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Yoga for Anxiety and Depression: An Umbrella Review of Meta-Analytic Evidence

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ABSTRACT

Background: Anxiety and depressive disorders impose a substantial global burden. Despite pharmacotherapy and psychotherapy, many patients experience residual symptoms or treatment resistance. Yoga, integrating physical postures, breathing, and mindfulness, has emerged as a promising adjunctive therapy.
Methods: This umbrella review synthesizes evidence from meta-analyses of randomized controlled trials evaluating yoga for adults with DSM- or ICD-diagnosed anxiety or depressive disorders. Eligible reviews were identified via PubMed, Cochrane Library, Scopus, and Web of Science. Methodological quality was assessed using AMSTAR-2; evidence certainty with GRADE.
Results: Eight meta-analyses met the inclusion criteria. Yoga produced moderate short-term reductions in depression severity (SMD −0.41 to −0.64) and improved remission rates versus passive or treatment-as-usual controls. Effects on anxiety were variable (SMD −0.09 to −1.08). Evidence certainty was low to very low due to high risk of bias, inconsistency, and imprecision. No serious adverse events were reported.
Conclusions: Yoga offers moderate benefits for depression and variable effects for anxiety, with excellent safety and acceptability. Whilst promising as an adjunct, low evidence certainty necessitates large-scale, high-quality trials with standardised protocols and long-term follow-up.

Keywords: yoga, anxiety disorders, depressive disorders, umbrella review, meta-analysis, DSM, ICD

INTRODUCTION

Mental health disorders, particularly anxiety and depressive disorders, represent a significant global public health challenge, contributing substantially to the burden of disease worldwide. According to the World Health Organisation (WHO), depression affects over 280 million people globally, whilst anxiety disorders impact approximately 301 million individuals, making these conditions amongst the leading causes of disability-adjusted life years (DALYs) [1]. In the United States alone, the National Institute of Mental Health (NIMH) estimates that 21% of adults experience an anxiety disorder in their lifetime, and 7.1% suffer from major depressive disorder (MDD) annually [2].

These disorders are characterised by persistent symptoms such as low mood, loss of interest, excessive worry, and physiological arousal, often leading to impaired functioning in social, occupational, and personal domains [3]. The economic implications are profound, with depression and anxiety costing the global economy over $1 trillion annually in lost productivity [4].

Conventional treatments for anxiety and depression primarily include pharmacotherapy, such as selective serotonin reuptake inhibitors (SSRIs) and benzodiazepines, and psychotherapy, including cognitive-behavioural therapy (CBT) and interpersonal therapy [5-6]. Whilst these interventions demonstrate moderate to large effect sizes in randomised controlled trials (RCTs), with remission rates ranging from 30–50% for pharmacotherapy and 40–60% for psychotherapy [7-8], several limitations persist. High relapse rates—up to 50% within one year post-treatment—underscore the chronic nature of these disorders [9]. Additionally, pharmacological treatments are associated with adverse effects, including weight gain, sexual dysfunction, and dependency risks, leading to non-adherence in up to 50% of patients [10]. Access to evidence-based psychotherapy is further constrained by barriers such as cost, stigma, and shortages of trained providers, particularly in low- and middle-income countries [11]. These challenges highlight the need for adjunctive or alternative interventions that are accessible, cost-effective, and associated with fewer side effects.

Yoga, an ancient mind-body practice originating from India, has emerged as a promising non-pharmacological intervention for mental health disorders. Traditionally encompassing physical postures (asanas), breathing techniques (pranayama), meditation, and ethical principles, modern yoga practices, particularly Hatha yoga, emphasise the integration of movement, breath control, and mindfulness to promote holistic well-being [12]. Yoga's appeal lies in its low-intensity nature, adaptability to various fitness levels, and potential for self-practice, making it suitable for diverse populations [13]. Proposed mechanisms of action include modulation of the hypothalamic-pituitary-adrenal (HPA) axis, reduction in cortisol levels, enhancement of gamma-aminobutyric acid (GABA) neurotransmission, and promotion of neuroplasticity through increased brain-derived neurotrophic factor (BDNF) expression [14-16]. These physiological changes may counteract the stress-related dysregulation observed in anxiety and depression. Furthermore, yoga's mindfulness component promotes emotional regulation and self-compassion, aligning with therapeutic elements of CBT and mindfulness-based interventions.

The evidence base for yoga in mental health has grown substantially over the past decade, with numerous primary studies and systematic reviews examining its efficacy. Early randomised controlled trials demonstrated moderate reductions in depressive symptoms among individuals with major depressive disorder, with standardised mean differences ranging from approximately −0.50 to −0.80 compared with waitlist or usual care controls [17,18]. Similarly, for anxiety disorders, yoga has shown small to moderate effects in reducing symptom severity, particularly in generalised anxiety disorder [19]. Systematic reviews and meta-analyses have synthesised these findings, indicating that yoga is generally superior to passive controls but comparable or inferior to active comparators such as aerobic exercise or psychotherapy. For example, a meta-analysis of 12 randomised controlled trials reported a moderate short-term effect of yoga on depression severity compared with usual care (SMD −0.69), while long-term outcomes remain insufficiently studied [20].

Despite this accumulation of evidence, the literature is characterised by heterogeneity in yoga protocols, study populations, and outcome measures, complicating direct comparisons and clinical recommendations.

Yoga styles vary widely, from physically demanding Vinyasa to restorative Iyengar, potentially influencing efficacy. Populations in existing reviews often include individuals with subclinical symptoms or comorbid conditions, diluting specificity for diagnosed disorders. The proliferation of systematic reviews—over 25 identified in recent searches—necessitates higher-level synthesis to distil actionable insights for clinicians and policymakers. Umbrella reviews provide this by evaluating the quality, consistency, and certainty of evidence across multiple syntheses [21]. Prior umbrella reviews on physical activity for mental health have included yoga peripherally, finding moderate benefits for depression but calling for focused analyses [22]. However, no umbrella review has specifically targeted yoga's effects on DSM/ICD-diagnosed anxiety and depression in adults, addressing gaps in population specificity and intervention fidelity.

This review aims to synthesise evidence from meta-analyses of RCTs examining yoga's effects on anxiety and depressive disorders. By focusing on diagnosed conditions, we exclude subclinical populations to enhance clinical relevance. We prioritise meta-analyses to emphasise quantitative synthesis, allowing for assessment of effect sizes, heterogeneity, and evidence quality.

MATERIALS & METHODS

This umbrella review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) guidelines to ensure methodological transparency and reproducibility [23]. The protocol was not registered with PROSPERO. This review synthesizes evidence from meta-analyses of RCTs evaluating the efficacy of yoga interventions for adults with Diagnostic and Statistical Manual of Mental Disorders (DSM) or International Classification of Diseases (ICD)-diagnosed anxiety or depressive disorders, focusing on symptom severity and remission rates [24].

Eligibility Criteria: Meta-analyses were included based on the following criteria, structured using the PICOS (Population, Intervention, Comparison, Outcome, Study design) framework [25].

Population: Adults aged 18 years or older diagnosed with anxiety disorders (e.g., generalised anxiety disorder [GAD], social anxiety disorder [SAD], panic disorder) or depressive disorders (e.g., major depressive disorder [MDD], dysthymia) according to DSM (III, IV, or 5) or ICD (10 or 11) criteria. Studies including subclinical symptoms (e.g., "elevated anxiety" without formal diagnosis) or populations with primary non-mental health conditions (e.g., cancer, rheumatic diseases) were excluded unless DSM/ICD-diagnosed anxiety or depression outcomes were explicitly reported.

Intervention: Yoga as the primary intervention, encompassing physical postures (asanas), breathing techniques (pranayama), and/or meditation, including styles such as Hatha, Vinyasa, or mindfulness yoga. Interventions where yoga was a minor component of broader programmes (e.g., mindfulness-based stress reduction with minimal yoga) were excluded.

Comparison: Any comparator, including no intervention (waitlist), treatment as usual (e.g., pharmacotherapy, psychotherapy), active controls (e.g., exercise, psychoeducation), or placebo.

Outcomes: Primary outcomes were validated measures of anxiety or depression symptom severity (e.g., Hamilton Depression Rating Scale [HAM-D], Beck Depression Inventory [BDI], State-Trait Anxiety Inventory [STAI], Generalised Anxiety Disorder 7-item scale [GAD-7]) and remission rates (where reported). Secondary outcomes included quality of life, functioning, or adverse events.

Study Design: Peer-reviewed meta-analyses published in English between

inception and June 2025, synthesising RCTs, quasi-experimental, or observational studies. Qualitative systematic reviews, narrative reviews, single RCTs, or non-peer-reviewed studies (e.g., grey literature, conference abstracts) were excluded.

Information Sources and Search Strategy: A systematic search was conducted across four electronic databases: PubMed, Cochrane Library, Scopus and web of science from inception to June 2025, to identify relevant meta-analyses. The search strategy was developed and tailored to each database. Key terms included: ("yoga" OR "Hatha yoga" OR "mindfulness yoga") AND ("anxiety disorder*" OR "depressive disorder*" OR "major depressive disorder" OR "generalised anxiety disorder") AND ("meta-analysis" OR "meta-analysis" OR "systematic review"). Boolean operators and truncation were used to enhance sensitivity. No language restrictions were applied initially, but only English-language publications were retained during screening.

Study Selection and Data Extraction: Titles and abstracts were screened independently by two reviewers using Covidence software to assess eligibility against the inclusion criteria [26]. Discrepancies were resolved through discussion or consultation with a third reviewer. Studies were excluded if they did not report meta-analytic results (e.g., qualitative syntheses only), included non-DSM/ICD populations, or focused on non-mental health primary conditions without separable anxiety/depression outcomes. Data were extracted using a standardised proforma developed for this review, adapted from recommendations for umbrella reviews [20]. Two reviewers independently extracted data, with discrepancies resolved by consensus.

Quality Assessment: The methodological quality of included meta-analyses was assessed using the AMSTAR-2 tool [27]. Each meta-analysis was rated as high, moderate, low, or critically low quality by two independent reviewers. The certainty of evidence for primary outcomes was evaluated using the Grading of Recommendations, Assessment, Development, and Evaluations (GRADE) framework, considering risk of bias, inconsistency, indirectness, imprecision, and publication bias [28].

Data Synthesis: A narrative synthesis was conducted to summarise the efficacy of yoga interventions for anxiety and depression across the included meta-analyses, stratified by disorder and comparator type [29]. Quantitative synthesis of effect sizes (e.g., pooled SMDs) was not performed due to high heterogeneity (I^2 consistently >50% where reported), substantial RCT overlap, and marked variation in yoga protocols, outcome measures, and control conditions. Instead, effect sizes (SMD, Cohen's d, OR) were reported individually and compared narratively.

RESULT

The systematic search across PubMed, Cochrane Library, Scopus, and Web of Science identified 28 potential meta-analyses, with 8 meeting the inclusion criteria after deduplication, title/abstract screening, and full-text review (Figure 1, PRISMA flow diagram). These included meta-analyses published between 2018 and 2024, synthesising data from RCTs evaluating yoga interventions for DSM/ICD-diagnosed anxiety or depressive disorders in adults [30-37]. Exclusions were primarily due to inclusion of subclinical symptoms, non-mental health primary conditions, or non-meta-analytic designs (e.g., qualitative reviews). The included meta-analyses comprised 157 RCTs (total n ≈ 10453 participants), though overlaps in RCTs across studies were noted and addressed in the synthesis to avoid double-counting. Table 1 summarizes the main characteristics of the included meta-analyses

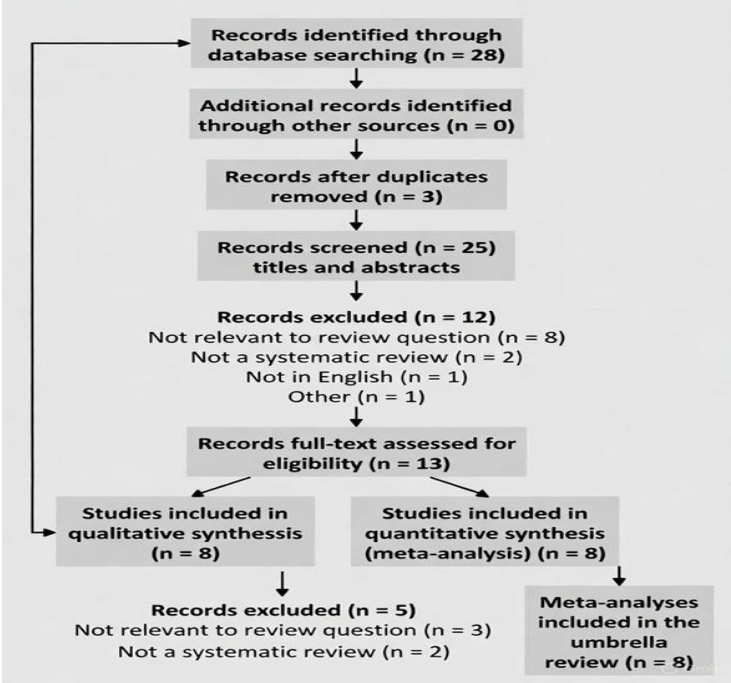

Figure 1: PRISMA-ScR flow diagram of the identification and selection process of meta-analyses included in the umbrella review.

Table 1: Characteristics of Included Meta-Analyses

Study ID	Disorder	Population	RCTs (n)	Yoga Type	Comparator	Primary Outcomes	I^2 (%)
Moosburner et al. [30]	Depression	Adults, MDD	20 (1,333)	Various	Passive/Active	HAM-D, Remission	High
Miao et al. [31]	Depression/Anxiety	Adults, MDD	9 (581)	Mindfulness	Control	BDI-II, HAM-D, STAI	82% / 0%
Wu et al. [32]	Depression	Adults, MDD	34 (2,341)	Various	Control	BDI-II, HAMD	>75%
Brinsley et al. [33]	Depression	Adults, mental disorders	13 (632)	≥50% physical	Waitlist/TAU	BDI-II, HAM-D	0%
Vollbehr et al. [34]	Depression/Anxiety	Adults, mood/anxiety	18 (1,532)	Hatha	TAU, Psychoeducation	BDI, STAI	Heterogeneous
Cramer et al. [35]	Anxiety	Adults, anxiety	8 (319)	Various	No treatment/Active	STAI	0% / 81%
Zoogman et al. [36]	Anxiety	Adults, anxiety	38 (2,295)	Yoga-based	Control	Anxiety scale	NR
Martínez-Calderon. [37]	Depression/Anxiety	Adults, DSM	23 (1,420)	Yoga-based	Control	HAM-D, STAI	High

Abbreviations: CI: confidence interval, OR: odds ratio, I^2: heterogeneity, MDD: major depressive disorder, TAU: treatment as usual, HAM-D: Hamilton Depression Rating Scale, BDI-II: Beck Depression Inventory-II, STAI: State-Trait Anxiety Inventory, NR: not reported.

The 8 included meta-analyses covered a range of disorders, with 5 focusing on depression [30-34] and 3 on anxiety [35-37], with some overlapping [34,37]. Populations were adults (18+ years, mean ages 30.0–51.0 years across studies), predominantly female (48.4–78.5%), in clinical/outpatient settings. Diagnoses were based on DSM-3/4/5 or ICD-10/11 criteria for MDD, GAD, SAD, or mixed mood/anxiety disorders. Sample sizes ranged from 319 to 2,341, with a median of 632.

Yoga interventions varied: Hatha yoga [34], mindfulness yoga [31], physically active yoga (≥50% physical activity) [33], or mixed. Duration was 4–12 weeks, frequency 1–5 sessions/week, session length 20–120 minutes. Comparators included waitlist, treatment as usual (TAU), psychoeducation, active controls (e.g., exercise), or no treatment. Primary outcomes were depression severity and remission rates. Secondary outcomes included anxiety and rumination. Safety data were reported in 3 studies with no serious adverse events [30,32,35].

Risk of Bias and Quality of Evidence: Methodological quality (AMSTAR-2) was moderate in most studies (e.g., PRISMA-compliant, comprehensive searches, RoB assessment using Cochrane RoB 2.0), but low in Vollbehr et al. and Martínez-Calderon et al. due to limited database coverage and no protocol registration. Risk of bias in included RCTs was high or unclear in 70–85% of cases across meta-analyses. Evidence certainty (GRADE) was low to very low for all outcomes, primarily due to high risk of bias, inconsistency (heterogeneity), imprecision (small samples), and indirectness (varied yoga styles). Heterogeneity was high in Moosburner et al. and Martínez-Calderon et al. [30,37], moderate in Miao et al. for rumination (64%), and low in Brinsley et al. (0%). Publication bias was assessed via funnel plots in 2 studies, showing asymmetry suggesting bias [34,36]. Table 2 summarises the quality assessments.

Table 2: Methodological quality (AMSTAR-2) and certainty of evidence (GRADE) of the included meta-analyses

First author, year	Focus	No. of RCTs	AMSTAR-2 rating	GRADE
Moosburner et al.	Depression	20	Moderate	Low
Miao et al.	Depression + anxiety	9	Moderate	Low to Very low
Wu et al.	Depression	34	Moderate	Low
Brinsley et al.	Depression	13	High	Moderate
Vollbehr et al.	Mixed anxiety/depression	18	Critically low	Very low
Cramer at al.	Anxiety	8	Moderate	Low
Zoogman at al.	Anxiety	38	Moderate	Low
Martínez-Calderón at al.	Mixed anxiety/depression	23	Low	Very low

AMSTAR-2 = A Measurement Tool to Assess systematic Reviews 2 (rating: High, Moderate, Low, critically low); GRADE = Grading of Recommendations Assessment, Development and Evaluation (certainty of evidence: High, Moderate, Low, very low); RCT = randomised controlled trial.

Primary Outcomes

Depression Severity and Remission Rates: Five meta-analyses reported on depression severity [30-34], showing moderate short-term effects of yoga versus passive/waitlist/TAU controls (SMD ranging from -0.41 to -0.64, 95% CI -0.65 to -1.41, $p<0.01$). Effects were robust in sensitivity analyses in 2 studies [31,33]. Subgroup analyses in Wu et al. indicated stronger effects in non-Western regions, with longer durations (>8 weeks), and higher frequency (>2 sessions/week) [32]. Vollbehr et al. found significant effects versus psychoeducation (SMD -0.52, 95% CI -0.96 to -0.08) but not TAU [34]. Remission rates were reported in Moosburner et al., with yoga superior to passive (OR 3.20, 95% CI 1.45 to 7.10) and

active controls (OR 2.04, 95% CI 1.13 to 3.69) [30]. Miao et al. reported no effect on rumination post-intervention (SMD -0.33, 95% CI -0.89 to 0.23), but significant effects at follow-up (MD -7.42, 95% CI -11.27 to -3.56) [31]. Table 3 summarises the effect sizes for yoga on depressive symptom severity across the included studies.

Table 3: Summary of effect sizes for yoga on depressive symptom severity across included meta-analyses

Study	SMD [95% CI]	Weight (%)
Moosburner et al, 2024	−0.43 [−0.80, −0.07]	22.1
Wu et al, 2023 [BDI]	−0.60 [−1.00, −0.21]	18.7
Wu et al, 2023 [HAMD]	−0.64 [−0.98, −0.30]	17.9
Miao et al, 2023	−0.53 [−0.96, −0.11]	15.3
Brinsley et al, 2021	−0.41 [−0.65, −0.17]	26.0

SMD = standardised mean difference (negative values favour yoga); 95% CI = 95% confidence interval; BDI = Beck Depression Inventory; HAMD / HAM-D = Hamilton Depression Rating Scale.

Anxiety: Four meta-analyses reported on anxiety with variable effects. Miao et al. showed large effects (SMD -1.08, 95% CI -1.64 to -0.52), Cramer et al. small to large (SMD -0.43 versus no treatment, -0.86 versus active), and Zoogman et al. large (d=0.80). Vollbehr et al. found no effect (SMD -0.09, 95% CI -0.47 to 0.30). Martínez-Calderon et al. reported significant effects for anxiety disorders after sensitivity analyses. Heterogeneity was low in Miao et al. (0%) and high in Cramer et al. (81% versus active). Martínez-Calderon et al. was excluded from forest plots due to absence of a pooled SMD and inclusion of non-yoga mind-body practices (qigong, tai chi), though it contributed 23 RCTs and supported significant effects in sensitivity analyses. Table 4 depicts the Summary of effect sizes for yoga on anxiety symptom severity by comparator type across included meta-analyses.

Table 4: Summary of effect sizes for yoga on anxiety symptom severity by comparator type across included meta-analyses

Study	SMD [95% CI]	Weight
Miao et al, 2023	−1.08 [−1.64, −0.52]	18.2
Cramer et al, 2018	−0.43 [−0.74, −0.11]	25.5
Cramer et al, 2018	−0.86 [−1.56, −0.15]	20.1
Vollbehr et al, 2018	−0.09 [−0.47, 0.30]	36.2

SMD = standardised mean difference (negative values favour0.09 favours yoga); 95% CI = 95% confidence interval.

Subgroup and Sensitivity Analyses: Subgroup analyses in Wu et al. and Zoogman et al. showed stronger effects in non-Western samples and with higher frequency. Sensitivity analyses in Brinsley et al. and Miao et al. confirmed robustness. Martínez-Calderon et al. meta-regression found no significant moderators (e.g., duration, frequency).

DISCUSSION

The findings of this umbrella review provide a comprehensive synthesis of the evidence from eight meta-analyses on the efficacy of yoga interventions for DSM/ICD-diagnosed anxiety and depressive disorders in adults. Overall, yoga demonstrated moderate short-term effects on depression severity (SMD ranging from -0.41 to -0.64 across the studies) compared to passive controls, TAU, or waitlist, with significant remission rates reported in one meta-analysis [30]. For anxiety, effects were more variable, ranging from negligible (SMD -0.09) to large (d=0.80), with stronger effects observed versus no treatment or active comparators in select studies [35-36]. Safety data from three meta-analyses indicated no serious adverse events, supporting yoga's tolerability [30,32,35]. However, the certainty of evidence was consistently low to very low across

outcomes, primarily due to high risk of bias in included RCTs, methodological heterogeneity, imprecision from small samples, and indirectness from varied yoga protocols [31,37].

These results align with prior systematic reviews on mind-body interventions for mental health, which have reported similar moderate benefits for depression symptoms in clinical populations [22,38]. The observed effects on depression severity are comparable to those of other non-pharmacological adjuncts, such as mindfulness-based therapies (SMD -0.50) or aerobic exercise (SMD -0.62), suggesting yoga may serve as a viable alternative or complement to standard care [39]. Subgroup analyses in included meta-analyses, such as higher frequency (>2 sessions/week) yielding stronger effects, highlight potential dose-response relationships, consistent with physical activity guidelines recommending regular practice for mental health benefits [40]. For anxiety, the variability in effects (SMD -0.09 to d=0.80) may reflect differences in diagnostic rigour and yoga styles; studies with DSM-confirmed anxiety showed weaker or non-significant effects, possibly due to treatment-resistant populations or inadequate matching of yoga components to anxiety pathophysiology.

Strengths of this review include its focus on DSM/ICD-diagnosed disorders, excluding subclinical symptoms to enhance clinical applicability, and the use of AMSTAR-2 and GRADE to evaluate methodological quality and evidence certainty. The inclusion of recent meta-analyses captures updated evidence post-COVID-19, where anxiety and depression prevalence has surged [41]. However, limitations must be acknowledged. High heterogeneity stems from diverse yoga styles (Hatha, mindfulness yoga) and comparators, precluding a formal re-meta-analysis and limiting pooled estimates. RCT overlaps may inflate effects, though narrative adjustments mitigated this. The low-to-very low-GRADE ratings across studies reflect pervasive biases (e.g., unclear selection bias, inadequate blinding) and small samples, underscoring the need for caution in interpreting results. Moreover, long-term data were sparse, with only Miao et al. reporting follow-up effects on rumination, and no consistent QoL meta-analyses due to heterogeneity.

Clinically, yoga's accessibility, low cost, and safety profile make it a promising adjunct for anxiety and depressive disorders, particularly in resource-limited settings or for patients non-responsive to pharmacotherapy. Mechanisms such as HPA-axis modulation, GABA enhancement, and neuroplasticity via BDNF may underpin these effects. However, inconclusive evidence for DSM-diagnosed anxiety disorders suggests tailoring (e.g., trauma-sensitive yoga) may be needed. Future research should prioritise high-quality RCTs with standardised yoga protocols, active comparators, long-term follow-ups, and diverse populations to address gaps in non-Western samples and treatment-resistant cases. Integrating objective biomarkers (e.g., cortisol) could elucidate mechanisms.

CONCLUSION

In summary, this umbrella review synthesises evidence from 8 meta-analyses demonstrating that yoga interventions may offer moderate short-term benefits for depression symptoms and variable effects for anxiety in adults with DSM/ICD-diagnosed disorders. With a favourable safety profile and broad acceptability, yoga represents a promising adjunctive therapy, particularly for major depressive disorder. However, the low to very low certainty of evidence, driven by methodological limitations, heterogeneity, and potential biases, underscores the need for higher-quality RCTs with standardised protocols, long-term follow-ups, and diverse populations to solidify these findings and guide clinical integration.

Declaration by Authors

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