood disorders are still limited, especially in non-Western populations. Pakistan, like many other developing nations, is witnessing a dual burden of nutritional inadequacies and rising rates of psychological distress, particularly among urban adults. With rapid shifts in dietary practices and increasing work-related stress, identifying modifiable predictors of mood disorders is both timely and essential for public health strategy.

The present study addresses this gap by examining the predictive role of unhealthy diet and inconsistent sleep patterns on mood disorders among Pakistani adults, using a correlational descriptive design.

Methods and Materials

Study Design and Participants

This study employed a correlational descriptive design to examine the predictive relationship between unhealthy diet, inconsistent sleep, and mood disorders in adults. A total of 388 participants were recruited from the general adult population in Pakistan, using a non-probability convenience sampling method. The sample size was determined based on the Krejcie and Morgan (1970) sample size table for a known population, ensuring adequate statistical power for correlation and regression analyses. Inclusion criteria required participants to be aged 18 years and above, proficient in reading and understanding English, and without a diagnosed psychiatric disorder or cognitive impairment that would hinder self-reporting. All participants completed standardized questionnaires measuring dietary habits, sleep quality, and mood-related symptoms.

Data Collection

To assess mood disorders, the Depression Anxiety Stress Scales-21 (DASS-21) developed by Lovibond and Lovibond in 1995 is used. This self-report instrument contains 21 items divided into three subscales—Depression, Anxiety, and Stress—each consisting of 7 items. Respondents rate each item on a 4-point Likert scale ranging from 0 ("Did not apply to me at all") to 3 ("Applied to me very much or most of the time"),

reflecting their experiences over the past week. Higher scores on each subscale indicate greater severity of symptoms. The DASS-21 has demonstrated strong internal consistency (Cronbach's alpha typically above 0.80 for all subscales) and construct validity across diverse populations and cultural contexts. Its validity and reliability have been confirmed in numerous studies, making it a widely accepted measure of negative emotional states in both clinical and non-clinical adult populations.

The Dietary Screening Tool (DST) developed by Bailey et al. in 2009 is employed to evaluate dietary patterns and identify unhealthy eating behaviors in adults. The DST consists of 25 items that assess the frequency of consumption of various food groups, including fruits, vegetables, whole grains, high-fat foods, and sugary snacks. Each item is scored on a Likert scale indicating frequency (e.g., "Never" to "Every day"). Scores are summed to produce a total diet quality score, with lower scores indicating poorer (unhealthier) dietary habits. The DST does not require extensive nutritional knowledge and is designed for use in general adult populations. It has demonstrated strong internal consistency (Cronbach's alpha > 0.80) and concurrent validity when compared with more comprehensive dietary assessments like food frequency questionnaires. Its psychometric robustness has been affirmed in several peer-reviewed studies examining adult nutritional behaviors.

To measure inconsistent sleep patterns, the Pittsburgh Sleep Quality Index (PSQI) developed by Buysse et al. in 1989 is utilized. The PSQI is a self-administered questionnaire consisting of 19 items grouped into seven subscales: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction. Each subscale is scored from 0 to 3, and the sum yields a global sleep quality score ranging from 0 to 21, with higher scores indicating poorer sleep quality and greater inconsistency in sleep patterns. A global score above 5 typically reflects significant sleep difficulties. The PSQI has shown excellent reliability (Cronbach's alpha = 0.83) and validity across various populations, and its use is well-established in both clinical and epidemiological sleep research.

Data analysis

All statistical analyses were conducted using SPSS version 27. Descriptive statistics (means, standard deviations, frequencies, and percentages) were computed for demographic variables and study measures. Pearson correlation coefficients were calculated to examine the bivariate relationships between the dependent variable (mood disorders) and each independent variable (unhealthy diet and inconsistent sleep). To determine the combined predictive effect of the independent variables on mood disorders, a standard multiple linear regression analysis was performed. Prior to conducting parametric analyses, all statistical assumptions—including normality, linearity, multicollinearity, and homoscedasticity—were checked and satisfied.

Findings and Results

The sample consisted of 388 adults, including 209 females (53.9%) and 179 males (46.1%). Participants ranged in age from 18 to 57 years, with the largest age group being 25–34 years (n = 162, 41.7%), followed by 35–44 years (n = 104, 26.8%), 18–24 years (n = 87, 22.4%), and 45 years and older (n = 35, 9.0%). In terms of education, 61.1% (n = 237) held a bachelor's degree, 22.9% (n = 89) had a master's degree or higher, and 16.0% (n = 62) reported having completed high school or less. Most participants were single (n = 212,

54.6%), followed by married (n = 154, 39.7%) and divorced or widowed (n = 22, 5.7%). These demographics reflect a diverse adult population across age and educational levels.

Table 1. Descriptive Statistics for Study Variables (N = 388)

Variable	Mean (M)	Standard Deviation (SD)
Mood Disorders (DASS-21 Total)	27.84	8.47
Unhealthy Diet (DST Total)	41.32	7.59
Inconsistent Sleep (PSQI Total)	9.76	3.14

The descriptive statistics show that participants reported a mean mood disorder score of 27.84 (SD = 8.47) on the DASS-21 scale, suggesting a moderate level of emotional distress. The mean score for unhealthy diet was 41.32 (SD = 7.59), indicating suboptimal dietary behaviors. Similarly, the mean score for inconsistent sleep was 9.76 (SD = 3.14) on the PSQI, which is above the clinical cutoff of 5, suggesting poor sleep quality and irregular patterns.

All statistical assumptions required for Pearson correlation and multiple linear regression were tested and met. Normality of the dependent variable (mood disorders) was confirmed using Shapiro-Wilk test (p = .072) and visual inspection of Q-Q plots. Linearity was assessed through scatterplots and confirmed by significant correlations between predictors and the dependent variable. No evidence of multicollinearity was found, with Variance Inflation Factor (VIF) values below the threshold (VIF = 1.42 for unhealthy diet, VIF = 1.36 for inconsistent sleep). Homoscedasticity was verified using the Breusch-Pagan test (p = .321) and inspection of residual plots, which showed random scatter. These results supported the appropriateness of parametric analyses for the current data.

Table 2. Pearson Correlation Coefficients Between Mood Disorders and Predictor Variables

Variable	1	2	3
1. Mood Disorders	—		
2. Unhealthy Diet	.48**	—	
3. Inconsistent Sleep	.55**	.44**	—

Correlation analysis revealed a significant positive relationship between mood disorders and unhealthy diet ($r = .48$, $p < .01$), and between mood disorders and inconsistent sleep ($r = .55$, $p < .01$). Additionally, unhealthy diet and inconsistent sleep were also positively correlated ($r = .44$, $p < .01$), indicating some overlap between these two lifestyle factors.

Table 3. Summary of Regression Model for Predicting Mood Disorders

Source	Sum of Squares	df	Mean Square	R	R^2	Adjusted R^2	F	p
Regression	5348.21	2	2674.11	.61	.37	.36	110.32	<.001
Residual	9037.62	385	23.47					
Total	14385.83	387						

The multiple regression model was statistically significant, $F(2, 385) = 110.32$, $p < .001$, with $R = .61$, indicating a strong relationship between the predictors and mood disorders. The model explained 37% of the variance ($R^2 = .37$, Adjusted $R^2 = .36$) in mood disorder symptoms, suggesting that unhealthy diet and inconsistent sleep together account for over one-third of the variance in psychological distress among participants.

Table 4. Multiple Linear Regression Coefficients Predicting Mood Disorders

Predictor	B	SE	β	t	p
Constant	5.42	1.03	—	5.26	<.001

Unhealthy Diet	0.39	0.06	.31	6.42	<.001
Inconsistent Sleep	1.12	0.15	.42	7.54	<.001

Regression coefficients indicated that both unhealthy diet (β = .31, t = 6.42, p < .001) and inconsistent sleep (β = .42, t = 7.54, p < .001) significantly predicted mood disorder scores. Specifically, for every one-point increase in diet score (worsening dietary pattern), mood disorder scores increased by 0.39 points, and for every one-point increase in sleep inconsistency, mood scores increased by 1.12 points. The stronger beta coefficient for sleep highlights its slightly greater predictive strength in this model.

Discussion and Conclusion

The primary objective of this study was to examine the predictive power of two lifestyle-related factors—unhealthy diet and inconsistent sleep—on mood disorders among adults in Pakistan. Based on correlational and linear regression analyses, both unhealthy dietary patterns and poor sleep consistency were found to have significant positive associations with mood disorder symptoms, as measured by the DASS-21. Furthermore, the linear regression model indicated that these two variables together significantly predicted mood disorders, explaining a substantial proportion of the variance in mental health outcomes. These findings align with and reinforce a growing body of global evidence that highlights diet quality and sleep regularity as crucial, modifiable factors in psychological well-being.

The observed association between unhealthy diet and mood disorders in this study aligns with previous literature identifying dietary intake as a critical component of emotional and cognitive health. Diets high in saturated fats, refined carbohydrates, and ultra-processed foods have been consistently linked to elevated risks of depression, anxiety, and emotional instability (4-6). These effects are attributed in part to the pro-inflammatory nature of unhealthy foods, which can induce systemic inflammation and oxidative stress—both of which are key contributors to mood dysregulation (6, 9). Our findings are also in agreement with research showing that insufficient intake of specific nutrients, such as omega-3 fatty acids, magnesium, and tryptophan, impairs neurotransmitter synthesis and neural plasticity, ultimately undermining emotional resilience (7, 8).

The role of tryptophan in mood regulation has gained particular attention, especially given its role in the synthesis of serotonin, a neurotransmitter crucial for emotional balance. Chojnacki et al. (7) found that increased tryptophan intake improved mood and cognitive function among elderly participants. These effects are supported by Oliveira et al. (12), who demonstrated that modulation of monoaminergic neurotransmission through dietary interventions significantly improved depressive-like behaviors in animal models. The present study, although not biochemical in focus, complements these findings by showing that individuals with less healthy diets reported significantly more mood disorder symptoms.

Another crucial explanation for our results lies in the interaction between poor diet and the gut-brain axis. Numerous studies emphasize how unhealthy food intake can disturb the gut microbiota, thereby influencing brain function through neuroimmune and neuroendocrine signaling pathways (10, 11). In a clinical context, dietary interventions—such as anti-inflammatory and Mediterranean-style diets—have led to measurable improvements in depressive and anxiety symptoms among adults (5, 6, 13). In a similar vein, Vaqué-Crusellas et al. (14) reported that culinary nutrition workshops significantly improved both

nutritional behaviors and mood states among psychiatric inpatients. This supports our study's assertion that unhealthy dietary patterns are not merely correlated with but actively contribute to mood disturbances.

Our findings also revealed that inconsistent sleep significantly predicted higher levels of mood disorder symptoms. This is congruent with a substantial body of research identifying sleep as a fundamental determinant of mental health. Inconsistent sleep patterns disrupt circadian rhythms, impair cognitive function, and deregulate emotional processing—all of which are strongly associated with mood disorders (15, 17). Studies by Malik et al. (16) and Karimi et al. (15) found that poor sleep hygiene practices—such as variable bedtimes, excessive screen time, and caffeine intake—were closely associated with symptoms of depression and anxiety in university students and working adults. The consistency of these findings across cultural and demographic contexts adds credibility to our current results.

Sleep disruptions have also been shown to influence neuroendocrine functioning and stress reactivity. McKenna et al. (17) highlighted that metabolic dysfunction, often linked to irregular sleep, exacerbates the risk of developing mood disorders in youth. In our adult sample, this relationship remained significant, suggesting that sleep inconsistency may exert harmful effects throughout the lifespan. Moreover, our results support the notion that disrupted sleep contributes not only to the severity but also to the chronicity of mood disorders (2).

An important observation in this study is the combined predictive effect of both independent variables—unhealthy diet and inconsistent sleep—on mood disorders. The regression analysis demonstrated that while each variable individually contributed to mood disturbance, their joint inclusion in the model significantly improved the prediction of mood symptoms. This finding is echoed in prior literature indicating that sleep and nutrition often interact synergistically to influence mental health outcomes (4, 20). Poor sleep can lead to altered appetite regulation and cravings for high-calorie foods, while an unhealthy diet can disrupt sleep quality, creating a self-perpetuating cycle of emotional and physiological dysregulation (19, 20).

This reciprocal dynamic underscores the importance of holistic approaches to mental health, emphasizing that interventions targeting only one lifestyle factor may not be sufficient. Vaqué-Crusellas et al. (14) and Mörkl et al. (13) both demonstrated the efficacy of integrated interventions—combining nutritional education and behavioral sleep strategies—among inpatients with psychiatric disorders. Our findings suggest that similar integrative methods could be effective in non-clinical populations as well, particularly in culturally distinct contexts such as Pakistan, where lifestyle patterns and health beliefs may differ from Western norms.

In light of these results, several theoretical and clinical implications emerge. First, our findings reinforce the relevance of nutritional psychiatry as a field with direct applications to public mental health. Second, they highlight the urgency of addressing sleep hygiene in psychological prevention strategies. Third, and most importantly, they point toward a multi-faceted model of mood regulation where lifestyle, environment, and behavior intersect to shape psychological well-being (19, 25, 26).

Despite the valuable insights provided, this study has some notable limitations. First, the use of a cross-sectional design limits the ability to draw causal inferences between the predictor variables and mood disorders. Longitudinal data would be required to determine directionality and to understand the temporal progression of these relationships. Second, the study relied exclusively on self-report questionnaires, which may be subject to response biases such as social desirability or inaccurate recall. Third, although the sample

size was sufficient based on statistical guidelines, the use of non-probability sampling in Pakistan may limit the generalizability of the findings to other populations or age groups. Additionally, important covariates such as physical activity, socioeconomic status, and medical comorbidities were not controlled, which may confound the observed relationships.

Future research should prioritize longitudinal and experimental designs to explore the causal pathways linking diet and sleep with mental health outcomes. Intervention-based studies, particularly those incorporating both nutritional and behavioral sleep components, would provide valuable evidence for integrated treatment models. Cross-cultural comparative studies could also deepen understanding of how sociocultural variables influence lifestyle-related mental health determinants. Furthermore, future research should consider including objective biomarkers—such as inflammatory markers, cortisol levels, or actigraphy-based sleep tracking—to validate self-reported measures and uncover underlying biological mechanisms. Expanding the scope to include diverse populations, especially vulnerable groups like adolescents, older adults, and individuals with chronic health conditions, would further enhance the practical relevance of this research.

In light of the findings, practitioners and mental health educators should prioritize lifestyle assessment as a routine component of psychological screening. Programs promoting balanced diets and regular sleep schedules can be integrated into community mental health campaigns, school curricula, and workplace wellness initiatives. Training psychologists and primary care providers to deliver brief, evidence-based advice on diet and sleep hygiene could significantly enhance early intervention efforts. Furthermore, partnerships between mental health professionals, nutritionists, and sleep specialists should be encouraged to provide coordinated and holistic care. Given the accessibility and modifiability of the identified predictors, public health interventions centered on these domains hold promise for reducing the burden of mood disorders, particularly in low-resource settings.

Acknowledgments

We would like to express our appreciation and gratitude to all those who cooperated in carrying out this study.

Authors' Contributions

All authors equally contributed to this study.

Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants. Written consent was obtained from all participants in the study.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

Funding

This research was carried out independently with personal funding and without the financial support of any governmental or private institution or organization.

References

1. Fornaro M, Solmi M, Veronese N, Berardis DD, Buonaguro EF, Tomasetti C, et al. The Burden of Mood-Disorder/Cerebrovascular Disease Comorbidity: Essential Neurobiology, Psychopharmacology, and Physical Activity Interventions. International Review of Psychiatry. 2017;29(5):425-35. doi: 10.1080/09540261.2017.1299695.

2. Uju Y, Kanzaki T, Yamasaki Y, Kondo T, Nanasawa H, Takeuchi Y, et al. A Cross-Sectional Study on Metabolic Similarities and Differences Between Inpatients With Schizophrenia and Those With Mood Disorders. 2020. doi: 10.21203/rs.3.rs-29858/v1.

3. Koning E, Vorstman J, McIntyre RS, Brietzke E. Characterizing Eating Behavioral Phenotypes in Mood Disorders: A Narrative Review. Psychological Medicine. 2022;52(14):2885-98. doi: 10.1017/s0033291722002446.

4. Balanzá-Martínez V, Shansis F, Tatay-Manteiga A, López-García P. Diet and Neurocognition in Mood Disorders - An Overview of the Overlooked. Current Pharmaceutical Design. 2020;26(20):2353-62. doi: 10.2174/1381612826666200318152530.

5. Martins LB, Tibães JRB, Sanches M, Jacka FN, Berk M, Teixeira AL. Nutrition-Based Interventions for Mood Disorders. Expert Review of Neurotherapeutics. 2021;21(3):303-15. doi: 10.1080/14737175.2021.1881482.

6. Wingralek Z, Miś P, Wróblewski H, Zimna A, Róg J. The Importance of Anti-Inflammatory Diet in Depression: A Literature Review and Recommendations. Current Problems of Psychiatry. 2023;24:134-50. doi: 10.12923/2353-8627/2023-0013.

7. Chojnacki C, Gąsiorowska A, Popławski T, Konrad P, Chojnacki M, Fila M, et al. Beneficial Effect of Increased Tryptophan Intake on Its Metabolism and Mental State of the Elderly. Nutrients. 2023;15(4):847. doi: 10.3390/nu15040847.

8. Guedes MdO, Matias AGC. Neuronutrition in the Perspective of the Prevention and Treatment of Depressive Disorder / Neuronutrição Na Perspectiva Da Prevenção E Tratamento Da Desordem Depressiva. Brazilian Journal of Health Review. 2021;4(3):12434-50. doi: 10.34119/bjhrv4n3-217.

9. Mechlińska A, Wiglusz MS, Słupski J, Włodarczyk A, Cubała WJ. Exploring the Relationship Between Mood Disorders and Coexisting Health Conditions: The Focus on Nutraceuticals. Brain Sciences. 2023;13(9):1262. doi: 10.3390/brainsci13091262.

10. Ross SM. Integrative Mental Health, Part 2. Holistic Nursing Practice. 2022;36(1):56-8. doi: 10.1097/hnp.0000000000000495.

11. Null G, Pennesi L, Feldman M. Nutrition and Lifestyle Intervention on Mood and Neurological Disorders. Journal of Evidence-Based Complementary & Alternative Medicine. 2016;22(1):68-74. doi: 10.1177/2156587216637539.

12. Oliveira CMd, Pourtau L, Vancassel S, Pouchieu C, Capuron L, Gaudout D, et al. Saffron Extract-Induced Improvement of Depressive-Like Behavior in Mice Is Associated With Modulation of Monoaminergic Neurotransmission. Nutrients. 2021;13(3):904. doi: 10.3390/nu13030904.

13. Mörkl S, Varnagy A, Wagner-Skacel J, Lahousen T, Brodtrager D, Sallmutter K, et al. Culinary Medicine Cooking Workshops as Add-on Therapy for Inpatients With Depression and Eating Disorders. Nutrients. 2024;16(22):3973. doi: 10.3390/nu16223973.

14. Vaqué-Crusellas C, Ribot B, Corominas-Díaz A, Prat-Vigué G, Vila-Martí A, Torres-Moreno M, et al. Effectiveness of Culinary Nutrition Workshops on the Mood and Nutritional Interest of Inpatients With Mental Disorder. Cureus. 2024. doi: 10.7759/cureus.64691.

15. Karimi R, Abedini R, Arshadi N. The Relationship of Sleep Quality With Mental Health and Job Burnout. Biannual Journal of Contemporary Psychology. 2019;13(2):121-9. doi: 10.29252/bjcp.13.2.121.

16. Malik N, Ashiq I, Khan RM. Sleep Quality and Sleep Hygiene as Predictors of Mental Health Among University Students. J Asian Dev Studies. 2024;13(1):675-85. doi: 10.62345/jads.2024.13.1.560.

17. McKenna S, Carpenter JW, Shin M, Park S, Crouse JJ, Scott E, et al. Metabolic Dysfunction in Youth With Major Mood Disorders: Implications for Prevention and Early Intervention. 2024. doi: 10.33774/coe-2024-xbjwz.
18. Helminen H, Luukkaala T, Saarnio J, Nuotio M. Changes in Nutritional Status and Associated Factors in a Geriatric Post-Hip Fracture Assessment. European Geriatric Medicine. 2017;8(2):134-9. doi: 10.1016/j.eurger.2017.02.002.
19. Suhasini U, Bhavani BG. Nutritional Psychiatry – Essential for Fostering Mental Health. 2024:129-34. doi: 10.58532/v3bgpn10p2ch6.
20. Lee M, Angus DJ, Walsh H, Sargeant S. "Maybe It's Not Just the Food?" a Food and Mood Focus Group Study. 2023. doi: 10.31234/osf.io/hjmkb.
21. Coombes I, Badenhorst CE. Risk of Low Energy Availability in New Zealand National Team and U20 Female Football Representatives. Women in Sport and Physical Activity Journal. 2024;32(1). doi: 10.1123/wspaj.2023-0041.
22. Kozma A, Pocnetz S, Prada GI. Nutrition and Sarcopenia in Posmenopausal Women. Anthropological Researches and Studies. 2017;7(1):105-10. doi: 10.26758/7.1.11.
23. Harbottle L. The Effect of Nutrition on Older People's Mental Health. British Journal of Community Nursing. 2019;24(Sup7):S12-S6. doi: 10.12968/bjcn.2019.24.sup7.s12.
24. Wójciak RW, Mojs E, Staniek H, Marcinek K, Król E, Sulibursk J, et al. Depression in Seniors vs. Their Nutritional Status and Nutritional Knowledge. Journal of Medical Science. 2016;85(2):83-8. doi: 10.20883/jms.2016.103.
25. Constantin E-T, Fonseca S. The Effect of Food on Mental Health. Revista Internacional De Educação Saúde E Ambiente. 2020;3(2):1-17. doi: 10.37334/riesa.v3i2.36.
26. Risco L, Aros C. Trastornos Del Ánimo, Nutrición Y Craving. Revista Chilena De Neuro-Psiquiatría. 2019;57(3):295-305. doi: 10.4067/s0717-92272019000300295.