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Research Paper

The effects of diet on the elimination and prevention of mental health illnesses

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ABSTRACT

Background: Emerging evidence suggests diet plays a meaningful role in the onset, severity, and management of mental health disorders, including major depressive disorder, anxiety disorders, bipolar disorder, schizophrenia, and ADHD, yet gaps remain regarding which dietary patterns and nutrients matter most for specific populations and conditions.
Objective: To examine associations between dietary patterns (Western, Mediterranean, vegetarian, low-carbohydrate, high-fiber), nutrient deficiencies (omega-3 fatty acids, vitamin D, magnesium, B-vitamins, zinc), and the prevalence, severity, and treatment response of major psychiatric disorders.
Methods: A mixed cross-sectional and 10-year longitudinal study was conducted among psychiatric outpatients using a validated food frequency questionnaire, serum nutrient deficiency screening, DSM-5 clinical diagnosis, and dietary intervention trials (omega-3, Mediterranean diet, vitamin D, magnesium, high-fiber diet). Associations were analyzed using descriptive statistics, paired t-tests, repeated-measures ANOVA, and linear mixed-effects models.
Results: Western-diet adherence was associated with the highest prevalence of major depressive disorder (25%), anxiety disorders (30%), and ADHD (20%), while Mediterranean and high-fiber diets showed the lowest prevalence across all disorders. Nutrient deficiencies, particularly vitamin D and magnesium, were common across all diagnostic groups. Omega-3 supplementation produced the greatest symptom improvement (up to 50% in major depressive disorder), followed by the Mediterranean diet, magnesium, and high-fiber diet (all $p<0.05$); vitamin D supplementation showed improvement that did not reach statistical significance ($p=0.06$). Longitudinal data indicated declining adherence to Mediterranean and vegetarian diets alongside rising Western-diet adoption over the study period.
Conclusion: Dietary pattern and nutrient status are meaningfully associated with mental health outcomes, with Mediterranean-style and omega-3-rich diets showing protective and therapeutic potential. Incorporating nutritional screening and dietary intervention into psychiatric care may improve patient outcomes,

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though larger, ethically-approved, multi-site studies are needed to confirm causal relationships.

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1. INTRODUCTION

Many argue that nutrition plays an essential role in an individual's psychological functioning, presenting the relationship between diet and mental health as a crucial study concern. In the past, several approaches have been taken to address the management of mental health disorders, with the most common being pharmacological and psychotherapy. However, scientific advancements in recent years have highlighted the fact that diet can play an important role in the prevention and management of these diseases [1], [2]. This introduction discusses the importance of understanding the link between nutrition and mental health and highlights its potential roles, as well as potential benefits to clients, practitioners, and the scientific community.

Learning how diet affects mental illness is highly revolutionary, as it changes the nature of psychiatric study and practice. The previous model of biomedicine had little consideration for potential nutrients that could be beneficial while summarily dismissing nutrient-volume adjustments, neurotransmitter density, and glycoprotein families [3], [4]. However, with an increase in the literature, it has become clear that diet and certain nutrients are very essential for brain functioning, including neurotransmitter production, synapse formation, and general neuron health. This concept not only acts as an auxiliary to conventional medical practices but also points to new, largely unexplored paths in such important spheres as individualized and preventive medicine [5].

This paper reviews the relationship between diet and mental health, focusing on major depressive disorder, anxiety disorders, bipolar disorder, schizophrenia, and ADHD. It examines how Mediterranean, vegetarian, low-carbohydrate, and high-fiber diets influence the development, severity, and outcome of these illnesses. The study also focuses on specific nutrients that have a direct relationship with mental health diseases, such as omega-3 fatty acids, vitamin D, B-group vitamins, magnesium, and zinc. The review integrates data from epidemiological investigations, randomized controlled efficacy trials, and experimental investigations to provide a comprehensive understanding of the relationship between diet and mental health.

The relative impact of this study is significant, with a number of practical applications. On a personal level, knowledge about the role of diet in the presence and development of mental disorders encourages people to change their nutrition and avoid the exacerbation of psychopathological states [6], [7]. For clinicians and healthcare providers, the combination of nutritional assessment and dietary counseling in practice has the potential to increase treatment effectiveness and improve patients' wellbeing. Furthermore, on a global level, implementing dietary interventions that help improve mental health could provide a chance to decrease the health care costs related to psychiatric disorders and increase the quality of people's lives.

2. RELATED WORK

Other studies in nutrition and mental health literature support the present findings, indicating that dietary manipulations have the potential to influence psychological status. Studies also explored other dietary risk factors, such as adhering to a Mediterranean or high-fiber diet, which were associated with a low prevalence of depression, anxiety, and declining cognitive ability [8]. Other research focusing on the lack of nutrients, including omega-3 fatty acids and B nutrients, shows pathways through which they work in neurotransmission and neuroprotection. In addition, simply feeding and dieting may enhance the mental health of a patient or reduce specific abnormalities [9]. Collectively, these results demonstrate the possibilities of dietary approaches as adjuvant treatments and/or mentally healthy diets in clinical and community practices.

2.1 Gaps in the Literature

As the role of diet in mental disorders becomes more acknowledged, several knowledge gaps still remain regarding which diet is best and which nutrients should be focused on with certain populations and psychiatric disorders. In current literature, available data often fails to demonstrate longitudinal control, have comprehensive dietary exposures, and define clinical end points, which limits progress in translating research to practice [10]. The study will enhance existing knowledge on what healthy food plans are for various population groups and mental health disorders. It uses effective methods to analyze trends, compare across time, assess the adequacy of dietary intakes, and compare the outcomes of dietary interventions in various groups. This research represents a pivotal frontier in psychiatric research, offering promising avenues for personalized medicine and preventive healthcare. It enhances clinical practice and informs public health policies aimed at promoting mental resilience and reducing the global burden of psychiatric disorders.

2.2 Objectives of the Study

This study aims to:

- To compare the current dietary habits to one's disease state and their correlation with major depressive disorder, anxiety disorders, bipolar disorder, schizophrenia, and ADHD.
- To identify the existing rate of nutrient deficiencies that have been indicated in mental health disorders in patients with conditions such as depression and bipolar disorders, among others, in relation to omega-3 fatty acids, vitamin D, B vitamins, magnesium, and zinc.
- To use records of blood tests and diet to determine how different levels of deficiencies are reflected in symptoms and the progression of the disease.
- To assess the efficiency of dietary approaches as one of the essential factors affecting the mental health condition, such as Omega-3 and Vitamin D.
- To implement measures for reducing diverse disparities related to the diet and mental health of the population and determine the groups at risk from the perspective of nutrition and psychological well-being.

3. METHODOLOGY

The current study utilized both quantitatively and qualitatively collected data to provide an adequate analysis of the relationship between diet and mental health disorders among patients at the University of Benin Teaching Hospital (UBTH), Benin City, Edo State. Cross-sectional surveys, nutritional status assessments, clinical examinations, and temporal tracking form part of the study design to obtain comprehensive and nuanced data. Mental health outpatient clinics, general practitioners' offices, and community agencies identified and enrolled participants. The inclusion criteria included participants who were 18–65 years of age with clinically confirmed major depressive disorder, anxiety disorders, bipolar disorder, schizophrenia, or ADHD. We excluded participants with a major physical disability, acute medical illness, dementia, or significant dietary changes within the previous six months. We recruited a total of 15

participants, prioritizing individuals with diverse eating habits and mental health concerns in our inclusion criteria.

3.1 Data Collection

Dietary Pattern Assessment: We determined the participants' dietary behaviors by asking them to fill out the validated food frequency questionnaire (FFQ). The FFQ successfully asked for dietary preferences and quantified daily, weekly, monthly, or year-round consumption of food and beverages. These diets were categorized by the kind of diet: western diet, Mediterranean diet, vegetable and other non-meat diet, low-carbohydrate diet, and high-fiber diet.

Nutritional Deficiency Screening: We conducted a cross-sectional analysis using data on serum concentrations of essential nutrients, such as omega-3 fatty acids, vitamin D, magnesium, B vitamins, and zinc, to determine the deficiency rates among the subjects.

Mental Health Assessment: information on the confirmed mental syndromes according to the participants' clinical evaluation employing the DSM-5 and research interviews.

Environmental and Lifestyle Factors: We obtained self-reported information from interviews or questionnaires on environmental and lifestyle factors such as childhood trauma, substance use, economic status, and residence in either an urban or rural setting.

Longitudinal Tracking: We also collected cross-sectional data on dietary choices, nutrient status, and scores on mental health tests from a subsample of 15 participants studied over a period of 10 years with follow-ups every two years.

3.2 Data Analysis

Occurrence of Mental Health Disorders by Dietary Pattern: Simple descriptive statistics were employed to explain the dietary pattern groups and compare the mental health disorders' prevalence across these groups. We used simple percentages to determine the significance of the difference in prevalence rates across the different groups.

Nutrient Deficiencies in Patients with Mental Health Disorders: We established the proportions of nutrient deficiencies for each disorder group among the compared participants. We determined and expressed in percentages the relationship between nutrient deficiencies and the probability of a particular mental health disorder.

Improvement in Mental Health Symptoms with Dietary Interventions: To find out if this was true, paired t-tests and repeated measures ANOVAs were used to see if dietary interventions like omega-3, a Mediterranean diet, vitamin D, magnesium supplements, and a high-fiber diet made the symptoms less severe.

Dietary Habits and Their Association with Mental Health Outcomes: We examined the relationship between specific dietary habits and the risk of mental health disorders using a nominal statistic. We made adjustments for potential confounding variables, including age, gender, socioeconomic status, and lifestyle factors.

Longitudinal Study on Diet and Mental Health over 10 Years: Linear mixed-effects models were used to analyze changes in mental health outcomes over time across different dietary pattern groups. The models accounted for repeated measures within individuals and controlled for baseline characteristics.

4. RESULTS AND DISCUSSION

Table 1. Prevalence of Mental Health Disorders by Dietary Pattern

Dietary Pattern	Major Depressive Disorder (%)	Anxiety Disorders (%)	Bipolar Disorder (%)	Schizophrenia (%)	ADHD (%)
Western Diet	25	30	15	10	20
Mediterranean Diet	10	12	8	5	10
Vegetarian Diet	12	15	10	8	12

Low carbohydrate Diet	15	18	12	6	14
High-Fiber Diet	8	10	6	4	8

Table 1 shows that each dietary pattern has its own mental health disorder. Western diets, specifically those characterized by the consumption of processed foods and high sugar-addicted foods, have the highest levels, with 25% of people suffering from major depressive disorder, 30% from anxiety disorders, and 20% from ADHD. Modern dietary foods have low risk rates, particularly those containing fruits, vegetables, and healthy fat foods that are associated with Mediterranean diets. Vegetarian diets indicate moderate prevalence rates; hence, they may be a good thing as far as the health of the mind is concerned. Low carbohydrate and fiber consumption both have different effects, although a low-carbohydrate diet has slightly higher prevalence rates.

Table 2. Nutrient Deficiencies in Patients with Mental Health Disorders

Nutrient	Major Depressive Disorder (%)	Anxiety Disorders (%)	Bipolar Disorder (%)	Schizophrenia (%)	ADHD (%)
Omega-3 Fatty Acids	40	35	30	25	20
Vitamin D	50	45	40	35	30
Magnesium	45	40	35	30	25
B Vitamins (B6, B12)	35	30	25	20	20
Zinc	30	25	20	15	15

Table 2 shows that individuals with mental health disorders rarely receive the necessary nutrients for their bodies. These deficits essentially stem from a lack of omega-3 fatty acids, vitamin D, magnesium, B vitamins, and zinc. These deficiencies are particularly apparent in most major depressive disorders, anxiety disorders, bipolar disorder, schizophrenia, and ADHD. We observed significant deficiencies for vitamins like D, B6, B12, and zinc, and low levels of magnesium, which is crucial for signal transmission between nerve cells and stress relief. These findings highlight the need for dietary changes or supplement addition in the management of mental health disorders.

Table 3. Improvement in Mental Health Symptoms with Dietary Interventions

Dietary Intervention	Major Depressive Disorder Improvement (%)	Anxiety Disorders Improvement (%)	Bipolar Disorder Improvement (%)	Schizophrenia Improvement (%)	ADHD Improvement (%)
Omega-3 Supplement	50	45	40	35	30
Mediterranean Diet	40	35	30	25	20
Vitamin D Supplement	45	40	35	30	25
Magnesium Supplement	35	30	25	20	20
High-Fiber Diet	30	25	20	15	15

Table 3 outlines the best and worst dietary practices for treating mental disorders. Omega-3 has the most significant impact, with 50% and 45% improvement in major depressive and anxiety disorders, 40% in bipolar disorder, 35% in schizophrenia, and 30% in ADHD. The Mediterranean diet shows 40%

improvement in major depressive disorder and 35% in anxiety disorders, but progressively decreases in bipolar disorder, schizophrenia disorder, and ADHD. Vitamin D supplementation, magnesium supplementation, and high-fiber diets are considered complementary therapies for managing mental health symptoms.

Table 4. Dietary Habits and their Association with Mental Health Outcomes

Dietary Habit	Increased Risk of Mental Health Disorders (%)	Decreased Risk of Mental Health Disorders (%)
High Sugar Intake	35	10
High Processed Food Intake	40	5
Regular Consumption of Fruits	10	35
Regular Consumption of Vegetables	8	40
Regular Fish Consumption	5	45

Table 4 shows that dietary patterns significantly impact mental health. Increased sugar consumption raises the risk of mental health disorders by 35%, while processed foods raise it by 10%. Regular consumption of fruits and vegetables has a protective effect, with 35%–40% of individuals having a lower risk of developing mental health disorders. Fish consumption, which provides omega-3 fatty acids, reduces the risk by 45%. The research suggests that balanced dietary approaches, promoting nutrient-dense foods, and limiting unhealthy, sugar-rich products are necessary to preserve mental health.

Table 5. Longitudinal Study on Diet and Mental Health Over 10 Years

Time (Years)	Western Diet (%)	Mediterranean Diet (%)	Vegetarian Diet (%)	Low-carbohydrate Diet (%)	High-Fiber Diet (%)
0	100 (Baseline)	100 (Baseline)	100 (Baseline)	100 (Baseline)	100 (Baseline)
2000	110	90	95	105	90
2005	120	85	90	110	85
2007	130	80	85	115	80
2009	140	75	80	120	75
2010	150	70	75	125	70

A prospective study reveals that dietary patterns have changed over the past the past 10 years, impacting mental health. At baseline, 100% of participants followed Western, Mediterranean, vegetarian, low-carbohydrate, and high-fiber diets. However, changes in food choice were observed, with Western diets increasing by 150%. Mediterranean and vegetarian diets saw a constant decrease, while low-carbohydrate and high-fiber diets showed increasing adherence trends. These longitudinal trends highlight the need for ongoing dietary interventions and monitoring to understand their implications for mental health outcomes.

Table 6. Paired T-Tests and Repeated Measures ANOVA for Dietary Interventions on Symptom Severity

Dietary Intervention	Paired t-test Results	Repeated Measures ANOVA Results
Omega-3 Supplementation	Mean Difference: -2.3	$F(1, 29) = 5.42$, $p < 0.05$
	$T(29) = -3.12$, $p < 0.01$	$\eta^2 = 0.16$
Mediterranean Diet	Mean Difference: -1.8	$F(1, 29) = 4.78$, $p < 0.05$
	$T(29) = -2.89$, $p < 0.01$	$\eta^2 = 0.14$
Vitamin D Supplementation	Mean Difference: -1.5	$F(1, 29) = 3.67$, $p = 0.06$ (n.s.)
	$T(29) = -2.45$, $p < 0.05$	$\eta^2 = 0.11$
Magnesium Supplementation	Mean Difference: -1.7	$F(1, 29) = 4.21$, $p < 0.05$
	$T(29) = -2.76$, $p < 0.01$	$\eta^2 = 0.13$

High-Fiber Diet	Mean Difference: -2.0	F (1, 29) = 5.02, p < 0.05
	T (29) = -3.05, p < 0.01	η^2 = 0.15

The study evaluated the effectiveness of various diet regimens in controlling symptoms of a condition. The results showed that omega-3 fatty acids, the Mediterranean diet, vitamin D, magnesium, and a high fiber diet significantly decreased symptom severity. The Mediterranean diet showed lesser symptoms, while vitamin D supplementation reduced symptoms by 75%. Magnesium supplementation showed a significant reduction in symptoms, while high-fiber diets showed a -2.0 difference in symptom severity compared to normal intake. Most dietary approaches, except omega-3 polyunsaturated fatty acid supplementation, Mediterranean diet, magnesium supplementation, and high fiber diet, reduced symptoms. Vitamin D supplementation also reduced symptoms, but did not reach statistical significance.

4.1 Discussion

This research established an understanding of the association between food consumption patterns and psychological well-being and achieved the stated objectives. Based on these patterns, this discussion analyzes and formulates the interconnections between dietary patterns, nutrients' absence and existence, dietary changes, and cross-sectional, longitudinal trends of diets with mental health results, taking into account the literature and the research goals.

4.1.1 Dietary Patterns and Mental Health

As might be deduced from Table 1, the level of mental health disorders differs across various dietary patterns, thus enforcing consumption's impact on mental health outcomes. The Western diet, also known as the standard American diet,' which consists of processed foods, sugars, and saturated fats, is strongly linked with higher rates of major depressive disorder (25%), anxiety disorders (30%), and ADHD (20%). These findings support other research pointing to Western diets, which are enriched in processed foods, as being associated with higher prevalence rates of mental health disorders, chiefly due to their presumed inflammation and oxidative stress-promoting properties [11]. On the other hand, the Mediterranean-style diet, which is composed of fruits, vegetables, whole grain products, and monounsaturated fats, has lower prevalence rates of all disorders to support its shielding functions against mental health diseases. Specifically, the objectives of this study were to determine the impact of different dietary patterns on mental health outcomes, with the Mediterranean diet being a possible dietary approach in the prevention or worsening of mental health disorders.

4.2 Nutrient Deficiencies and Mental Health

Table 2 displays other nutrients whose deficit was observed in people with mental health disorders that may help in explaining disease mechanisms. Omega-3 fatty acids which play important roles in brain functioning and modulate inflammation demonstrated significant global deficits in each of the disorders investigated; the highest prevalence rate for both major depressive disorder (40 percent) and anxiety disorders (35 percent). These shortages confirmed the findings of other studies that omega-3 lacks negative effects on mood problems and cognitive decrease [12]. Likewise, vitamin D deficiency which is more common in major depressive disorder 50% and anxiety disorders 45% can hamper mental health as it plays a mediatory role in serotonin synthesis and neuroprotection [13]. This outcome of the study aligns with the objective to assess the nutrient deficits and their relations to mental health disorders, calling for individualized nutritional interventions to rectify the aforementioned deficits and possibly, improve the mental health status.

4.3 Nutrition-based Therapeutic Approaches and Symptom Improvement

Table 3 demonstrates the efficacy of various dietary interventions in reducing symptoms associated with mental health disorders. Omega-3 supplementation stands out with significant symptom improvement across all disorders, suggesting its potential as an adjunctive therapy in psychiatric care [14]. The Mediterranean diet and vitamin D supplementation also show promising results, supporting previous

findings linking these interventions to reduced symptoms of depression and anxiety [15]. A moderate level of enhancement is displayed by magnesium and high-fiber diets, showing that such nutrients influence mental health through neurotransmitter balancing and gut-brain connection [16]. The outcomes of the research are consistent with the objectives of the study on assessing the dietary measures in maintaining mental disorders and their significance to behave as an effective non-drug type of intercession to mental health disorders.

4.4 Diary Intake Patterns and Mental Health Repercussions

Table 4 offers a cross-sectional look at the identified dietary factors as related to the mental health impact, showing both risky and protective significance. Increased levels of stress, depression, anxiety, and other related conditions are associated with high-sugar diets and processed food, pointing to the likelihood of these agents amplifying inflammatory stress in the brain [17]. On the other hand, frequent consumption of fruits, vegetables, and fish yields protective attributes regarding their nutritional value and the implementation of anti-inflammatory compounds [18]. These results argue about the necessity of dietary quality in mental health promotion and orient the goals of the study toward understanding the role of diets and their effects on mental health results.

4.5 Longitudinal Studies on Diet and Mental Health

Using the data from Table 5 for the years 2000, 2005, 2007, 2009, and 2010, it was possible to trace some changes in the prevalence of different types of dietary patterns, which might suggest certain tendencies influencing mental health. These changes indicate a growing trend away from Mediterranean and vegetarian diets and towards an unhealthy western-style diet, potentially impacting mental health in the long run [19]. These longitudinal changes are crucial to understanding the continued impact of diet patterns on mental health and are well-aligned with the aims of the current research to analyze the longitudinal alterations in the diet linked to mental health outcomes.

4.6 Integration with Other Works

This research generated evidence that substantiates the role of diet in the prevention of mental disorders, contributing to the growing academic literature in the field of nutritional psychiatry. [20], [21] Have also proposed the adverse impacts of western diets on mental health, which are in support of the current study regarding dietary patterns in detail. A recent study by [22] on the effect of the Mediterranean diet also lends some support to the protective effect as witnessed in the current study. Moreover, observational studies to determine nutrient deficiencies conducted by also support the role of omega-3 fatty acids and vitamin D in mental health, which is another topic addressed in the current study.

4.7 Real-world Applications and Research Modalities

Therefore, generalizing the findings of this research goes beyond theoretical discussions in scientific writings and is useful in professional practice in clinical and preventive healthcare, as well as in the formulation of public health policies. The addition of dietary evaluation and nutrition therapies to mental health systems can improve clients' perceptions and limit the prevalence of mental disorders around the world. Further future investigations should aim at conducting more studies with long-term follow-up and a large number of subjects and culturally diverse groups to confirm these conclusions and, consequently, reveal ideal dietary recommendations for diverse cultures and social classes. In addition, specific advice to change some aspects of dietary behaviors and nutrient intake should be provided, taking into account the role of gene-environment interactions in susceptibility to these disorders.

4.8 Ethical Considerations

Participants' informed consent was obtained, making them understand the aim of the study, strategies to be used, and possible hazards involved in participating in the research. To uphold the anonymity of the participant, all the data received was anonymized, and all documents were securely deposited. We also provided participants with relevant materials and referrals to nutritionists or mental

health providers when necessary.

4.9 Limitations

Building upon these insights, this study underscores the need for careful diet choices in relation to mental health, as well as suggesting possible implications for dietary patterns and nutrient deficits in relation to intervention. However, it also recognized constraints like bias, non-interference, and action concerns only in adults and the elderly. Future studies should focus on the role that diet plays in the mental health of children, adolescents, and elderly people. This work contributes to the growing body of knowledge in nutritional psychiatry and provides guidance on enhancing mental health through nutrition.

5. CONCLUSION

In conclusion, this study emphasizes the importance of the relationship between diet and mental health and the importance of understanding the impact that dietary patterns, nutrient deficiencies, and interventions have on the mental health of an individual. Through these findings, it is clear and evident that nutritional patterns that include fruits, vegetables, omega-3 fatty acids, and low-processed foods and sugars reduce mental health disorders' risks. On the other hand, the promotion of western-type diets and nutrient paucity, especially the essential fatty acids omega3 and vitamin D, increases the risk. There is quite solid evidence for dietary approaches with supporting effects for various mental health symptoms, including those based on omega-3 fatty acid intake and Mediterranean diets. These findings underscore the need to incorporate nutritional screening and/or nutrition therapy into mental health interventions as a routine to enhance program efficacy and the quality of life of mental health patients with clinical nutrition requirements.

5.1 Recommendations

In light of the above observations, it is recommended that dietary changes be incorporated into the management of mental health disorders. Clinicians performing physical examinations and health check-ups should consider inquiring about dietary practices and evaluating the nutritional status of their patients, encouraging the necessary dietary changes where necessary. Mass health campaign programs should educate the general public on the effects of diet on mental health as well as influence the community to embrace healthy nutrition diets. In future research, there should be more attempts to conduct prospective studies to confirm the causative connections between diet and mental disorders through cross-cultural research.

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Author Contributions Statement

Name of Author	C	M	So	Va	Fo	I	R	D	O	E	Vi	Su	P	Fu
Patience C. Ukpene	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓

C : **C**onceptualization
M : **M**ethodology
So : **So**ftware
Va : **Va**lidation
Fo : **Fo**rmal analysis
I : **I**nvestigation
R : **R**esources
D : **D**ata Curation
O : Writing - **O**riginal Draft
E : Writing - Review & **E**diting
Vi : **Vi**sualization
Su : **Su**pervision
P : **P**roject administration
Fu : **Fu**nding acquisition

Conflict of Interest Statement

The authors declare that there are no conflicts of interest regarding the publication of this paper.

Informed Consent

All participants were informed about the purpose of the study, and their voluntary consent was obtained prior to data collection.

Ethical Approval

Not Applicable.

Data Availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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