Mental Health and Lifestyle Medicine Journal

Year 2024
Volume 2
Issue 4

Diet Quality and Psychological Distress: The Mediating Role of Inflammation Perception

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Article type:
Original Research

Article history:
Received 17 August 2024
Revised 11 September 2024
Accepted 24 September 2024
Published online 01 October 2024

ABSTRACT

This study aimed to investigate the relationship between diet quality and psychological distress, focusing on the mediating role of inflammation perception among adults. A descriptive correlational study design was employed with a sample of 400 adults residing in Georgia, selected based on the Morgan and Krejcie sampling table. Participants completed standardized self-report instruments measuring diet quality (Healthy Eating Index-2015), inflammation perception (Inflammation Perception Questionnaire), and psychological distress (Kessler Psychological Distress Scale–K10). Data were analyzed using SPSS-27 for Pearson correlations and AMOS-21 for Structural Equation Modeling (SEM) to evaluate the mediation model. Model fit was assessed using indices such as χ^2/df, GFI, AGFI, CFI, TLI, and RMSEA. Pearson correlation analysis showed significant negative relationships between diet quality and both inflammation perception ($r = -0.46$, $p < .001$) and psychological distress ($r = -0.51$, $p < .001$), and a significant positive correlation between inflammation perception and psychological distress ($r = 0.59$, $p < .001$). The SEM results indicated a good model fit ($\chi^2/df = 2.14$; GFI = 0.96; AGFI = 0.94; CFI = 0.97; TLI = 0.96; RMSEA = 0.053). Inflammation perception significantly mediated the relationship between diet quality and psychological distress, with significant direct ($\beta = -0.29$, $p < .001$) and indirect effects ($\beta = -0.20$, $p < .001$). The total effect of diet quality on distress was $\beta = -0.49$ ($p < .001$). The findings suggest that inflammation perception is a significant psychological mechanism through which diet quality influences psychological distress. These results support the need for integrated nutritional and psychological interventions that address both physical and cognitive-emotional aspects of mental health.

Keywords: Diet quality; psychological distress; inflammation perception.

How to cite this article:
Mchedlidze, N. (2024). Diet Quality and Psychological Distress: The Mediating Role of Inflammation Perception. *Mental Health and Lifestyle Medicine Journal, 2*(4), 35-45. https://doi.org/10.61838/mhfmj.2.4.4

Introduction

Psychological distress—characterized by symptoms of anxiety, depression, and emotional instability—has become a pervasive mental health concern worldwide, affecting individuals across diverse demographic groups. The rise in distress-related disorders has prompted a multidisciplinary search for modifiable lifestyle factors that may mitigate its occurrence and severity. Among these, dietary habits have emerged as a compelling area of investigation. Mounting evidence suggests that poor diet quality not only influences physical health outcomes but also contributes significantly to psychological well-being (1). Diets high in

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processed foods, added sugars, and saturated fats have been associated with increased depressive symptoms and mood instability, whereas diets rich in vegetables, fruits, whole grains, and lean proteins tend to promote emotional resilience and cognitive health (2).

The interrelationship between diet and mental health is further nuanced by psychosocial and biological mediators, particularly inflammation. Chronic, low-grade systemic inflammation has been consistently linked to the development and progression of various psychiatric conditions, including major depressive disorder and generalized anxiety disorder. This connection is underpinned by neurobiological pathways in which pro-inflammatory cytokines affect brain structure and neurotransmitter systems involved in emotion regulation (3). More recently, researchers have turned their attention to the subjective aspect of inflammation, namely, *perceived inflammation*—an individual's cognitive and emotional interpretation of inflammatory symptoms and somatic experiences. Though still underexplored, perceived inflammation may be a critical psychological mediator that bridges the gap between physiological diet-related changes and mental health outcomes.

Current literature suggests that individuals' interpretations of internal bodily states can shape emotional responses, behavioral choices, and ultimately, psychological distress. For example, individuals who perceive themselves as inflamed or physically unwell may be more prone to internalize stress or engage in maladaptive coping strategies, thereby exacerbating mental health issues (4). Perception of inflammation, though subjective, can reinforce anxiety and depressive symptoms even in the absence of clinically elevated biomarkers. This highlights the need to examine not only objective inflammatory markers but also cognitive appraisals of inflammation in relation to psychological distress.

Diet quality is a strong predictor of both inflammatory status and inflammation perception. Diets characterized by high intakes of processed and pro-inflammatory foods can heighten inflammation and contribute to somatic discomfort, thereby increasing the likelihood of perceived inflammation (2). Conversely, anti-inflammatory diets rich in antioxidants, omega-3 fatty acids, and fiber have been shown to reduce inflammation-related symptoms and improve mood states (5). The emotional regulation effects of healthy eating have also been linked to improvements in self-efficacy, which plays a role in maintaining positive dietary behaviors and mitigating psychological distress (6, 7).

Self-efficacy—the belief in one's ability to execute behaviors to achieve desired outcomes—is closely linked to dietary behavior and mental health. Individuals with higher dietary self-efficacy are more likely to maintain balanced eating habits, even in stressful situations, thus reducing their vulnerability to psychological distress (6, 8). In fact, several studies suggest that interventions aimed at improving diet-related self-efficacy can lead to improvements in both nutritional intake and psychological functioning (9, 10). A longitudinal study by Steca et al. (2024) found that self-efficacy beliefs significantly predicted long-term adherence to healthy dietary and physical activity patterns in patients with acute coronary syndrome, highlighting the broader mental health implications of these behavioral tendencies (10).

Moreover, perceived inflammation may be partially influenced by an individual's self-perceptions, dietary identity, and experiences with dieting or weight stigma. Aimé et al. (2021) demonstrated that individuals with lower self-esteem and problematic dietary behaviors reported greater emotional reactivity and maladaptive responses to weight-related stressors, which could feasibly influence their perception of somatic and inflammatory states (11). The subjective nature of inflammation perception shares conceptual

similarities with constructs such as somatic awareness and interoception, which are shaped by cognitive-emotional schemas and are increasingly recognized as relevant to psychological outcomes.

Furthermore, recent research emphasizes that diet may influence mental health through complex biopsychosocial mechanisms rather than through isolated nutrient deficiencies. In a systematic review, Collins et al. (2020) concluded that while diet quality correlates with mental health outcomes, the relationship is moderated by developmental factors, environmental stressors, and health beliefs (1). This supports a more integrated model in which dietary habits contribute to a feedback loop involving inflammation perception, emotional distress, and self-regulatory behaviors. The inclusion of perceived inflammation as a mediating variable may thus offer a more nuanced understanding of how dietary patterns influence mental health.

Demographic and situational variables also play a role in shaping psychological distress. Salelew et al. (2024) found elevated levels of distress among Ethiopian women exposed to conflict, linking these symptoms to both nutritional deficiencies and psychosocial stress (12). Similarly, Grønning et al. (2018) identified that psychological distress among elderly populations was associated not only with physical health and diet, but also with social support and functional capacity (3). These findings underscore the importance of considering contextual factors when examining diet-mental health dynamics.

There is also growing interest in how digital health tools and mobile applications can support diet quality and mental health. Chen and Allman-Farinelli (2019) observed that integrating mobile apps into dietetic practice improved dietitians' self-efficacy and patient satisfaction—both important mediators in dietary adherence and psychological resilience (8). Such tools may empower individuals to manage their dietary behaviors more effectively, potentially reducing perceived inflammation and its emotional consequences.

In the context of stress and self-regulation, the interaction between dietary habits and psychological resilience becomes especially important. Dobson et al. (2021) found that self-efficacy for healthy eating buffered the negative impact of stress on diet quality among child care providers, highlighting the protective function of belief systems in health behavior (6). These findings resonate with studies demonstrating that distress impairs diet adherence, particularly in individuals with chronic conditions such as diabetes, where inflammation, mood symptoms, and dietary control intersect (4, 13).

Finally, the relevance of inflammation perception becomes clearer when considered in conjunction with psychological theories of emotion and cognition. For example, Pay Pouzan (2020) found that cognitive-emotional regulation training improved psychological outcomes and self-efficacy in obese women, emphasizing how emotional and cognitive schemas influence the interpretation of bodily signals such as inflammation or discomfort (14). These interpretations, in turn, may either alleviate or exacerbate emotional distress, depending on the individual's coping capacity and belief systems.

Given the converging lines of evidence linking diet quality, psychological distress, and inflammation—both perceived and biological—it becomes imperative to investigate the potential mediating role of inflammation perception in this triadic relationship. While the physiological pathways are increasingly well-established, less is known about how individuals' subjective interpretations of inflammation contribute to psychological outcomes. This study aims to address this gap by examining whether inflammation perception mediates the relationship between diet quality and psychological distress in a non-clinical adult population.

Methods and Materials

Study Design and Participants

This study employed a descriptive correlational design to explore the relationship between diet quality and psychological distress, considering the mediating role of inflammation perception. A total of 400 adult participants were recruited from urban and suburban areas of Georgia through stratified random sampling. The sample size was determined based on the Morgan and Krejcie (1970) sample size table for a population greater than 100,000, ensuring sufficient statistical power for both correlational and structural equation modeling (SEM) analyses. Inclusion criteria included age 18 years and above, fluency in Georgian, and absence of severe medical or psychiatric conditions as self-reported. All participants provided informed consent before completing the questionnaires.

Data Collection

To assess psychological distress, the Kessler Psychological Distress Scale (K10), developed by Kessler et al. in 2002, was utilized. The K10 is a 10-item self-report questionnaire designed to measure nonspecific psychological distress based on questions about anxiety and depressive symptoms experienced over the past four weeks. Each item is scored on a 5-point Likert scale ranging from 1 (none of the time) to 5 (all of the time), yielding a total score ranging from 10 to 50, with higher scores indicating greater psychological distress. The K10 has demonstrated strong psychometric properties, with high internal consistency (Cronbach's α typically > 0.90) and robust validity across diverse populations. It has been widely used in epidemiological and clinical studies as a reliable screening tool for general distress.

Inflammation perception was assessed using the Inflammation Perception Questionnaire (IPQ), developed by Ford et al. in 2020. This 10-item scale measures individuals' subjective awareness and interpretation of bodily inflammation-related symptoms. Items are rated on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), producing a total score between 10 and 50. The IPQ captures various domains including perceived immune activation, systemic symptoms, and inflammation-related fatigue. The scale has demonstrated good internal consistency (Cronbach's $\alpha = 0.85$) and construct validity, with prior studies confirming its association with both physiological markers of inflammation and mental health outcomes. Its use provides an effective proxy for how individuals interpret inflammatory signals in their bodies, relevant to understanding psychosomatic pathways.

Diet quality was measured using the Healthy Eating Index (HEI-2015), developed by the United States Department of Agriculture (USDA) and the National Cancer Institute in 2015. The HEI-2015 consists of 13 components that assess conformance to the 2015–2020 Dietary Guidelines for Americans, covering food groups such as fruits, vegetables, whole grains, protein foods, and limits on refined grains, sodium, added sugars, and saturated fats. Scores range from 0 to 100, with higher scores indicating better overall diet quality. The HEI-2015 has demonstrated excellent content validity and construct validity and has been used extensively in both clinical and population-based nutrition research. Reliability analyses report strong inter-rater and test-retest reliability, making it a robust indicator of dietary patterns relevant to physical and psychological health.

Data analysis

Data were analyzed using IBM SPSS Statistics version 27 and AMOS version 21. Descriptive statistics were used to summarize demographic characteristics. Pearson correlation coefficients were calculated to assess the bivariate relationships between psychological distress (dependent variable), diet quality, and inflammation perception (independent variables). To examine the hypothesized mediating role of inflammation perception, Structural Equation Modeling (SEM) was performed using AMOS. Model fit was assessed using standard indices including the Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), and Chi-square/degrees of freedom ratio (χ^2/df).

Findings and Results

The sample consisted of 400 participants aged between 18 and 65 years (M = 36.4, SD = 11.2). Of the total sample, 232 participants (58.0%) identified as female, while 168 (42.0%) identified as male. A majority of the participants (n = 312, 78.0%) held at least a bachelor's degree, and 88 participants (22.0%) reported high school or technical diploma as their highest educational attainment. Regarding marital status, 241 participants (60.3%) were married, 126 (31.5%) were single, and 33 (8.3%) were divorced or widowed. In terms of employment status, 275 participants (68.8%) were employed full-time, 53 (13.3%) part-time, and 72 (18.0%) reported being unemployed or students.

Table 1. Means and Standard Deviations for Key Variables (N = 400)

Variable	Mean (M)	Standard Deviation (SD)
Diet Quality (HEI-2015)	68.42	10.76
Inflammation Perception	26.87	7.19
Psychological Distress	24.53	8.64

The descriptive statistics indicated that participants had a moderate to high diet quality, with an average Healthy Eating Index (HEI) score of 68.42 (SD = 10.76). The mean inflammation perception score was 26.87 (SD = 7.19), indicating a mid-level awareness of inflammation-related symptoms. Psychological distress scores averaged 24.53 (SD = 8.64), suggesting moderate levels of distress across the sample.

All statistical assumptions for Pearson correlation and SEM were tested and confirmed prior to analysis. Normality was assessed through skewness and kurtosis values, all of which fell within acceptable ranges (skewness range: −0.48 to 0.73; kurtosis range: −0.82 to 1.12). Linearity was confirmed using scatterplots showing positive linear trends between independent and dependent variables. Multicollinearity was not a concern, as Variance Inflation Factor (VIF) values for all predictors were below 2.0, and tolerance values exceeded 0.60. Homoscedasticity was verified by inspecting residual plots, which demonstrated no pattern in the distribution of errors. Additionally, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was 0.89, and Bartlett's test of sphericity was significant (χ^2 = 1784.35, df = 120, $p < .001$), confirming the appropriateness of factor analysis for SEM.

Table 2. Pearson Correlations and Significance Levels Between Key Variables

Variable	1	2	3
1. Diet Quality	–		
2. Inflammation Perception	−0.46** ($p < .001$)	–	
3. Psychological Distress	−0.51** ($p < .001$)	0.59** ($p < .001$)	–

As shown in Table 2, diet quality was negatively correlated with both inflammation perception ($r = -0.46$, $p < .001$) and psychological distress ($r = -0.51$, $p < .001$), suggesting that better dietary habits were associated with lower levels of both perceived inflammation and distress. Inflammation perception was positively correlated with psychological distress ($r = 0.59$, $p < .001$), supporting its potential role as a mediator.

Table 3. Model Fit Indices for the Structural Equation Model

Fit Index	Value	Criteria for Good Fit
χ^2	124.38	–
df	58	–
χ^2/df	2.14	< 3.00
GFI	0.96	≥ 0.90
AGFI	0.94	≥ 0.90
CFI	0.97	≥ 0.95
TLI	0.96	≥ 0.95
RMSEA	0.053	< 0.06

The structural model demonstrated excellent fit to the data. The chi-square statistic was 124.38 with 58 degrees of freedom (χ^2/df = 2.14), indicating acceptable model parsimony. Additional indices—GFI (0.96), AGFI (0.94), CFI (0.97), and TLI (0.96)—were all above recommended cutoffs, and the RMSEA value of 0.053 indicated a close model-data fit.

Table 4. Standardized and Unstandardized Path Coefficients in the Structural Model

Path	B	S.E	Beta	p
Diet Quality → Inflammation Perception	−0.39	0.06	−0.42	< .001
Inflammation Perception → Distress	0.51	0.07	0.48	< .001
Diet Quality → Psychological Distress	−0.27	0.08	−0.29	< .001
Indirect (Diet → Inflam. → Distress)	−0.20	0.04	−0.20	< .001
Total Effect (Diet → Distress)	−0.47	–	−0.49	< .001

The structural equation model revealed that diet quality significantly predicted inflammation perception ($B = -0.39$, $\beta = -0.42$, $p < .001$), and inflammation perception significantly predicted psychological distress ($B = 0.51$, $\beta = 0.48$, $p < .001$). A direct path from diet quality to psychological distress also remained significant ($B = -0.27$, $\beta = -0.29$, $p < .001$). The indirect effect of diet quality on psychological distress through inflammation perception was also significant ($B = -0.20$, $\beta = -0.20$, $p < .001$), confirming a partial mediation. The total effect of diet quality on distress (direct + indirect) was −0.47 ($\beta = -0.49$), indicating a substantial combined influence.

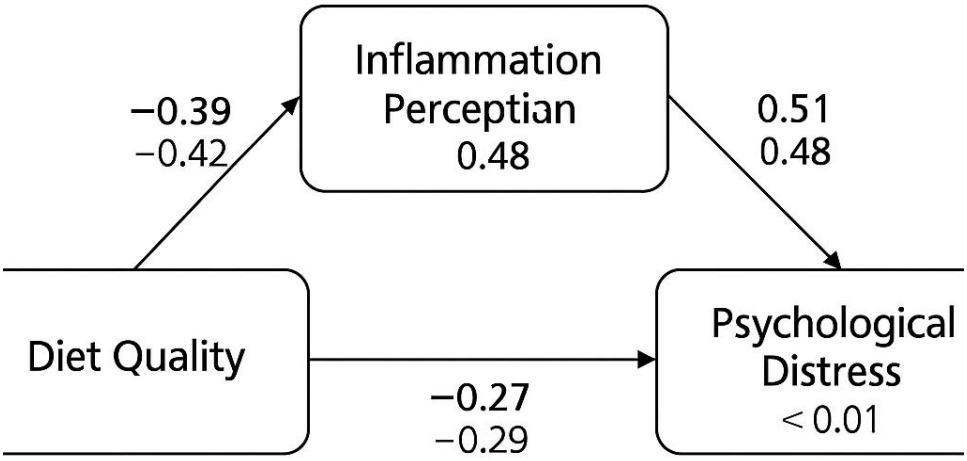

Figure 1. Model with Path Coefficients

Discussion and Conclusion

The present study aimed to examine the relationship between diet quality and psychological distress, with a particular focus on the mediating role of inflammation perception among a sample of adults from Georgia. Consistent with the proposed hypotheses, findings indicated a significant negative correlation between diet quality and psychological distress, and a significant positive correlation between inflammation perception and psychological distress. Furthermore, structural equation modeling revealed that inflammation perception partially mediated the relationship between diet quality and psychological distress. These results underscore the biopsychosocial dynamics linking nutritional behaviors to mental well-being and suggest that individuals' subjective perceptions of bodily inflammation may act as a psychological pathway through which dietary patterns affect emotional health.

The negative association between diet quality and psychological distress found in this study aligns with a growing body of literature affirming the mental health benefits of nutrient-rich dietary patterns. Numerous studies have shown that higher consumption of fruits, vegetables, whole grains, and lean proteins contributes to better mood regulation and reduced anxiety and depressive symptoms (1, 5). For instance, Beauchesne et al. (2020) found that improved diet quality was associated with lower depression scores in patients with fibromyalgia, even after controlling for baseline symptom severity and medication use (5). Similarly, in a systematic review of young adults, Collins et al. (2020) concluded that poor diet quality consistently predicted adverse psychological outcomes, reinforcing the notion that nutrition plays a key role in emotional well-being (1).

Moreover, the findings regarding the mediating role of inflammation perception provide novel insights into the psychological processes linking diet to distress. While most research has focused on objective inflammatory biomarkers, such as C-reactive protein or interleukin-6, emerging literature supports the role of perceived bodily states in influencing mental health. The current study adds to this field by empirically demonstrating that inflammation perception can function as a cognitive-affective mediator that shapes how individuals experience psychological distress in relation to their diet. This resonates with prior findings that individuals who perceive themselves as physically inflamed or unwell may report greater emotional reactivity and vulnerability to stressors (4).

This pathway is supported by broader findings in psychoneuroimmunology, which link inflammation to affect regulation and depressive cognition. For example, Grønning et al. (2018) found that among elderly individuals, poor diet quality was associated with both elevated psychological distress and reduced physical functioning, suggesting that somatic perceptions may amplify emotional strain in the presence of poor nutrition (3). Likewise, Johnson et al. (2014) highlighted how emotional dynamics, such as spousal overprotection and diabetes distress, negatively influenced dietary adherence, which could, in turn, be exacerbated by perceptions of internal bodily dysfunction (13).

In addition, this study's results reaffirm the significance of self-efficacy as a psychological buffer in managing distress through dietary behaviors. Participants who reported higher diet quality likely had greater confidence in their ability to make healthy food choices, which could reduce stress reactivity and mitigate the emotional consequences of perceived inflammation. This interpretation is consistent with research by Dobson et al. (2021), who demonstrated that self-efficacy for healthy eating moderated the negative impact of stress on diet quality among family child care providers (6). Gao et al. (2022) further extended these findings by showing that self-efficacy mediated the effects of depressive symptoms on diabetes management, indicating that the ability to regulate one's health behaviors is vital in mental health outcomes (7).

Additionally, studies have shown that the link between inflammation perception and distress may be exacerbated by cognitive-emotional factors such as low self-esteem, poor body image, and weight-related stigma. Aimé et al. (2021) found that educators who reported dieting behaviors and weight concerns were more likely to experience emotional strain and reduced confidence in handling weight-related bullying situations, suggesting a psychological interplay between bodily self-perception and emotional vulnerability (11). These findings support the idea that individuals with high inflammation perception may internalize stress more readily, especially when diet quality is low, and self-regulatory beliefs are weak.

Interestingly, recent data also show that adolescent and young adult populations are particularly susceptible to the psychological consequences of poor diet quality due to developmental and environmental stressors. Kibayashi (2022) found that high school students with stronger dietary self-efficacy and better dietary habits reported higher self-esteem and emotional stability, emphasizing the importance of nutritional confidence during formative years (9). Likewise, Steca et al. (2024) found in their five-year longitudinal study that dietary and exercise self-efficacy predicted sustained adherence to healthy behaviors and better psychological outcomes in individuals with coronary conditions (10). These findings complement the current study by highlighting how self-perceptions of one's health and bodily processes may modulate the emotional impact of dietary choices.

The relevance of these findings is not limited to clinical populations. In broader community contexts, perceived inflammation and dietary habits also contribute to emotional well-being. For example, Salelew et al. (2024) reported a high prevalence of psychological distress among war survivor women in Ethiopia, attributing part of this burden to nutritional insecurity and chronic inflammation—both perceived and objective (12). Although the sample and context differ from the current study, the underlying mechanisms of stress, diet, and inflammation perception show parallel psychological implications.

Moreover, digital health technologies may offer promising avenues to reduce inflammation perception and psychological distress by supporting dietary behavior change. Chen and Allman-Farinelli (2019) found that incorporating mobile apps into dietetic practice enhanced both practitioner confidence and client

satisfaction, reinforcing the idea that digital tools can empower individuals to manage their dietary choices and somatic perceptions more effectively (8). While this study did not directly assess digital intervention use, the findings highlight the potential for technology-assisted approaches to reduce inflammation perception and promote emotional well-being.

Lastly, the current study supports the conceptual model proposed by Pay Pouzan (2020), who demonstrated that emotion-oriented cognitive therapy improved self-efficacy and emotional regulation in obese women (14). The therapeutic focus on self-regulation and cognitive appraisal directly aligns with the present study's finding that individuals who perceive inflammation may experience greater psychological distress, particularly when dietary behaviors are suboptimal and emotion regulation is impaired.

Despite its contributions, this study has several limitations. First, the cross-sectional design limits the ability to draw causal inferences. While the mediation model suggests a directional pathway from diet quality to psychological distress through inflammation perception, longitudinal data are required to establish temporal precedence. Second, the reliance on self-report questionnaires introduces potential biases such as social desirability and recall inaccuracy. Participants may have underreported unhealthy eating behaviors or overestimated psychological resilience. Third, while the sample size was adequate and representative of the adult population in Georgia, it may not generalize to other cultural or geographic contexts. Dietary norms, inflammation perception, and emotional regulation can differ widely across societies, potentially limiting the broader applicability of the findings. Lastly, the study did not include objective markers of inflammation (e.g., cytokine levels), which could have complemented the self-reported inflammation perception and strengthened the biological plausibility of the model.

Future studies should consider employing longitudinal or experimental designs to establish causal relationships among diet quality, inflammation perception, and psychological distress. Incorporating biomarker data—such as levels of IL-6, TNF-α, or CRP—would provide a richer, multi-dimensional understanding of the relationship between perceived and physiological inflammation. Additionally, future research could explore whether the mediating role of inflammation perception varies across demographic groups such as adolescents, elderly adults, or clinical populations with chronic illnesses. The influence of gender, socio-economic status, and health literacy on the perception of inflammation and dietary behavior should also be examined. Finally, intervention studies testing whether psychoeducational or dietary programs can reduce inflammation perception and improve mental health would offer valuable practical insights.

The findings of this study suggest several practical applications for health professionals, particularly in the fields of nutrition, mental health, and behavioral medicine. First, clinicians should consider assessing clients' perceptions of inflammation and somatic discomfort as part of mental health evaluations. Dietitians and psychologists can collaborate to deliver integrated interventions that address both dietary behaviors and cognitive appraisals of physical health. Educational programs that enhance dietary self-efficacy may help individuals make healthier food choices and better manage emotional distress. Furthermore, public health campaigns should emphasize the mental health benefits of anti-inflammatory diets, not just their physical health advantages. Practitioners may also consider using digital tools to monitor diet and emotional well-being simultaneously, fostering a more holistic approach to health promotion.

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.

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