Health Science Reports

WILEY

Health Science Reports Open Access

METHODS AND PROTOCOLS OPEN ACCESS

Ultra-Processed Food Consumption, Mental Health, and Quality of Life in Adults: A Systematic Review Protocol

José Igor Ferreira Santos Jesus[1] | Milka Barbosa Costa[1] | Gabriel Victor Alves Santos[2] | Kaio Vinicius C. Silva[1] | Suelen Marçal Nogueira[2,3] | Manuel Monfort-Pañego[4] | Priscilla Rayanne e Silva[2,5] | Matias Noll[1,2]

[1]Faculdade de Nutrição, Universidade Federal de Goiás, Goiânia, Brazil | [2]Instituto Federal Goiano, Campus Ceres, Goiânia, Goiás, Brazil | [3]Universidade Evangélica de Goiás, Campus Ceres, Goiânia, Goiás, Brazil | [4]University of Valencia, Valencia, Spain | [5]Faculdade de Medicina, Universidade de São Paulo, São Paulo, Brazil

Correspondence: José Igor Ferreira Santos Jesus (jose_igor@discente.ufg.br) | Manuel Monfort-Pañego (manuel.monfort@uv.es) | Matias Noll (matias.noll@ifgoiano.edu.br)

Received: 8 April 2025 | **Revised:** 11 December 2025 | **Accepted:** 7 January 2026

Funding: Fundação de Amparo à Pesquisa do Estado de Goiás-FAPEG

Keywords: mental health | NOVA | quality of life | ultra-processed food

ABSTRACT

Background and Aims: The consumption of ultra-processed foods is linked to an increase in chronic noncommunicable diseases and risk of mortality. Adverse effects on health have a direct impact on quality of life, compromising general well-being. Thus, with this systematic review protocol, we aimed to review the literature on the association of high consumption of ultra-processed foods with quality of life and mental health in adults and quantify it through meta-analysis.

Methods: This protocol is based on PRISMA-P and has been registered on PROSPERO (CRD42024599909). The CINAHL, EMBASE, FSTA, LILACS, Scopus, Ovid, PsycNET, PubMed, and Web of Science databases will be searched. This strategy uses the MeSH terms and their variations. The search was limited to original peer-reviewed articles with no language restrictions. Two reviewers independently read and extracted data. Methodological quality and risk of bias will be assessed using the GRADE, CASP, and Downs and Black methods.

Results: This protocol describes how the results of the systematic review will be organized, detailing the procedures for study selection, inclusion, and data analysis.

Conclusions: It is hoped that it will offer a consolidated and up-to-date view of the impact of ultra-processed foods on the quality of life and mental health.

Trial Registration: PROSPERO: CRD42024599909.

1 | Introduction

The consumption of ultra-processed foods (UPFs) has increased along with a reduction in the consumption of healthy foods [1–3]. The NOVA classification system categorizes foods based on their level of processing [4], defining UPFs as industrially manufactured foods and beverages with little to no intact food, ready-to-eat, and requiring minimal preparation [5–8]. The classification of these foods is based on the use of advanced

Abbreviations: APA, American Psychological Association; CASP, Critical Appraisal Skills Program; CINAHL, Cumulative Index to Nursing and Allied Health Literature; CNCD, chronic noncommunicable diseases; FSTA, Food Science and Technology Abstracts; GRADE, Grading of Recommendations, Assessment, Development, and Evaluations; LILACS, Latin American and Caribbean Health Sciences Literature; MeSH, Medical Subject Headings; MH, mental health; PRISMA, Preferred Reporting Items for Systematic Reviews and Meta-Analyses; PRISMA-P, Preferred Reporting Items for Systematic Reviews and Meta-Analyses Protocols; PROSPERO, Prospective Register of Systematic Reviews; QoL, quality of life; UPF, ultra-processed food; WHO, World Health Organization.

processing technology and the presence of industrial additives [9, 10], which aim to improve their palatability, sensory quality, and shelf life [11, 12], regardless of the amount of sugars, salt, or other additives alone [9, 10].

High consumption of UPF is directly related to an increased risk of chronic noncommunicable diseases (CNCDs) such as obesity, diabetes, metabolic syndrome, cancer, and mental disorders such as anxiety, depression, and Alzheimer's disease in different age groups [12–22]. These associations have gained prominence as global dietary patterns shift in the context of increasing UPF availability [23, 24]. Recent evidence suggests that these adverse health effects profoundly compromise quality of life (QoL), as the deterioration of physical and mental faculties reduces people's ability to live full and productive lives [12, 25–27].

According to the World Health Organization (WHO), health is intrinsically linked to QoL and mental health (MH), constructs that are intertwined and influenced by the individual's context. In terms of QoL, this involves the cultural context and value system in which they live. This concept also encompasses well-being in terms of physical and psychological health, social relationships, beliefs, and interaction with the environment. Crucially, MH constitutes a fundamental component of this ecosystem; it is defined as a state of mental well-being formed by complex individual, social, and structural factors, transcending the mere absence of mental disorders [28, 29]. Studies have shown that the poorer the QoL and mental and physical health, the poorer the eating habits [30, 31]. In addition, poor diet quality has been recognized as a modifiable risk factor for mental disorders, especially depression [25, 30, 32]. Although research has focused on dietary patterns and macronutrients, recent evidence suggests that the degree to which food is processed can also influence MH [25, 31, 33].

Thus, research related to the consumption of UPFs to improve QoL and MH is crucial because of the growing concern about their effects and high global consumption of these foods [1, 12, 34]. Although there are studies that have evaluated the relationship between UPFs and mental disorders [25, 35–37] and QoL [30, 31], the results have often been analyzed separately, overlooking the synergistic relationship between psychological state and general perception of well-being, and have not focused on QoL in its broadest form and have methodological limitations such as restrictions on databases, languages, and types of studies. Therefore, we describe the protocol of a systematic review that will shed light on the association of high UPF consumption with QoL and MH, answering the question: "What are the effects of high UPF consumption on the quality of life and mental health of adults?"

2 | Materials and Methods

This protocol was performed according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Protocols (PRISMA-P) guidelines [38, 39] and registered in the International Prospective Register of Systematic Reviews (PROSPERO) under number CRD42024599909. The systematic review and meta-analysis will be conducted following the guidelines of the Cochrane Collaboration Handbook of Systematic Reviews [40] and Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) (Figure 1) [41]. The PE/ICO strategy [42] (Population, Exposure/Intervention, Comparison, and Outcome) will be used to answer the review questions, where: P—Adults; E—High consumption of UPFs; O—Effects in QoL and MH.

2.1 | Eligibility Criteria

Articles must meet all inclusion criteria; studies that meet any exclusion criteria will be excluded.

Inclusion criteria:

(i1) Original, peer-reviewed journal articles;

(i2) Studies on the association between high UPF consumption and QoL and MH;

(i3) Original articles from quantitative, qualitative, or mixed studies (e.g., cross-sectional, cohort, case-control);

(i4) Studies with a sample of adults aged 18–64 years, according to the WHO definition [43];

(i5) Articles published in any language;

(i6) Articles published since 2009 that follow the NOVA food classification [23].

Exclusion criteria:

(e1) Duplicate articles;

(e2) Studies with incomplete data;

(e3) Studies with mixed samples in which it is not possible to separate the data analyzed;

(e4) Studies not available in full in the databases searched and those that could not be accessed even after three consecutive attempts to contact the authors;

(e5) Studies officially withdrawn from the scientific literature due to prior retraction;

(e6) Impossibility of translating restricted languages, even after using collaborative resources and digital tools [44];

(e7) Studies focusing on dietary restriction for weight loss purposes;

(e8) Studies on assessments and associations conducted exclusively in specific populations, such as rural groups, hospitalized patients, pregnant women, indigenous people, immigrants, refugees, and isolated people;

(e9) Studies that evaluated only adults with mental disabilities or with some chronic noncommunicable disease;

(e10) Opinion articles, editorial comments, letters to the editor or similar, dissertations, theses, reviews, case reports, abstracts and proceedings of conferences and books.

2.2 | Source of Information

Searches will be conducted in the following electronic databases: PsycArticles (via APA PsycNet), selected because it offers access to full peer-reviewed articles in the field of psychology—unlike other collections on the platform, such as PsycINFO, which present overlapping content or less adherence to the scope of this review; Cumulative Index to Nursing and Allied Health Literature (CINAHL), Embase, Food Science and Technology Abstracts (FSTA), Latin American and Caribbean Literature in Health Sciences (LILACS), Ovid, PubMed (including full coverage of the

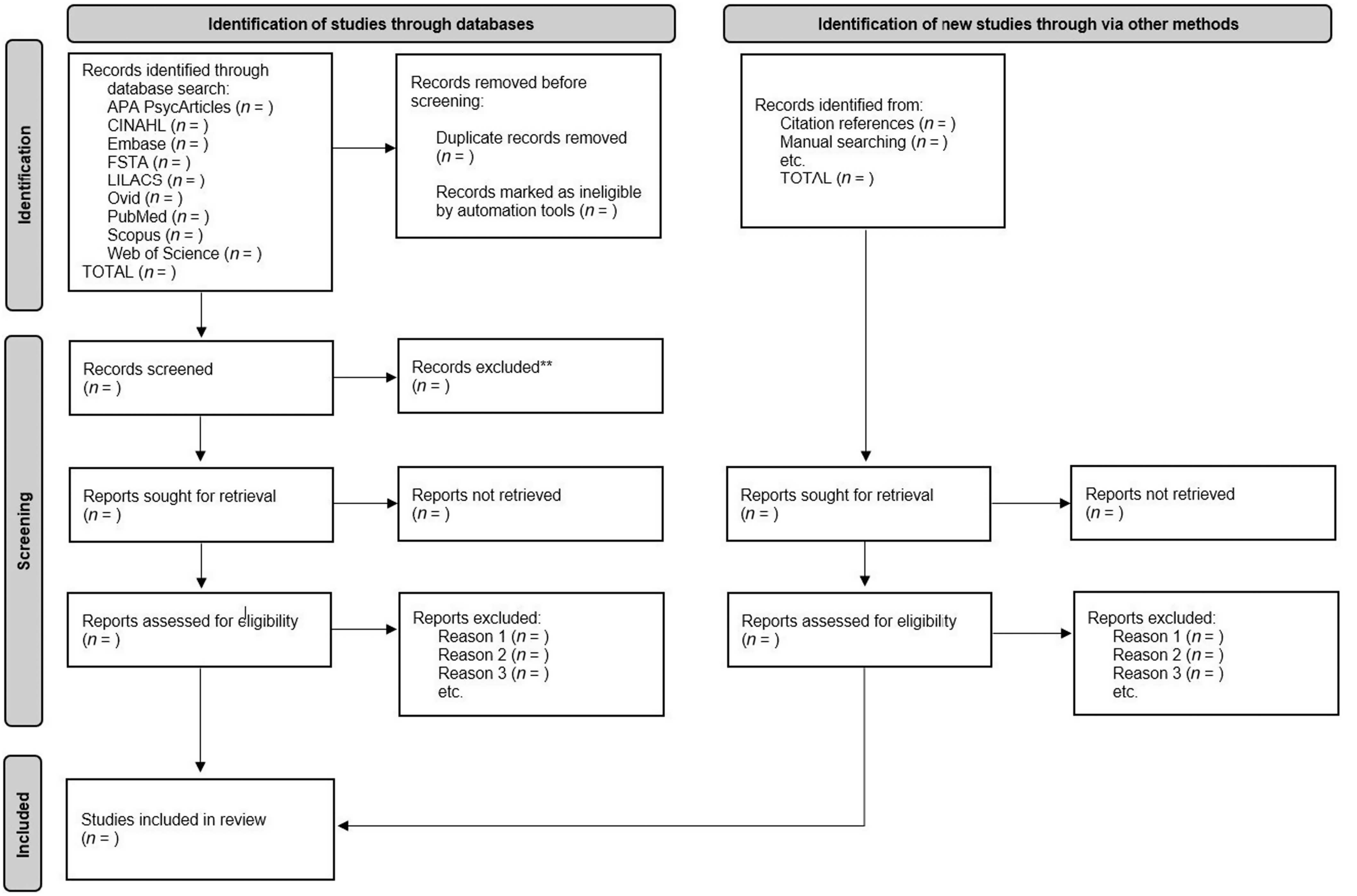

FIGURE 1 | PRISMA 2020 flow diagram for identifying, screening, and including studies [41]. **If automation tools were used, indicate how many records were excluded by a human and how many were excluded by automation tools.

TABLE 1 | General search strategy.

Search	Entry terms
#1	("adult" OR "adults" OR "adulthood" OR "female" OR "females" OR "individuals" OR "male" OR "males" OR "man" OR "men" OR "middle age" OR "midlife" OR "woman" OR "women")
#2	("candy" OR "carbonated beverage" OR "convenience food" OR "fast food" OR "highly-processed" OR "industrialized foods" OR "junk food" OR "NOVA" OR "nova classification" OR "NOVA food classification" OR "NOVA system" OR "prepared foods" OR "processed foods" OR "ready-to-consume" OR "ready-to-eat" OR "soft drinks" OR "sweet" OR "ultra processed" OR "ultra processed foods" OR "ultra-processed foods" OR "ultra-processed products" OR "UPF")
#3	("anxiety" OR "angst" OR "hypervigilance" OR "nervousness" OR "anxiousness" OR "C-DAS" OR "CFSS-DS" OR "COHIP" OR "COHRQoL" OR "depression" OR "depressive symptoms" OR "depressive symptom" OR "depressed mood" OR "mood disorder" OR "HRQOL" OR "life quality" OR "major depressive disorder" OR "mental disorder" OR "mental health" OR "mental hygiene" OR "QoL" OR "quality of life" OR "well-being" OR "whoqol" OR "whoqol-bref" OR "sf-36")
#4	(#1) AND (#2) AND (#3)

MEDLINE database), Scopus, and Web of Science. The selection of these databases considered their relevance to the fields of health, psychology, nutrition, and epidemiology, as well as their broad indexing of peer-reviewed scientific literature, in line with the eligibility criteria adopted in this review. The search will be conducted in August 2025. In addition, the reference lists of all eligible articles will be manually screened to identify additional relevant studies.

2.3 | Search Strategy

The search strategy was developed based on the Medical Subject Headings (MeSH) terms. The Boolean operators "AND" and "OR" were used to search the databases (Table 1). Specific search refinement strategies were applied according to each platform to optimize the search strategy for each database (Supporting Information S2: File 1).

To ensure the review is comprehensive and up to date, an updated search of all selected databases will be conducted just before the final manuscript is submitted. This step will identify and include any relevant studies published after the initial screening phase, ensuring that the results reflect the latest scientific evidence.

2.4 | Selection Process

Retrieved articles will be imported into Rayyan, where duplicates will be removed, and titles and abstracts will be screened. Reviewers (R1 and R2) will independently and blindly assess titles and abstracts, selecting studies based on inclusion and exclusion criteria [40]. Any discrepancies will be resolved by a senior reviewer, R3 or R4, based on the eligibility criteria. Subsequently, R1 and R2 will read through the articles selected in the previous stage blindly and independently to assess their inclusion in the review [41]. To guarantee the transparency and quality of the reviews, the percentage of agreement and Cohen's κ coefficient will be calculated [45]. This coefficient is used to test the interrater reliability [45, 46].

2.5 | Assessing the Risk of Bias

Two tools will be used to assess the risk of bias. For quantitative studies, the risk of bias will be assessed independently by two reviewers (R1 and R2) using the Downs and Black method. This tool is used in the field of health to assess the quality of studies and consists of 27 items. The items are scored based on reporting, external validity, bias, confounding factors, and power [47]. The higher the final score, the higher the quality of the study and the lower the risk of bias. However, the questionnaire includes items that are not suitable for some observational studies. Therefore, a compatible version will be applied for cross-sectional or cohort studies (0–12 points) and another version for longitudinal studies (0–16 points) [48].

The risk of bias in qualitative studies will be assessed using the Critical Appraisal Skills Program (CASP) questionnaire (a Qualitative Studies Checklist). This tool consists of ten items and assesses the validity of the results (Section A: six items), the results (Section B: three items), and whether the results are useful (Section C: one item). The initial nine items (Sections A and B) are objective questions that can be answered as "yes," "can't say," and "no," respectively. The final item requires qualitative responses. The overall quality of each study assessed will receive a score based on a three-star system in three categories: low (01 star; 0–6 points), moderate (02 stars; 7–12 points), and high (03 stars; 13–18 points) [48, 49]. In the event of a disagreement between the assessments of R1 and R2, another independent reviewer (R3 or R4) will be consulted for resolution.

2.6 | Certainty of the Evidence

The recommendations of the Grading of Recommendations, Assessment, Development, and Evaluations (GRADE) classify the quality of evidence as "high," "moderate," "low," or "very low" [50]. The GRADEpro GDT software will be used to assemble the tables. All review authors will independently conduct a certainty assessment, and any discrepancies will be discussed and resolved [51].

The results of observational studies will begin with a "low" certainty of evidence and those of randomized controlled trials will begin with a "high" certainty of evidence. However, certainty can increase or decrease according to preestablished criteria. For example, certainty can be reduced by 1 level if (i) the proportion of studies classified as "low risk of bias" is 50%–75%, (ii) heterogeneity is moderate, (iii) there is publication bias (Egger's test), (iv) we generalize to different populations, and (v) the power of the analysis is 80%–90%. Similarly, certainty can be reduced by two levels if (i) the proportion of studies classified as having a "low risk of bias" is $< 50\%$, (ii) heterogeneity is high, and (iii) the power of the analysis was $< 80\%$. However, the certainty of the evidence may increase in the case of dose–response effects and very large effects [51, 52].

2.7 | Publication Bias

We will combine two methods to achieve better certainty regarding the risk of bias when at least ten studies are included in the meta-analysis. The first is a funnel plot (i.e., a scatter plot relating effect sizes to the study sample size). Initially, we visually examined the symmetry of the funnel plot by considering possible sources of bias such as heterogeneity, reporting bias, publication bias, and randomization. If asymmetry is detected in the funnel, additional tests will be conducted to investigate the source of this bias [53]. In addition, we will apply Egger's regression test, which is a linear regression approach of the effect estimated by the standard error, weighted by the inverse of the variance of the association measure [54].

2.8 | Training of Reviewers

Rayyan software, a tool designed to assist in systematic reviews and meta-analyses, will be used for study selection [55]. The authors responsible for assessing the eligibility of the articles will be trained in the use of the inclusion and exclusion criteria using 50 titles and abstracts before coding the articles. In addition, the researchers will participate in training to standardize the assessment of the risk of bias, learn how to extract data from the articles using the software, and assess at least five studies that will not be included in the final review, and use the software [44, 53, 56].

2.9 | Data Extraction

The data extraction process will involve reading potential articles in full [41]. Table 2 lists all the aspects used for data extraction. The extracted information will include details, such as the name of the author, year of publication, country or region, title, e-mail address, main objective, study design, intervention, sample, collection period, type of study, data collection instrument, statistical analysis, main results, and identified gaps.

2.10 | Synthesis and Analysis of Results

Data from each article will be used to draw up evidence tables describing the included studies and covering the study

TABLE 2 | Main version of the table used to degrade the data from the included studies.

#	Author/year/country	Title/DOI	Objective	Study design	Intervention	Sample	Collection period	Type of study	Instrument used	Statistical analysis	Results	Gaps
1												
2												
3												
⋮												
n												

characteristics, context, participants, results, and findings. Where feasible and appropriate, data points from primary observational studies were used to conduct random-effects meta-analyses. We will then estimate the effects and their 95% confidence intervals. This model assumes a normal distribution of the study's prevalence estimates, considering intra- and interstudy variations [57]. Sensitivity will be assessed by considering the proportion of studies with a high risk of bias and taking one study at a time to determine whether it will affect the results of the meta-analysis. The power of each meta-analysis will be calculated as a measure of precision [58].

Statistical heterogeneity will be quantified using the I^2 statistic. This statistic represents the proportion of variation in the summarized results of the meta-analyses. I^2 values range from 0% to 100%, with intervals of 0%–25%, 25.1%–75%, and 75.1%–100% indicating "low," "moderate," and "high" heterogeneity, respectively. When heterogeneity cannot be readily explained, one analytical approach is to incorporate it into a random effects model, such as a fixed-effect model. A sensitivity analysis will be performed to identify the sources of heterogeneity. In addition, we will report the $?^2$ and Cochran Q tests, with a $p < 0.05$ considered statistically significant for heterogeneity [59, 60].

We will conduct a meta-analysis when sufficient and reasonably homogeneous quantitative data are available across studies. If the outcomes, measures, or study designs differ substantially the findings will instead be synthesized narratively. In both cases, data will be extracted according to the predefined fields in Table 2. When a meta-analysis is feasible, we will additionally perform sensitivity and subgroup analyses to explore sources of heterogeneity, and meta-regression if appropriate. The decision to conduct a meta-analysis will be based on a critical analysis of the evidence found, considering the methodological weight, the relevance of each study, and the available data [59, 61].

3 | Discussion

High consumption of UPF can cause a series of adverse effects on physical health and MH in different age groups [13, 62]. These include cancer, metabolic syndromes, obesity [12], insulin resistance, and gastrointestinal disorders [15, 63]. In addition, they have been linked to more prevalent symptoms of depression [12, 26] and anxiety [25] and a lower perception of QoL, including energy, vitality, and general satisfaction with health [12].

Given the growing evidence of the adverse effects of UPF, it is necessary to defend and support healthier and more natural diets [64, 65]. Concerns about numerous harmful outcomes are increasing owing to the risk of UPFs being associated with adverse health outcomes [66, 67]. Recommendations include reducing the consumption of these foods and increasing the intake of fresh and minimally processed foods [68, 69].

Through this systematic review, we aimed to determine the relationship between high UPF consumption, QoL, and MH. Despite the exponential growth in research on UPFs, to the best of our knowledge, there is currently no systematic review with a meta-analysis that examines the effects of this class of foods on QoL and MH outcomes. Although the literature includes studies that have evaluated the relationship between UPF, mental disorders, and QoL, these results were analyzed separately. We hope that the results of this review will serve as a basis for public health interventions, contribute to future randomized clinical trials, and focus on QoL and MH outcomes.

4 | Strengths and Limitations

One of the main advantages of creating a systematic review protocol is that it promotes transparency in conducting the research. This is achieved by widely disseminating the review methodology in a structured and organized manner, providing robust results that support decision-making and are highly valued by all stakeholders. In addition, the search of nine databases, without language restrictions, coverage of different and more complex techniques, and a wider range of terms in the search strategy, was configured as robust for this review protocol.

Among the limiting factors, it is possible that the review does not identify eligible studies, culminating in an "empty" review [70–72]. The fact that there is a variation in the classification of foods, influence of the time of the intervention, and type of questionnaire used to collect data may also be barriers to the study. There is also the possibility of methodological bias, such as nonvalidated instruments, heterogeneity between studies, and quantitative synthesis of data. These factors would result in complex or even infeasible analyses.

Thus, research into the relationship between high consumption of UPFs, QoL, and MH will provide more scientific evidence, helping to mitigate the existing gaps.

5 | Conclusion

A systematic review of the high consumption of UPF associated with QoL and MH is extremely relevant as it allows for the synthesis and comprehensive analysis of scientific evidence on the effects of these foods on human health. This methodological approach will offer of the impact of UPF on the QoL and MH. In addition, it could provide a basis for the formulation of public policies, nutritional guidelines, and public health interventions while highlighting gaps in current knowledge and directing future research.

Author Contributions

José Igor Ferreira Santos Jesus: conceptualization, methodology, validation, formal analysis, investigation, resources, writing – original draft preparation, writing – review and editing, visualization, funding acquisition. **Milka Barbosa Costa:** methodology, validation, writing – original draft preparation, writing – review and editing. **Gabriel Victor Alves Santos:** methodology, validation, writing – original draft preparation, writing – review and editing, visualization. **Kaio Vinicius C. Silva:** methodology, validation, writing – original draft preparation, writing – review and editing, visualization. **Suelen Marçal Nogueira:** methodology, validation, writing – original draft preparation, writing – review and editing, visualization, supervision. **Manuel Monfort-Pañego:** conceptualization, methodology, validation, formal analysis, investigation, resources, writing – original draft preparation, writing – review and editing, visualization, supervision. **Priscilla Rayanne e Silva:** conceptualization, methodology, validation, formal analysis, investigation, resources, writing – original draft preparation, writing – review and editing, visualization, supervision. **Matias Noll:** conceptualization, methodology, validation, formal analysis, investigation, resources, writing – original draft preparation, writing – review and editing, visualization, supervision.

Acknowledgments

This research was supported by the Fundação de Amparo à Pesquisa do Estado de Goiás-FAPEG, in addition to the collaboration of the Grupo de Pesquisa Sobre Saúde da Criança e do Adolescente (GPSaCA—https://www.gpsaca.com.br) and the Instituto Federal Goiano (IF Goiano, Campus Ceres).

Ethics Statement

The data used in the analysis will be assessed based on studies that have already been published without the need for research ethics approval.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

Data sharing is not applicable—no new data generated, or the article describes entirely theoretical research.

Transparency Statement

The lead author José Igor Ferreira Santos Jesus affirms that this manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.

References

1. C. A. Monteiro, J. C. Moubarac, G. Cannon, S. W. Ng, and B. Popkin, "Ultra-Processed Products Are Becoming Dominant in the Global Food System," *Obesity Reviews* 14 (2013): 21–28, https://doi.org/10.1111/obr.12107.

2. N. Kliemann, A. Al Nahas, E. P. Vamos, et al., "Ultra-Processed Foods and Cancer Risk: From Global Food Systems to Individual Exposures and Mechanisms," *British Journal of Cancer* 127 (2022): 14–20, https://doi.org/10.1038/s41416-022-01749-y.

3. F. Juul, E. Martinez-Steele, N. Parekh, C. A. Monteiro, and V. W. Chang, "Ultra-Processed Food Consumption and Excess Weight Among US Adults," *British Journal of Nutrition* 120 (2018): 90–100, https://doi.org/10.1017/S0007114518001046.

4. C. A. Monteiro, G. Cannon, R. B. Levy, et al., "Ultra-Processed Foods: What They Are and How to Identify Them," *Public Health Nutrition* 22 (2019): 936–941, https://doi.org/10.1017/S1368980018003762.

5. C. A. Monteiro, R. B. Levy, R. M. Claro, I. R. R. Castro, and G. Cannon, "A New Classification of Foods Based on the Extent and Purpose of Their Processing," *Cadernos de Saúde Pública* 26 (2010): 2039–2049, https://doi.org/10.1590/S0102-311X2010001100005.

6. N. Kliemann, F. Rauber, R. Bertazzi Levy, et al., "Food Processing and Cancer Risk in Europe: Results From the Prospective EPIC Cohort Study," *Lancet Planetary Health* 7 (2023): e219–e232, https://doi.org/10.1016/S2542-5196(23)00021-9.

7. S. A. Silva, A. S. do Carmo, and K. M. B. Carvalho, "Lifestyle Patterns Associated With Common Mental Disorders in Brazilian Adolescents: Results of the Study of Cardiovascular Risks in Adolescents (ERICA)," *PLoS One* 16 (2021): e0261261, https://doi.org/10.1371/journal.pone.0261261.

8. N. Mara Paterlini Marques, M. Cattafesta, F. Lacerda Pires Soares, et al., "Consumption of Minimally Processed and Ultra-Processed Foods

by Individuals on Hemodialysis in Southeastern Brazil," *Journal of Human Growth and Development* 32 (2022): 237–251, https://doi.org/10.36311/jhgd.v32.13856.

9. Q. Cai, M. J. Duan, L. H. Dekker, et al., "Ultraprocessed Food Consumption and Kidney Function Decline in a Population-Based Cohort in the Netherlands," *American Journal of Clinical Nutrition* 116 (2022): 263–273, https://doi.org/10.1093/ajcn/nqac073.

10. M. Cattafesta and L. Bresciani Salaroli, "Beyond Ultra-Processed Foods: The New Direction of the Basic Food Basket in Brazil," *Journal of Human Growth and Development* 34 (2024): 06–10, https://doi.org/10.36311/jhgd.v34.15748.

11. F. F. Bestari, N. Andarwulan, and E. Palupi, "Synthesis of Effect Sizes on Dose Response From Ultra-Processed Food Consumption Against Various Noncommunicable Diseases," *Foods* 12 (2023): 4457, https://doi.org/10.3390/foods12244457.

12. G. Pagliai, M. Dinu, M. P. Madarena, M. Bonaccio, L. Iacoviello, and F. Sofi, "Consumption of Ultra-Processed Foods and Health Status: A Systematic Review and Meta-Analysis," *British Journal of Nutrition* 125 (2021): 308–318, https://doi.org/10.1017/S0007114520002688.

13. M. L. da C. Louzada, C. dos S. Costa, T. N. Souza, G. L. da Cruz, R. B. Levy, and C. A. Monteiro, "Impact of the Consumption of Ultra-Processed Foods on Children, Adolescents and Adults' Health: Scope Review," *Cadernos de Saúde Pública* 37 (2021): e00323020, https://doi.org/10.1590/0102-311x00323020.

14. W. Suksatan, S. Moradi, F. Naeini, et al., "Ultra-Processed Food Consumption and Adult Mortality Risk: A Systematic Review and Dose–Response Meta-Analysis of 207,291 Participants," *Nutrients* 14 (2021): 174, https://doi.org/10.3390/nu14010174.

15. M. Z. Jardim, B. V. L. Costa, M. C. Pessoa, and C. K. Duarte, "Ultra-Processed Foods Increase Noncommunicable Chronic Disease Risk," *Nutrition Research* 95 (2021): 19–34, https://doi.org/10.1016/J.NUTRES.2021.08.006.

16. S. P. Mambrini, F. Menichetti, S. Ravella, et al., "Ultra-Processed Food Consumption and Incidence of Obesity and Cardiometabolic Risk Factors in Adults: A Systematic Review of Prospective Studies," *Nutrients* 15 (2023): 2583, https://doi.org/10.3390/nu15112583.

17. I. M. Isaksen and S. N. Dankel, "Ultra-Processed Food Consumption and Cancer Risk: A Systematic Review and Meta-Analysis," *Clinical Nutrition* 42 (2023): 919–928, https://doi.org/10.1016/J.CLNU.2023.03.018.

18. F. M. Delpino, L. M. Figueiredo, R. M. Bielemann, et al., "Ultra-Processed Food and Risk of Type 2 Diabetes: A Systematic Review and Meta-Analysis of Longitudinal Studies," *International Journal of Epidemiology* 51 (2022): 1120–1141, https://doi.org/10.1093/ije/dyab247.

19. M. M. Lane, J. A. Davis, S. Beattie, et al., "Ultraprocessed Food and Chronic Noncommunicable Diseases: A Systematic Review and Meta-Analysis of 43 Observational Studies," *Obesity Reviews* 22 (2021): e13146, https://doi.org/10.1111/obr.13146.

20. A. Ramadas, H. Rizal, S. Rajakumar, et al., "Dietary Intake, Obesity, and Metabolic Risk Factors Among Children and Adolescents in the SEACO-CH20 Cross-Sectional Study," *Scientific Reports* 14 (2024): 11265, https://doi.org/10.1038/s41598-024-61090-7.

21. A. O. Werneck, E. M. Steele, F. M. Delpino, et al., "Adherence to the Ultra-Processed Dietary Pattern and Risk of Depressive Outcomes: Findings From the NutriNet Brasil Cohort Study and an Updated Systematic Review and Meta-Analysis," *Clinical Nutrition* 43 (2024): 1190–1199, https://doi.org/10.1016/J.CLNU.2024.03.028.

22. P. A. Claudino, N. B. Bueno, S. Piloneto, et al., "Consumption of Ultra-Processed Foods and Risk for Alzheimer's Disease: A Systematic Review," *Frontiers in Nutrition* 10 (2023): 1–10, https://doi.org/10.3389/fnut.2023.1288749.

23. C. A. Monteiro, G. Cannon, J.-C. Moubarac, R. B. Levy, M. L. C. Louzada, and P. C. Jaime, "The UN Decade of Nutrition, the NOVA Food Classification and the Trouble With Ultra-Processing," *Public Health Nutrition* 21 (2018): 5–17, https://doi.org/10.1017/S1368980017000234.

24. J.-S. Shim, S.-Y. Shim, H.-J. Cha, J. Kim, and H. C. Kim, "Socioeconomic Characteristics and Trends in the Consumption of Ultra-Processed Foods in Korea From 2010 to 2018," *Nutrients* 13 (2021): 1120, https://doi.org/10.3390/nu13041120.

25. M. M. Lane, E. Gamage, N. Travica, et al., "Ultra-Processed Food Consumption and Mental Health: A Systematic Review and Meta-Analysis of Observational Studies," *Nutrients* 14 (2022): 2568, https://doi.org/10.3390/nu14132568.

26. K. E. Lane, I. G. Davies, Z. Darabi, M. Ghayour-Mobarhan, S. S. Khayyatzadeh, and M. Mazidi, "The Association Between Ultra-Processed Foods, Quality of Life and Insomnia Among Adolescent Girls in Northeastern Iran," *International Journal of Environmental Research and Public Health* 19 (2022): 6338, https://doi.org/10.3390/ijerph19106338.

27. J. K. Hohls, H.-H. König, E. Quirke, and A. Hajek, "Anxiety, Depression and Quality of Life—A Systematic Review of Evidence From Longitudinal Observational Studies," *International Journal of Environmental Research and Public Health* 18 (2021): 12022, https://doi.org/10.3390/ijerph182212022.

28. The WHOQOL Group, "The World Health Organization Quality of Life Assessment (WHOQOL): Position Paper From the World Health Organization," *Social Science & Medicine* 41 (1995): 1403–1409, https://doi.org/10.1016/0277-9536(95)00112-K.

29. World Health Organization, *World Mental Health Report: Transforming Mental Health for All* (WHO, 2022).

30. S. Hosseinpour-Niazi, M. Niknam, P. Amiri, et al., "The Association Between Ultra-Processed Food Consumption and Health-Related Quality of Life Differs Across Lifestyle and Socioeconomic Strata," *BMC Public Health* 24 (2024): 1955, https://doi.org/10.1186/s12889-024-19351-7.

31. D. Hosseininasab, F. Shiraseb, N. Bahrampour, et al., "Ultra-Processed Food Consumption and Quality of Life: A Cross-Sectional Study in Iranian Women," *Frontiers in Public Health* 12 (2024): 1–10, https://doi.org/10.3389/fpubh.2024.1351510.

32. N. P. G. Paans, D. Gibson-Smith, M. Bot, et al., "Depression and Eating Styles Are Independently Associated With Dietary Intake," *Appetite* 134 (2019): 103–110, https://doi.org/10.1016/j.appet.2018.12.030.

33. W.-K. Tang and J. C.-Y. Lee, "Association of Fast-Food Intake With Depressive and Anxiety Symptoms Among Young Adults: A Pilot Study," *Nutrients* 16 (2024): 3317, https://doi.org/10.3390/nu16193317.

34. E. M. Hecht, A. Rabil, E. Martinez Steele, et al., "Cross-Sectional Examination of Ultra-Processed Food Consumption and Adverse Mental Health Symptoms," *Public Health Nutrition* 25 (2022): 3225–3234, https://doi.org/10.1017/S1368980022001586.

35. H.-S. Ejtahed, P. Mardi, B. Hejrani, et al., "Association Between Junk Food Consumption and Mental Health Problems in Adults: A Systematic Review and Meta-Analysis," *BMC Psychiatry* 24 (2024): 438, https://doi.org/10.1186/s12888-024-05889-8.

36. A. Shafiee, S. Aghajanian, E. Heidari, et al., "Contribution of Obesity in the Association Between Fast-Food Consumption and Depression: A Mediation Analysis," *Journal of Affective Disorders* 362 (2024): 623–629, https://doi.org/10.1016/j.jad.2024.07.036.

37. S. Dai, J. Wellens, N. Yang, et al., "Ultra-Processed Foods and Human Health: An Umbrella Review and Updated Meta-Analyses of Observational Evidence," *Clinical Nutrition* 43 (2024): 1386–1394, https://doi.org/10.1016/j.clnu.2024.04.016.

38. D. Moher, A. Liberati, J. Tetzlaff, and D. G. Altman, "Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA

Statement," *Journal of Clinical Epidemiology* 62 (2009): 1006–1012, https://doi.org/10.1016/j.jclinepi.2009.06.005.

39. L. Shamseer, D. Moher, M. Clarke, et al., "Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA-P) 2015: Elaboration and Explanation," *BMJ* 349 (2015): g7647, https://doi.org/10.1136/bmj.g7647.

40. J. P. T. Higgins, J. Thomas, J. Chandler, et al., eds., *Cochrane Handbook for Systematic Reviews of Interventions* (Wiley, 2019), https://doi.org/10.1002/9781119536604.

41. M. J. Page, J. E. McKenzie, P. M. Bossuyt, et al., "The PRISMA 2020 Statement: An Updated Guideline for Reporting Systematic Reviews," *BMJ* 372 (2021): n71, https://doi.org/10.1136/bmj.n71.

42. J. McGowan, M. Sampson, D. M. Salzwedel, E. Cogo, V. Foerster, and C. Lefebvre, "PRESS Peer Review of Electronic Search Strategies: 2015 Guideline Statement," *Journal of Clinical Epidemiology* 75 (2016): 40–46, https://doi.org/10.1016/j.jclinepi.2016.01.021.

43. F. C. Bull, S. S. Al-Ansari, S. Biddle, et al., "World Health Organization 2020 Guidelines on Physical Activity and Sedentary Behaviour," *British Journal of Sports Medicine* 54 (2020): 1451–1462, https://doi.org/10.1136/bjsports-2020-102955.

44. W. P. da costa, M. S. V. Fernandes, A. R. Memon, P. R. E. S. Noll, M. M. Sousa, and M. Noll, "Factors Influencing the Work of Researchers in Scientific Initiation: A Systematic Review Protocol," *PLoS One* 19 (2024): e0297186, https://doi.org/10.1371/journal.pone.0297186.

45. J. Sim and C. C. Wright, "The Kappa Statistic in Reliability Studies: Use, Interpretation, and Sample Size Requirements," *Physical Therapy* 85 (2005): 257–268.

46. M. L. McHugh, "Interrater Reliability: The Kappa Statistic," *Biochemia Medica* 22 (2012): 276–282.

47. S. H. Downs and N. Black, "The Feasibility of Creating a Checklist for the Assessment of the Methodological Quality Both of Randomised and Non-Randomised Studies of Health Care Interventions," *Journal of Epidemiology and Community Health* 52, no. 1978 (1998): 377–384, https://doi.org/10.1136/jech.52.6.377.

48. S. C. de Carvalho Borges, C. R. Mendonça, R. M. Ferreira Silva, A. De Vitta, and M. Noll, "Prevalence and Risk Factors of Musculoskeletal Disorders in Basketball Players: Systematic Review and Meta-Analysis," *Healthcare* 11 (2023): 1190, https://doi.org/10.3390/healthcare11081190.

49. Critical Appraisal Skills Programme Checklist, *CASP Systematic Review Checklist* (Oxford, 2018), https://casp-uk.net/casp-tools-checklists/qualitative-studies-checklist/.

50. H. Schünemann, J. Brożek, G. Guyatt, and A. Oxman, *GRADE Handbook: Introduction to GRADE Handbook* (Evidence Prime, 2013), https://gdt.gradepro.org/app/handbook/handbook.html.

51. G. H. Guyatt, A. D. Oxman, H. J. Schünemann, P. Tugwell, and A. Knottnerus, "GRADE Guidelines: A New Series of Articles in the Journal of Clinical Epidemiology," *Journal of Clinical Epidemiology* 64 (2011): 380–382, https://doi.org/10.1016/j.jclinepi.2010.09.011.

52. H. Balshem, M. Helfand, H. J. Schünemann, et al., "GRADE Guidelines: 3. Rating the Quality of Evidence," *Journal of Clinical Epidemiology* 64 (2011): 401–406, https://doi.org/10.1016/j.jclinepi.2010.07.015.

53. J. A. C. Sterne, A. J. Sutton, J. P. A. Ioannidis, et al., "Recommendations for Examining and Interpreting Funnel Plot Asymmetry in Meta-Analyses of Randomised Controlled Trials," *BMJ* 343 (2011): d4002, https://doi.org/10.1136/bmj.d4002.

54. M. Egger, G. D. Smith, M. Schneider, and C. Minder, "Bias in Meta-Analysis Detected by a Simple, Graphical Test," *BMJ* 315 (1997): 629–634, https://doi.org/10.1136/bmj.315.7109.629.

55. M. Ouzzani, H. Hammady, Z. Fedorowicz, and A. Elmagarmid, "Rayyan a Web and Mobile App for Systematic Reviews," *Systematic Reviews* 5 (2016): 210, https://doi.org/10.1186/s13643-016-0384-4.

56. E. A. Silveira, A. M. S. Romeiro, A. L. Junger, et al., "The Impact of the COVID-19 Pandemic on Medical Education: A Systematic Review of Distance Learning, Student's Perceptions, and Mental Health," *Journal of Human Growth and Development* 33 (2023): 405–419, https://doi.org/10.36311/jhgd.v33.14647.

57. W. Siemens, G. Schwarzer, M. S. Rohe, S. Buroh, J. J. Meerpohl, and G. Becker, "Methodological Quality Was Critically Low in 9/10 Systematic Reviews in Advanced Cancer Patients—A Methodological Study," *Journal of Clinical Epidemiology* 136 (2021): 84–95, https://doi.org/10.1016/j.jclinepi.2021.03.010.

58. K. V. C. Silva, B. D. Costa, A. C. Gomes, B. Saunders, and J. F. Mota, "Factors That Moderate the Effect of Nitrate Ingestion on Exercise Performance in Adults: A Systematic Review With Meta-Analyses and Meta-Regressions," *Advances in Nutrition* 13 (2022): 1866–1881, https://doi.org/10.1093/advances/nmac054.

59. M. G. Pereira and T. F. Galvão, "Heterogeneity and Publication Bias in Systematic Reviews," *Epidemiologia e Serviços de Saúde* 23 (2014): 775–778, https://doi.org/10.5123/S1679-49742014000400021.

60. J. Zou, Z. Xiao, J. Yang, et al., "Impact of Cancer Types on COVID-19 Infection and Mortality Risk: A Protocol for Systematic Review and Meta-Analysis," *BMJ Open* 12 (2022): e058078, https://doi.org/10.1136/bmjopen-2021-058078.

61. M. Borenstein, L. V. Hedges, J. P. T. Higgins, and H. R. Rothstein, "A Basic Introduction to Fixed-Effect and Random-Effects Models for Meta-Analysis," *Research Synthesis Methods* 1 (2010): 97–111, https://doi.org/10.1002/jrsm.12.

62. E. K. da Silva Oliveira, T. S. Vieira, O. F. de Souza, et al., "Consumption of Ultra-Processed Foods in the Brazilian Amazon During COVID-19," *Nutrients* 16 (2024): 2117, https://doi.org/10.3390/nu16132117.

63. P. R. S. Noll, M. Noll, L. C. de Abreu, E. C. Baracat, E. A. Silveira, and I. C. E. Sorpreso, "Ultra-Processed Food Consumption by Brazilian Adolescents in Cafeterias and School Meals," *Scientific Reports* 9 (2019): 7162, https://doi.org/10.1038/s41598-019-43611-x.

64. F. Campirano, N. López-Olmedo, P. Ramírez-Palacios, and J. Salmerón, "Sustainable Dietary Score: Methodology for Its Assessment in Mexico Based on EAT-Lancet Recommendations," *Nutrients* 15 (2023): 1017, https://doi.org/10.3390/nu15041017.

65. L. Rossi, M. Ferrari, and A. Ghiselli, "The Alignment of Recommendations of Dietary Guidelines With Sustainability Aspects: Lessons Learned From Italy's Example and Proposals for Future Development," *Nutrients* 15 (2023): 542, https://doi.org/10.3390/nu15030542.

66. F. Pan, Z. Wang, H. Wang, et al., "Association Between Ultra-Processed Food Consumption and Metabolic Syndrome Among Adults in China—Results From the China Health and Nutrition Survey," *Nutrients* 15 (2023): 752, https://doi.org/10.3390/nu15030752.

67. X. Chen, Z. Zhang, H. Yang, et al., "Consumption of Ultra-Processed Foods and Health Outcomes: A Systematic Review of Epidemiological Studies," *Nutrition Journal* 19 (2020): 86, https://doi.org/10.1186/s12937-020-00604-1.

68. L. Rodríguez-Mañas, R. Murray, C. Glencorse, and S. Sulo, "Good Nutrition Across the Lifespan Is Foundational for Healthy Aging and Sustainable Development," *Frontiers in Nutrition* 9 (2023): 01–12, https://doi.org/10.3389/fnut.2022.1113060.

69. A. H. Lichtenstein, L. J. Appel, M. Vadiveloo, et al., "2021 Dietary Guidance to Improve Cardiovascular Health: A Scientific Statement From the American Heart Association," *Circulation* 144 (2021): e472–e487, https://doi.org/10.1161/CIR.0000000000001031.

70. J. Yaffe, P. Montgomery, S. Hopewell, and L. D. Shepard, "Empty Reviews: A Description and Consideration of Cochrane Systematic

Reviews With No Included Studies," *PLoS One* 7 (2012): e36626, https://doi.org/10.1371/journal.pone.0036626.

71. M. B. Costa, R. M. F. Silva, K. V. C. Silva, et al., "Food Consumption and Mental Health in Children and Adolescents: A Systematic Review Protocol," *MethodsX* 13 (2024): 103015, https://doi.org/10.1016/j.mex.2024.103015.

72. D. R. Oliveira Batista, K. V. C. Silva, M. Torres, et al., "Effects of Energy Drinks on Mental Health and Academic Performance of University Students: A Systematic Review and Meta-Analysis Protocol," *PLoS One* 20 (2025): e0319533, https://doi.org/10.1371/journal.pone.0319533.

Supporting Information

Additional supporting information can be found online in the Supporting Information section.
Arq_Supl_1_Search_Strategy.docx. Arq_Supl_2_PrismaP.docx.