

REVIEW ARTICLE

Dietary Patterns and Mental Health Outcomes: A Narrative Review of Original Research

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Abstract

This narrative review examined original human research on dietary patterns and mental health outcomes. PubMed was the primary database, with Google Scholar used as a supplementary source. Searches covered publications from 1 January 2017 to 14 September 2026. Study selection was guided by explicit eligibility criteria. Data were extracted using a structured framework, appraised with design-specific tools, and synthesised narratively. Eligible studies evaluated Mediterranean or Paleolithic dietary patterns, ultra-processed food consumption, or broader dietary patterns in relation to depression, anxiety, stress, psychological distress, or mental health-related quality of life. Thirty-three principal analyses were included: eight randomised controlled trials, 19 prospective, longitudinal, or target-trial-emulation analyses, and six analytical cross-sectional studies. Observational evidence most consistently linked higher ultra-processed food consumption with poorer depressive outcomes. Mediterranean-style and other healthier dietary patterns were associated with more favourable outcomes in several trials and prospective studies, but null and inconsistent findings were also identified. Evidence for Paleolithic dietary patterns was limited to cross-sectional studies. Overall, dietary quality was associated with mental health outcomes, but methodological heterogeneity, risk of bias, and residual confounding limit causal interpretation. Further well-designed randomised and longitudinal studies are required.

Keywords: *Anxiety, depression, dietary patterns, Mediterranean diet, mental health, ultra-processed foods.*



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Introduction

Depression, anxiety, stress-related symptoms, and psychological distress contribute substantially to impaired functioning, reduced quality of life, and healthcare burden [1]. Diet has received increasing attention as a potentially modifiable influence on mental health. Dietary-pattern research considers foods consumed together rather than isolated nutrients, including Mediterranean-style, Paleolithic, ultra-processed-food, and broader healthy or unhealthy patterns [2-5]. This narrative review examined original human research on these dietary patterns in relation to depression, anxiety, stress, psychological distress, and mental health-related quality of life, with attention to study design and methodological quality.

Methods

This review was conducted as a focused narrative review rather than a systematic or scoping review. The search aimed to identify a representative body of original human research across relevant dietary exposures, mental health outcomes, populations, and study designs.

Search strategy

PubMed was the primary database. A reproducible search was last updated on 15 September 2026 and covered publications dated from 1 January 2017 to 14 September 2026. The search comprised three groups : (1) Mediterranean and Paleolithic diets; (2) ultra-processed foods; and (3) broader dietary patterns and dietary trajectories. Each group was combined with terms relating to depression, anxiety, stress, psychological distress, mental health, and mental health-related quality of life. Searches were restricted to English-language human research and excluded reviews, meta-analyses, and animal-only studies. Complete PubMed and Google Scholar search strategies are provided in Supplementary Table S1.

The three PubMed searches identified 514, 180, and 743 records, respectively. After removal of

163 duplicates by PMID, 1,274 unique PubMed records remained.

Google Scholar was searched on 16 September 2026 as a supplementary source. Three corresponding search groups were used, and the first 50 results from each search, ranked by relevance, were reviewed, giving 150 Google Scholar results screened in total. Citation checking was also used to identify relevant studies not retrieved by the predefined PubMed title and abstract search terms.

Eligibility and study selection

Eligible studies reported original human research examining Mediterranean or Paleolithic dietary patterns, ultra-processed food consumption, or broader healthy or unhealthy dietary patterns in relation to depression, anxiety, stress, psychological distress, or mental health-related quality of life. Randomised controlled trials, prospective and longitudinal studies, target-trial emulations, and analytical cross-sectional studies were considered. Reviews, meta-analyses, animal studies, and studies without a relevant dietary exposure or mental health outcome were excluded.

In this review “healthy” and “unhealthy” are descriptive labels based on dietary components and scoring conventions used in the original studies. Healthier patterns generally emphasise vegetables, fruit, whole grains, legumes, nuts, fish or unsaturated fats, whereas less healthy patterns generally feature higher intake of ultra-processed foods, refined grains, added sugars or foods high in saturated fat. The specific exposure definitions and scoring rules vary between studies and are considered when interpreting the findings.

Dietary exposures were interpreted according to the constructs measured. Mediterranean and Paleolithic adherence scores represented conformity to the dietary components specified in each study. Ultra-processed-food measures quantified intake using processing-based classification criteria (NOVA), whereas empirically derived dietary patterns reflected

combinations of foods identified statistically from dietary data. Study-specific processed-food scores were considered separately and were not assumed to represent ultra-processed-food intake. Inflammatory indices estimated the inflammatory potential of the diet, while nutrient and food-group trajectories characterised intake levels and changes over time. These measures were included to provide complementary perspectives on dietary exposure and mental health, with their distinct definitions retained in the narrative synthesis..

On 15 September 2026, the 1,274 unique PubMed records underwent AI-assisted title-and-abstract prioritisation using ChatGPT (GPT-5.6; OpenAI) and were provisionally grouped into 51 priority full-text candidates, 172 potentially relevant secondary candidates, and 1,051 initially non-prioritised records. These categories represented preliminary relevance priorities only and not treated as eligibility decisions. The prioritisation instructions specified original human research examining dietary exposures and mental health outcomes relevant to the review question.

During revision, the sole author reassessed the titles and abstracts of a fixed random subset of 100 initially non-prioritised records against the review's eligibility criteria (14 October 2026). We recorded decisions, reasons, and review dates, and flagged potentially relevant or uncertain records for further assessment. A second, author-confirmed retrospective review of 100 previously non-prioritised records (15 October 2026) identified 14 for full-text assessment, 16 requiring clarification and 70 excluded at the title-and-abstract stage. This set was distinct from the 14 October sample; a false-negative rate was not estimated because the sampling frames were not directly comparable.

A retrospective DOI/PMID reconciliation matched 28 of the original 33 principal analyses to saved PubMed records: 20 priority, seven secondary, and one initially non-prioritised. SMILES and Francis et al. were identified by supplementary citation checking and three further reports were subsequently selected for principal synthesis.

The focused principal evidence set comprised 33 published analyses selected for coverage across study designs, exposures, mental health outcomes and positive or null findings. All 33 were assessed in full text by the sole author to confirm eligibility and inclusion; no studies were excluded at this stage. A reliable historical total of full texts assessed at earlier stage was unavailable and is acknowledged as a limitation (Section 4.3). Where multiple publications arose from the same trial or substantially overlapping cohort and addressed closely related questions, one was treated as the principal study for counting and synthesis, while companion reports were used only for supplementary context. Overlapping analyses, including multiple UK-Biobank reports, were not interpreted as fully independent replications.

Data extraction

Data was extracted using a structured framework covering study design, setting, sample size, follow-up period, dietary exposure definition, mental health outcome, main effect estimate, and covariate adjustment. Extraction was performed by the sole author and cross-checked against the primary-source index provided in Supplementary Table S2.

Methodological appraisal

Methodological appraisal was conducted according to study design. Randomised controlled trials were evaluated using the Cochrane Risk of Bias 2 framework [6]. Prospective and longitudinal cohort studies were appraised using the Joanna Briggs Institute cohort framework [7], and analytical cross-sectional studies using the Joanna Briggs Institute analytical cross-sectional framework [8]. The target-trial-emulation study was assessed using a ROBINS-I-informed approach because it remained observational [9].

Appraisal informed weighting, not exclusion. Author-defined JBI labels indicated no major (lower), potentially important (moderate), or substantial (higher) methodological concerns;

intermediate labels reflected uncertainty. Domain judgements appear in Supplementary Table S2; PREDIDEP recurrence and BDI outcomes were assessed separately.

Data synthesis

Meta-analysis was not undertaken because of substantial heterogeneity in populations, dietary exposures, outcome definitions, follow-up periods, and statistical measures. Findings were synthesised narratively, with randomised trials considered first, followed by prospective and longitudinal evidence and then cross-sectional studies. Interpretation emphasised study design, methodological quality, temporal ordering, population overlaps, and the presence of positive, null, or inconsistent findings.

Results

Study characteristics

Thirty-three principal analyses were included: eight randomised controlled trials, 19 prospective, longitudinal, or target-trial-emulation analyses, and six analytical cross-sectional studies. Dietary exposures included Mediterranean-style and Paleolithic dietary patterns, ultra-processed food consumption, broader healthy and unhealthy dietary patterns, pro-inflammatory diets, and longitudinal dietary trajectories. Depression or depressive symptoms were the most frequently assessed outcomes, while anxiety, stress, psychological distress, and mental health-related quality of life were examined less often. Characteristics and methodological appraisal of the included studies are summarised in Tables 1–3 and Supplementary Table S2.

Methodological quality varied substantially. Several randomised trials had important limitations related to missing outcome data, lack of blinding, self-reported outcomes, co-interventions, or per-protocol analysis. Prospective and longitudinal studies provided stronger temporal evidence but remained susceptible to residual confounding and dietary measurement error. Several publications arose

from overlapping source populations, particularly UK Biobank, and were therefore interpreted as complementary rather than fully independent replications.

Findings from randomised controlled trials

The randomised trials provided mixed evidence that dietary intervention improves mental health outcomes. The SMILES trial reported a greater reduction in depressive symptoms following a modified Mediterranean-style dietary intervention than with social-support control [10]. The AMMEND trial also reported substantially lower depressive symptom scores following a 12-week Mediterranean-diet intervention in young men with depression [11].

HELFIMED reported improvement in depressive symptoms following a Mediterranean-style intervention, although interpretation was complicated by concurrent fish-oil supplementation and attrition [12]. Francis et al. similarly found short-term improvements in depressive symptoms following a broader healthy-diet intervention in young adults, although the intervention was not exclusively Mediterranean and incomplete follow-up was substantial [13].

Other trials were less supportive. In PREDIDEP, the Mediterranean-diet intervention did not significantly reduce the primary outcome of depression recurrence, although depressive symptom scores were lower at selected secondary time points [14]. Radkhah et al. found no statistically significant adjusted effects on depression, anxiety, or stress [15]. A small pilot trial comparing Mediterranean and ketogenic hypocaloric diets reported greater improvement in depressive symptoms with the Mediterranean diet, but fewer than half of randomised participants contributed depression outcome data and the analysis was per protocol [16].

Overall, intervention findings suggest possible benefit for depressive symptoms in selected populations, but effects were not consistent across trials and several studies had important methodological limitations. A Mediterranean-diet

trial during pregnancy also reported lower perceived stress and anxiety than usual care, although questionnaire completion restricted the analysis [17].

Prospective, longitudinal, and target-trial-emulation studies

Prospective studies most consistently associated greater ultra-processed food intake with poorer depressive outcomes, including the Nurses' Health Study II, NutriNet-Santé, SUN and ELSA-Brasil cohorts [18-21]. Higher intake was also associated with subsequent psychological distress in the Melbourne Collaborative Cohort Study [22]. An ASPREE/ALSOP target-trial emulation found associations with depressive symptoms and mental health-related quality of life, although the analysis remained observational [23].

UK Biobank analyses linked unhealthy dietary patterns or greater ultra-processed food intake with depressive and anxiety outcomes [24,25]. Wu et al. also reported adverse dietary-pattern associations in UK Biobank and an independent Chinese cohort [26]. Reports using overlapping UK Biobank populations were interpreted as complementary analyses rather than independent replications.

Findings for healthier dietary patterns were less consistent. Greater Mediterranean-diet adherence was associated with lower incident depression in Swedish and Chinese cohorts [27,28]. In Maastricht, the Dutch Healthy Diet score was inversely associated with incident depressive symptoms, whereas Mediterranean and DASH scores were null after full adjustment [29]. Whitehall II found no clear association for a high-sugar, high-saturated-fat pattern [30].

Other findings depended on the exposure definition. Among older Chinese adults, vegetable-egg-bean-milk and salt-preserved vegetable-garlic patterns were associated with lower and higher odds of depressive symptoms, respectively, while a meat-fish pattern was null [31]. A pro-inflammatory diet was associated with higher depression risk in Seniors-ENRICA [32]. Increasing Mediterranean adherence

together with reduced ultra-processed food intake was associated with lower symptom scores in Moli-sani [33]. Nutrient and food-group trajectories in Chinese young adults showed differing associations with symptom onset or transition [34]. In MAP, higher DASH/MIND scores were associated with fewer repeated depressive symptoms, whereas Mediterranean scores were null and Western scores were adverse [35]. In CHAMP, Australian and Mediterranean diet scores were not significantly associated with incident depressive symptoms [36].

Cross-sectional studies

Cross-sectional studies generally reported associations in a similar direction but could not establish temporal ordering. In NHANES, adults with the greatest ultra-processed food consumption had higher odds of depressive symptoms (OR 1.81, 95% CI 1.09-3.02) and reported more anxious and mentally unhealthy days [37]. In a young southern Italian sample, the highest ultra-processed food quartile was associated with higher odds of depressive symptoms (OR 2.70, 95% CI 1.33-5.51), although a clear graded dose-response relationship was not observed [38].

The international ALIMENTAL study also identified positive associations between an ultra-processed dietary pattern and depressive symptoms in several subgroups, while healthier patterns were inversely associated with depression in some groups [39]. An Israeli study found associations involving Mediterranean diet and a study-specific processed-food score, although findings were sensitive to model specification and the processed-food measure was not equivalent to NOVA-defined ultra-processed food [40].

In the principal synthesis, evidence concerning Paleolithic dietary patterns was limited to two Iranian cross-sectional studies. Zamani et al. reported lower odds of above-median depression, anxiety, and stress symptom categories with greater Paleolithic adherence, although outcomes were dichotomised using sample-specific

medians rather than standard clinical thresholds [41]. In the larger YaHS/TAMYZ study, greater Paleolithic adherence was associated with lower anxiety odds, whereas associations with depression and stress were not statistically significant [42].

Overall findings

Across the included studies, the most consistent finding was an observational association between higher ultra-processed food consumption and poorer depressive outcomes. Mediterranean-style and other healthier dietary patterns were associated with more favourable outcomes in several randomised and prospective studies, but null and inconsistent findings were also identified. Evidence concerning anxiety, stress, psychological distress, and mental health-related quality of life was less extensive than evidence concerning depression. Within the principal synthesis, Paleolithic-diet evidence remained sparse and cross-sectional. Overall, the findings support an association between dietary patterns and mental health outcomes, but heterogeneity in study design, exposure measurement, outcome assessment, population characteristics, and methodological quality limits causal interpretation.

Discussion

Summary of main findings

The reviewed evidence supports an association between dietary patterns and mental health outcomes, although consistency varied by exposure and outcome. The clearest observational pattern concerned ultra-processed food consumption, which was associated with poorer depressive outcomes across several prospective cohorts [18-23,25]. By contrast, evidence for Mediterranean-style and other healthier dietary patterns was mixed. Several trials and prospective cohorts reported improvements in depressive symptoms or lower subsequent depression risk [10-13,27,28], whereas PREDIDEP did not significantly reduce depression recurrence [14],

Radkhah et al. found no clear adjusted effects on depression, anxiety, or stress [15], and the Maastricht Study found no significant association between Mediterranean-diet adherence and incident depressive symptoms after full adjustment [29].

Differences between trials may reflect distinct clinical questions and intervention components. SMILES examined a 12-week intervention for adults with a current major depressive episode, whereas Francis et al. studied a three-week intervention in young adults with elevated depressive symptoms [10,13]. PREDIDEP instead enrolled patients in total or partial remission and followed them for two years to assess depression recurrence [14]. Thus, short-term reductions in symptom scores and prevention of depression recurrence address different outcomes. Intervention intensity also varied: SMILES provided seven individual dietitian sessions, while HELFIMED combined dietary education, cooking workshops and food provision with fish-oil supplementation [10,12]. The latter design does not isolate the contribution of dietary change. Differences in baseline depression status, duration, adherence and clinician-rated versus self-reported outcomes may contribute to variation in findings, but their relative contributions cannot be established from comparisons across these heterogeneous trials.

The distinction between depressive symptoms and clinically diagnosed depression is important because many studies relied on symptom scales rather than clinical diagnoses. Evidence concerning anxiety, stress, psychological distress, and mental health-related quality of life was less extensive. The principal synthesis included two Iranian cross-sectional studies of Paleolithic dietary patterns, with inconsistent findings for depression and stress [41,42].

Possible mechanisms

Several biological and behavioural pathways may contribute to these associations. Healthier dietary patterns generally provide more fibre, unsaturated fats, micronutrients, and plant-derived bioactive

compounds, which may influence inflammatory, oxidative, metabolic, and gut-brain pathways [2,4,5]. Conversely, diets high in ultra-processed foods may contain more refined carbohydrates, saturated fat, sodium, and additives while providing less fibre and fewer nutrient-dense foods [3-5].

These mechanisms remain plausible rather than established. Dietary patterns also cluster with sleep, physical activity and socioeconomic circumstances, which may influence both food choice and mental health. Some cohorts adjusted for these factors: the Nurses' Health Study II included physical activity, family income and sleep duration, while NutriNet-Santé included physical activity and several socioeconomic indicators [18,19]. Nevertheless, incomplete measurement, changes during follow-up and unmeasured factors may leave residual confounding. Reverse causation can also affect prospective studies if emerging depressive symptoms alter diet before the outcome is detected [19]. Excluding baseline cases and applying lagged analyses can reduce this concern; the association in the Nurses' Health Study II persisted after a four-year lag [18]. These safeguards strengthen temporal interpretation but do not establish causality. Accordingly, the cohort findings indicate prospective associations rather than confirmed causal effects.

Strengths and limitations

A strength of this review is the inclusion of randomised, prospective, longitudinal, target-trial-emulation, and analytical cross-sectional evidence, allowing findings to be interpreted according to study design and methodological quality. Null and inconsistent findings were retained, and overlapping reports were identified to avoid treating them as fully independent replications. A further strength is the provision of full search strategies (Supplementary Table S1) and study-specific appraisal rationales (Supplementary Table S2), including explicit documentation of source-based limitations in the primary reports.

Several limitations should be acknowledged. This was a focused narrative review rather than an exhaustive systematic review. PubMed was the primary database, Google Scholar was supplementary, and the search was restricted to English-language publications from 2017 onwards. The search and screening process was reconstructed and updated during revision rather than prospectively conducted under a systematic-review protocol. A reliable historical total of full texts assessed at earlier screening stages was unavailable. AI-assisted title-and-abstract prioritisation was used only to organise records, while final eligibility, inclusion, extraction, and appraisal were verified by the sole author. Single-author review therefore increases the possibility of selection or judgement error. Publication and language bias, as well as the possible omission of eligible studies, cannot be excluded. In addition, no protocol was prospectively registered and no formal certainty-of-evidence assessment was undertaken.

The underlying studies also had limitations. Several randomised trials were small or at important risk of bias because of missing data, unblinded self-reported outcomes, co-interventions, or per-protocol analyses. Observational studies remained vulnerable to residual confounding and dietary measurement error. Some analyses used overlapping source populations, particularly UK Biobank, and cross-sectional studies could not establish temporal direction. Heterogeneity in dietary definitions, outcomes, follow-up periods, and statistical models also precluded quantitative pooling.

Implications for future research

The findings support further investigation of diet as a potentially modifiable component of mental health but do not establish any specific dietary pattern as an effective treatment. Dietary improvement may form part of broader health promotion but should complement rather than replace established mental health care.

Future trials should use adequately powered samples, prespecified outcomes, intention-to-

treat analyses, stronger strategies to minimise attrition, and longer follow-up. Prospective studies would benefit from repeated dietary assessment and repeated validated mental health measures. Greater attention is also needed for anxiety, stress, psychological distress, and mental health-related quality of life. Overall, current evidence is more consistent with an observational relationship than with a definitive causal therapeutic effect.

Conclusion

The available evidence indicates that dietary patterns are associated with mental health outcomes, particularly depression and depressive symptoms. Higher ultra-processed food consumption showed the most consistent observational association with poorer outcomes. Mediterranean-style and other healthier dietary patterns were associated with more favourable outcomes in several randomised and prospective studies, but findings were not uniform. Within the principal synthesis, evidence for Paleolithic dietary patterns remains limited to cross-sectional studies.

Overall, current evidence supports an association between dietary quality and mental health but does not establish a direct therapeutic effect of any specific dietary pattern. Further adequately powered randomised trials and longitudinal studies with repeated dietary assessment, validated mental health outcomes, and longer follow-up are required.

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Conflict of interest

The author declares no conflict of interest.

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Author Contributions

Zicheng Wo: Conceptualization; Methodology; Software (AI-assisted title-and-abstract prioritisation); Validation; Formal analysis; Investigation (searching, screening, full-text assessment, data extraction, and methodological appraisal); Data curation; Writing – original draft; Writing – review and editing; Visualization (Tables 1–3 and Supplementary Tables S1–S2).

Ethics approval

Not applicable. This review used only published aggregate data from previously conducted studies; no new human or animal data were collected.

Table 1. Characteristics, main findings, and methodological appraisal of randomised controlled trials

Study / setting	Design; sample; follow-up	Exposure / outcome	Main finding	Appraisal
[10] Jacka et al. (SMILES), 2017 — Australia	RCT; 67 randomised, 56 with 12-week data; 12 weeks	Modified Mediterranean-style diet vs social-support control Depression (MADRS); HADS secondary	Greater MADRS improvement vs control: 7.1 points (SE 1.6); Cohen's d = -1.16 (95% CI -1.73 to -0.59); remission 32.3% vs 8.0%.	Some concerns
[11] Bayes et al. (AMMEND), 2022 — Australia	RCT; 75 recruited, 72 analysed; 12 weeks	Mediterranean diet vs befriending control Depression (BDI-II); quality of life	Week-12 BDI-II between-group difference 14.4 points (95% CI 11.41–17.39), favouring the Mediterranean-diet intervention.	High risk
[12] Parletta et al. (HELFIMED), 2019 — Australia	RCT; 152 recruited; 95 completed 3-month and 85 completed 6-month assessments	Mediterranean-style diet + fish oil vs social-group control Depression, anxiety, stress (DASS); quality of life	At 3 months, greater depression improvement vs control (difference -4.52, 95% CI -8.53 to -0.52); anxiety and stress differences were not significant.	High risk
[13] Francis et al., 2019 — Australia	RCT; 101 randomised, 76 completed post-intervention; 3 weeks	Healthy-diet intervention vs habitual-diet control Depression (CESD-R, DASS-21); anxiety and stress (DASS-21)	Lower CESD-R (p = 0.007, d = 0.65) and DASS-depression (p = 0.002, d = 0.75) vs control; anxiety (p = 0.032) and stress (p = 0.004) also improved.	High risk
[14] Cabrera-Suárez et al. (PREDIDEP), 2024 — Spain	RCT; 208 randomised, 196 started intervention, 179 retained at 2 years; 91 with complete BDI data	Mediterranean diet + extra-virgin olive oil vs usual care Depression recurrence; depressive symptoms (BDI)	No significant recurrence effect (HR 0.91, 95% CI 0.39–2.13); BDI favoured intervention at 20 months (between-group difference -3.35, 95% CI -6.08 to -0.61).	Some concerns; high risk (secondary BDI)
[15] Radkhah et al., 2023 — Iran	RCT; 60 randomised; 12 weeks	Mediterranean diet instruction vs standard nutrition education Depression, anxiety, stress (DASS-21)	No significant between-group differences after adherence adjustment: depression (p = 0.302), anxiety (p = 0.054), stress (p = 0.588).	High risk
[16] Mela et al., 2026 — Spain	Pilot RCT; 64 randomised (32/group), 37 completed; BDI analysed in 30 (18 Med, 12 Keto); 3 months	Mediterranean vs ketogenic hypocaloric diet Depressive symptoms (BDI)	Greater BDI improvement was reported with the Mediterranean diet; per-protocol BDI analysis included 30 participants.	High risk
[17] Casas et al. (IMPACT-BCN), 2023 — Spain	RCT; 1,221 randomised across three arms; MedDiet vs usual-care questionnaire analysis n=680 (331/349); approximately 12–16 weeks	Mediterranean-diet intervention vs usual care; maternal stress (PSS) and anxiety (STAI)	Follow-up PSS: 15.9 (SE 0.4) vs 17.0 (SE 0.4), p=0.035; STAI: 13.6 (SE 0.4) vs 15.8 (SE 0.5), p=0.004, favouring the intervention.	High risk

Table 2. Characteristics, main findings, and methodological appraisal of prospective, longitudinal, and target-trial-emulation studies

Study / setting	Design; sample; follow-up	Exposure / outcome	Main finding	Appraisal
[18] Samuthpongton et al., 2023 — USA, NHS II	Prospective cohort; 31,712 women; 2003–2017	Ultra-processed food (servings/day) Incident depression (strict definition)	Highest (>8.8 servings/day) vs lowest (<4 servings/day) UPF quintile: HR 1.49 (95% CI 1.26–1.76).	Lower concern
[19] Adjibade et al., 2019 — France, NutriNet-Santé	Prospective cohort; 26,730; mean 5.4 years	Ultra-processed food (% by weight) Incident depressive symptoms (CES-D)	Per 10-percentage-point increase in UPF share by food weight: HR 1.21 (95% CI 1.15–1.27).	Lower-to-moderate concern
[20] Gómez-Donoso et al. (SUN), 2020 — Spain	Prospective cohort; 14,907; median 10.3 years	Ultra-processed food Incident depression	Highest vs lowest UPF quartile: HR 1.33 (95% CI 1.07–1.64).	Lower-to-moderate concern
[21] Ferreira et al., 2025 — Brazil, ELISA-Brasil	Prospective cohort; 13,870; ~8 years	Ultra-processed food (% of total energy) Incident/persistent depression (CIS-R)	Highest vs lowest UPF quartile: incident depression HR 1.30 (95% CI 1.04–1.61).	Lower-to-moderate concern
[22] Lane et al., 2023 — Australia, Melbourne Collaborative Cohort	Prospective cohort; 23,299; ~15 years	Ultra-processed food (energy-adjusted intake quartiles) Psychological distress (K10 ≥20)	Highest vs lowest UPF quartile: elevated psychological distress aOR 1.23 (95% CI 1.10–1.38).	Moderate concern
[23] Mengist et al., 2025 — Australia, ASPREE/ALSOP	Target-trial emulation (observational); 11,192 for CES-D, 11,201 for SF-12; median 5.8 years	UPF ≥4 vs <4 servings/day Depressive symptoms (CES-D-10 ≥8); SF-12 mental health	UPF ≥4 vs <4 servings/day: depressive symptoms RR 1.10 (95% CI 1.04–1.18); SF-12 $\beta = -0.40$ (95% CI -0.65 to -0.15).	Moderate risk of bias
[24] Chen et al., 2023 — UK Biobank	Prospective cohort; 126,819; mean ~7.6 years	Empirically derived dietary patterns Depressive (PHQ-9) and anxiety symptoms (GAD-7)	DP1, Q5 vs Q1: depressive symptoms OR 1.17 (95% CI 1.03–1.32); anxiety symptoms OR 1.18 (95% CI 1.03–1.35).	Lower-to-moderate concern
[25] Sun et al., 2023 — UK Biobank	Prospective cohort; 183,474; mean ~13.1 years	Ultra-processed food (servings, energy share, weight share) Incident depression; anxiety	UPF servings, Q4 vs Q1: depression HR 1.22 (95% CI 1.13–1.31); anxiety HR 1.13 (95% CI 1.06–1.21).	Lower-to-moderate concern
[26] Wu et al., 2023 — China + UK Biobank	Prospective multicohort; 7,094 China + 96,810 UK	Broader dietary patterns Depressive outcomes	China sugar-rich pattern: HR 1.22 (95% CI 1.02–1.46); UKB processed-food pattern: HR 1.39 (95% CI 1.16–1.68).	Lower-to-moderate concern
[27] Yin et al., 2021 — Sweden	Prospective cohort; 49,261 surveyed, 42,515 analysed; mean 20.4 years	Mediterranean diet adherence Clinically ascertained incident depression	High vs low adherence: HR 0.82 (95% CI 0.71–0.94).	Lower concern
[28] Zhang et al., 2025 — China, SSACB	Prospective cohort; 52,232; mean 6.29 years	Alternate Mediterranean diet score (aMED, 0–9) Incident depression (ICD-10 F32–F33)	High vs low aMED: HR 0.83 (95% CI 0.70–0.98).	Lower-to-moderate concern
[29] Gianfredi et al. (Maastricht), 2021 — Netherlands	Prospective cohort; 2,646; up to 7 years	Dutch Healthy Diet (DHD), Mediterranean and DASH scores Incident depressive symptoms (PHQ-9)	Per 1-SD higher DHD score: HR 0.83 (95% CI 0.73–0.96); Mediterranean and DASH scores were not significant after full adjustment.	Moderate concern
[30] Vermeulen et al., 2018 — UK, Whitehall II	Prospective cohort; 5,044; 5 years	RRR-derived high-sugar/high-saturated-fat dietary pattern Incident/recurrent depressive symptoms (CES-D ≥16 or antidepressant use)	No adjusted association with incident or recurrent symptoms; for recurrent symptoms, HSHF Q4 vs Q1: men OR 0.67 (95% CI 0.36–1.23), women OR 1.26 (0.58–2.77).	Moderate concern
[31] Pei et al. (CLHLS), 2022 — China	Longitudinal cohort; 2,873; 2011–2014	Three empirically derived dietary patterns Incident depressive symptoms	Vegetable–egg–bean–milk, T3 vs T1: OR 0.65 (95% CI 0.49–0.87); salt-preserved vegetable–garlic, T2 vs T1: OR 1.33 (1.00–1.77); meat–fish pattern null.	Moderate concern
[32] Bizzozero-Peroni et al., 2022 — Spain, Seniors-ENRICA	Prospective cohorts; 1,627 + 1,579; ~2–3 years	Dietary Inflammatory Index (DII) Incident depression/depressive symptoms	Highest vs lowest DII quartile: pooled OR 2.07 (95% CI 1.01–3.13).	Lower-to-moderate concern
[33] Bracone et al. (Moli-sani), 2026 — Italy	Longitudinal repeated measures; 1,417; median 12.7 years	Changes in Mediterranean Diet Score (MDS) and NOVA-UPF intake Depressive-symptom change (PHQ-2)	Increased MDS/reduced UPF vs reduced MDS/increased UPF: PHQ-2 $\beta = -0.42$ (95% CI -0.73 to -0.12).	Moderate concern
[34] Chen et al., 2025 — Shanghai university, China	Longitudinal trajectory study; 6,447; 28 months	Nutrient and food-group intake trajectories Depressive-symptom onset/transition (BDI-II)	Several non-recommended trajectories were associated with higher depressive-symptom onset; findings varied across dietary components.	Moderate concern

Study / setting	Design; sample; follow-up	Exposure / outcome	Main finding	Appraisal
[35] Cherian et al. (MAP), 2021 — USA	Longitudinal cohort; n=709; adjusted Model 2 n=651; mean follow-up 6.53 years.	DASH, MIND, Mediterranean and Western dietary scores; repeated depressive symptoms (CES-D-10).	Model 2, highest vs lowest tertile: DASH $\beta = -0.102$ (95% CI -0.203 to -0.0005); MIND $\beta = -0.132$ (-0.249 to -0.016); Mediterranean $\beta = -0.024$ (-0.127 to 0.078); Western $\beta = 0.105$ (0.021 to 0.189).	Moderate concern
[36] Das et al. (CHAMP), 2021 — Australia	Prospective cohort; baseline dietary assessment n=794; approximately 3 years; diet-score-specific analysis n not reported.	Australian and Mediterranean dietary scores; incident depressive symptoms (GDS ≥ 5).	Australian dietary score: OR 1.00 (95% CI 0.97–1.02); Mediterranean dietary score: OR 1.02 (95% CI 0.89–1.17). Neither association was statistically significant.	Moderate concern

Table 3. Characteristics, main findings, and methodological appraisal of analytical cross-sectional studies

Study / setting	Design; sample; follow-up	Exposure / outcome	Main finding	Appraisal
[37] Hecht et al., 2022 — USA, NHANES	Analytical cross-sectional; 10,359	NOVA-defined UPF (% of total energy) Mild depressive symptoms; self-reported anxious and mentally unhealthy days	UPF $\geq 80\%$ vs $<20\%$ of energy: mild depressive symptoms OR 1.81 (95% CI 1.09–3.02); anxious days RR 1.19 (95% CI 1.16–1.23); mentally unhealthy days RR 1.22 (95% CI 1.18–1.25).	Lower-to-moderate concern
[38] Godos et al., 2023 — Southern Italy	Analytical cross-sectional; 596	NOVA-defined UPF (% of total energy) Depressive symptoms (CES-D-10)	Highest vs lowest UPF quartile: OR 2.70 (95% CI 1.33–5.51); no clear graded dose-response.	Moderate concern
[39] Achour et al. (ALIMENTAL), 2025 — International	Analytical cross-sectional; 15,262	PCA-derived healthy and UPF-related dietary factors Elevated depressive symptoms (CES-D ≥ 20)	Women aged 18–34: UPF-related factor aOR 1.21 (95% CI 1.15–1.27); healthy factor aOR 0.84 (0.80–0.89). Associations varied by sex and age.	Moderate concern
[40] Houminer-Klepar & Dopelt, 2025 — Israel	Analytical cross-sectional; 303 responses, 253 complete	Mediterranean adherence and study-specific processed-food score Anxiety (GAD-7); depressive symptoms (PHQ-9)	Separate diet models showed associations, but neither dietary score was independently significant in joint models; processed-food $\beta = 0.130$ ($p = 0.053$) for depression after sleep adjustment.	Moderate-to-higher concern
[41] Zamani et al., 2023 — Tehran, Iran	Analytical cross-sectional; 435 women	Paleolithic and Mediterranean adherence scores Above-median DASS-21 depression, anxiety and stress symptoms	T3 vs T1: Paleolithic adherence, depression OR 0.21 (95% CI 0.12–0.37); Mediterranean adherence, OR 0.20 (0.11–0.36). Anxiety and stress showed similar inverse associations.	Higher concern
[42] Khodadadi et al., 2024 — Iran, YaHS/TAMYZ	Analytical cross-sectional; 7,165	Paleolithic diet and lifestyle scores Anxiety, depression and stress symptoms (DASS-21)	Highest versus lowest Paleolithic diet quartile, Model 3: anxiety OR 0.68 (95% CI 0.48–0.96); depression and stress associations were not significant.	Moderate-to-higher concern

Abbreviations used in Tables 1–3: aMED, alternate Mediterranean diet; aOR, adjusted odds ratio; BDI, Beck Depression Inventory; CES-D, Center for Epidemiologic Studies Depression Scale; DASS-21, Depression Anxiety Stress Scales-21; DII, Dietary Inflammatory Index; HADS, Hospital Anxiety and Depression Scale; HR, hazard ratio; K10, Kessler Psychological Distress Scale; MADRS, Montgomery–Åsberg Depression Rating Scale; OR, odds ratio; PHQ, Patient Health Questionnaire; RCT, randomised controlled trial; RR, risk ratio; SF-12, 12-item Short Form Health Survey; UPF, ultra-processed food; WHOQOL, World Health Organization Quality of Life.

Additional abbreviations: CESD-R, Center for Epidemiologic Studies Depression Scale–Revised; CES-D-10, 10-item CES-D; CIS-R, Clinical Interview Schedule–Revised; DHD, Dutch Healthy Diet; DP1, dietary pattern 1; GAD-7, Generalized Anxiety Disorder-7; MDS, Mediterranean Diet Score; PCA, principal component analysis; PHQ-2/PHQ-9, 2-/9-item Patient Health Questionnaire; RRR, reduced rank regression; SE, standard error. DASH, Dietary Approaches to Stop Hypertension; GDS, Geriatric Depression Scale; MIND, Mediterranean–DASH Intervention for Neurodegenerative Delay; PSS, Perceived Stress Scale; STAI, State–Trait Anxiety Inventory.

Note: Thirty-three principal analyses are presented across Tables 1–3. Companion publications from overlapping trials or cohorts were not counted as independent studies. Multiple UK Biobank analyses were treated as complementary rather than fully independent replications. Appraisal labels summarise design-specific risk-of-bias assessments described in the Methods.

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