

Evidence Map of Yoga for Depression, Anxiety, and Posttraumatic Stress Disorder

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Background: This study describes evidence of yoga's effectiveness for depressive disorders, general anxiety disorder (GAD), panic disorder (PD), and posttraumatic stress disorder (PTSD) in adults. We also address adverse events associated with yoga. **Methods:** We searched multiple electronic databases for systematic reviews (SRs) published between 2008 and July 2014, randomized controlled trials (RCTs) not identified in eligible SRs, and ongoing RCTs registered with ClinicalTrials.gov. **Results:** We identified 1 SR on depression, 1 for adverse events, and 3 addressing multiple conditions. The high-quality depression SR included 12 RCTs ($n = 619$) that showed improved short-term depressive symptoms (standardized mean difference, -0.69 , 95% confidence interval, -0.99 to -0.39), but there was substantial variability ($I^2 = 86\%$) and a high risk of bias for 9 studies. Three SRs addressing multiple conditions identified 4 nonrandomized studies ($n = 174$) for GAD/PD and 1 RCT ($n = 8$) and 2 nonrandomized studies ($n = 22$) for PTSD. We separately found 1 RCT ($n = 13$) for GAD and 2 RCTs ($n = 102$) for PTSD. Collectively, these studies were inconclusive for the effectiveness of yoga in treating GAD/PD and PTSD. The high-quality SR for adverse events included 37 primary reports ($n = 76$) in which inversion postures were most often implicated. We found 5 ongoing trials (3 for PTSD). **Conclusions:** Yoga may improve short-term depressive symptoms, but evidence for GAD, PD, and PTSD remain inconclusive.

Keywords: panic disorder, systematic review, PTSD

Mental health conditions such as depressive and anxiety disorders are common in the general adult population, cause significant morbidity, and are associated with increased medical utilization and lost productivity.¹⁻⁴ Although there are a variety of available evidence-based treatments, including different medications and behavioral therapies,^{1,2} a minority of individuals achieve remission with standard treatments, and even fewer can maintain remissions over years.³⁻⁷ In addition, antidepressant medications have multiple adverse effects,^{1,2,8} and there is concern that their effectiveness has been overestimated.⁹ Psychotherapy interventions can be effective and generally have a lower risk of adverse effects, but they require high levels of patient motivation and participation.^{1,2}

There has been increasing interest in nonpharmacologic approaches, such as yoga, for the treatment of mental health conditions. In the 2007 National Health Interview Survey (NHIS), 6.1% or 13 million adults in the United States reported practicing yoga.¹⁰ In 2002, NHIS showed that 16% of those who practiced yoga did so for specific medical conditions; one fifth of these individuals indicated mental health disorders.¹¹ In 2012, a privately conducted market survey of adults in the United States showed that 8.7% or 20 million were practicing yoga.¹² Despite the growing popularity of

yoga, incorporation of yoga into medical treatment remains limited by available data about its effectiveness for specific medical conditions and unclear approaches for delivery of yoga interventions in a healthcare setting.^{13,14}

Yoga originated in ancient India as a collection of spiritual and physical practices aimed at achieving greater union with the divine or true self. By the 15th century, yoga teachings were compiled into texts that addressed diverse aspects of physical and spiritual health.¹⁵⁻¹⁸ In Western societies, modern yoga practice is most commonly associated with Hatha yoga, which is derived from these texts. There are numerous styles of Hatha yoga, including those that emphasize physical and lifestyle practices (Sivananda, Kripalu, Iyengar, Ashtanga, and Vinyasa) and others that focus on more esoteric aspects of yoga philosophy (Kundalini, Sahaj, and Siddha). Recently, numerous yoga regimens focusing on fitness, such as Power Yoga, Yogafit, and Bikram Yoga (a form of hot yoga), have gained popularity in the United States.¹⁹ Interventions used in healthcare settings often refer to techniques drawn from various traditions, including Sudarshan Kriya yoga (SKY, rhythmic breathing practices), Kirtan Kriya (meditative chanting from Kundalini yoga), and yoga Nidra (deep relaxation through meditation).²⁰⁻²²

Given the widespread use of yoga and its potential to improve symptoms of mental illness, we conducted an evidence map to evaluate the breadth, depth, and methodology of published literature on yoga for important mental health conditions.²³ Evidence mapping is an emerging approach that describes key characteristics of existing information for a broad area of medicine.²⁴⁻²⁶ In this study, we present the results and characteristics of systematic reviews and randomized controlled trials (RCTs) examining yoga for the treatment of depressive disorders, general anxiety disorder (GAD), panic disorder (PD), and posttraumatic stress disorder (PTSD), as well as our findings for adverse events associated with yoga practice.

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Methods

We conducted this study as part of a larger report for the Veterans Health Administration's Evidence-Based Synthesis Program. The complete technical report is available elsewhere and includes additional information on other high-impact conditions that were originally addressed (eg, low back pain, prevention of falls), along with complete details on our methodology.²³

Key Questions (KQ)

KQ1: What are the extent, distribution, and methodological designs of intervention studies that evaluate yoga for depressive disorders, GAD, PD, and PTSD?

KQ2: What are the extent, distribution, and methodological designs of studies that assess the adverse effects of yoga?

Data Sources and Search Strategies

To address KQ1, we searched PubMed (1966 to July 2014), the Cochrane Database of Systematic Reviews (2003–July 2014), and EMBASE (1950–July 2014) for each condition of interest. In consultation with an experienced librarian, we used Medical Subject Headings (MeSH) terms and selected free-text terms for yoga, systematic reviews, RCTs, and the medical condition of interest (Online Supplemental Table 1). We also searched ClinicalTrials.gov for unpublished trials, both completed and ongoing, in July 2014. For KQ2, we searched PubMed for systematic reviews that addressed adverse effects associated with yoga. We also searched the Allied and Complementary Medicine Database (AMED, 1995–July 2014) using the single term “yoga.”

Study Selection, Data Abstraction, and Quality Assessment

Using prespecified inclusion and exclusion criteria (Online Supplemental Table 2), 2 investigators assessed titles and abstracts for relevance to the key questions. We focused on systematic reviews (published after 2008) that addressed the use of yoga in adults to treat any eligible medical condition and measured relevant health outcomes. We included all types of yoga practice and any duration or intensity of yoga. For eligible conditions, we also included RCTs published subsequent to the most recent systematic reviews. Systematic reviews examining adverse effects of yoga practice were also eligible.

Articles identified by either investigator as potentially relevant were retrieved for full-text review by 2 investigators. Disagreements were resolved by discussion or by a third investigator. Results were tracked in both DistillerSR (Evidence Partners, Inc., Ottawa, ON, Canada) and EndNote (version 5; Thomson Reuters, Toronto, ON, Canada).

Data abstraction and quality assessment of systematic reviews were performed by 1 investigator and verified by a second. Disagreements were resolved by consensus or by obtaining a third investigator's opinion when consensus could not be reached. Data elements included study characteristics (eg, search date, eligibility criteria), synthesis methods (eg, meta-analyses and sensitivity analyses), results (eg, number and design of included primary studies, sample characteristics, and treatment effects), funding source, conflicts of interest, and authors' conclusions. We adapted key quality criteria from the Quality of Reporting of Meta-analyses (QUOROM)²⁷ and Assessment of Multiple Systematic Reviews (AMSTAR)²⁸ instruments to categorize each systematic review as good, fair, or poor quality (see Online Supplemental Table 3 for detailed ratings). We

did not formally assess the quality of the primary literature, relying instead on quality assessments reported in eligible systematic reviews.

Data Synthesis

We grouped eligible systematic reviews by clinical topic and described them qualitatively. When multiple reviews were available, we analyzed the overlap among included primary studies. We prioritized the most recent systematic reviews of high quality in describing the number of identified primary studies, primary study designs, patient populations, intervention characteristics, and treatment effects. To evaluate treatment effects, we focused on RCTs. When non-RCTs were included in systematic reviews, we report descriptive data for these studies. We report standardized mean differences (SMDs, calculated as the difference in average scores between groups, divided by the pooled standard deviations of both groups) and Cochran's Q and I² statistics, when provided by eligible systematic reviews.

We used a structured approach to make recommendations about appropriate next steps for evaluating yoga's effectiveness for each eligible clinical condition. We indicated need for RCTs if there were 3 or fewer RCTs of good quality and recommended a systematic review if more than 3 RCTs were available but no high-quality systematic review was identified. If at least 1 high-quality systematic review was found, we suggested either updating the review or surveillance of the primary literature for new RCTs, depending on whether RCTs have been published since the completion of the most recent review.

Results

We identified 4 eligible systematic reviews relevant for depressive disorders, GAD, PD, and PTSD (Figure 1). One high-quality review evaluated RCTs of yoga for depression treatment,²⁹ whereas 3 other reviews of lower quality included multiple mental health conditions.^{30–32} We found a separate high-quality systematic review that evaluated adverse events.³³ Table 1 summarizes the characteristics of included systematic reviews for mental health conditions and adverse events.

Table 2 depicts summary information for both primary RCTs included in eligible systematic reviews and separately identified RCTs. Overall, there were 14 RCTs evaluating yoga for depressive disorders; 12 of these were identified by the high-quality systematic review²⁹ (Table 2). There was 1 RCT of patients with PTSD from 1 eligible systematic review,^{31,34} and we separately identified 2 other small RCTs of yoga for PTSD.^{35,36} Two nonrandomized studies of PTSD were also included in 1 eligible review³² (Online Supplemental Table 4). No RCTs on GAD or PD were included in eligible systematic reviews, which instead contained 4 nonrandomized studies (Online Supplemental Table 4). We found 1 small RCT evaluating yoga for GAD³⁷ (Table 2).

We provide detailed search results from ClinicalTrials.gov in Online Supplemental Table 5—we identified 3 completed but unpublished trials (2 for depressive disorders and 1 for PTSD), and 5 planned or ongoing trials (1 for depressive disorders, 1 for GAD, and 3 for PTSD).

Yoga for Depressive Disorders

We focus here on the most recent, high-quality review by Cramer et al,²⁹ which included all of the relevant RCTs identified among other eligible systematic reviews for depression. Cramer et al²⁹

Table 1 Characteristics of Included Systematic Reviews

	Cramer et al, 2013 ²⁹	Balasubra-maniam et al, 2013 ³⁰	Cabral et al, 2011 ³¹	da Silva et al, 2009 ³²	Cramer et al, 2013 ³³
Targeted condition(s)					
General psychiatric	—	X	X	—	—
Depressive disorders	X	—	—	X	—
Anxiety disorders	—	—	—	X	—
Other	—	Insomnia	Memory, cognition	OCD	—
Quality	Good	Fair	Poor	Poor	Good
Search date	January 2013	June 2011	NR	July 2008	February 2013
Databases searched					
PubMed	X	X	X	X	X
Cochrane	X	X	X	—	—
PsycINFO	X	X	—	X	—
IndMED	X	—	—	—	X
Scopus	X	—	—	—	X
Clinicaltrials.gov	—	X	X	—	—
Others	Gray literature	EMBASE	EBSCO Google scholar	—	CAMbase Cases database
Study designs included					
Randomized controlled trials	X	X	X	X	—
Nonrandomized trials	—	—	—	X	—
Case reports/series	—	—	—	X	X
Meta-analysis?	X	—	X	—	—
Primary studies (n)					
All disorders	12	16	10	34	37
Depressive disorders ^a	12	4	5	16	—
GAD/PD ^a	—	—	—	4	—
PTSD ^a	—	—	1	2	—

Abbreviations: OCD, obsessive-compulsive disorder; NR, not reported; GAD, generalized anxiety disorder; PD, panic disorder; PTSD, posttraumatic stress disorder.

^aIndividual mental conditions were diagnosed by a clinician, met established clinical criteria, or qualified by scores on validated screening instruments.

searched 5 computerized databases and the gray literature for eligible RCTs published through January 17, 2013. They included 12 RCTs (n = 619 participants) that evaluated yoga compared with active or inactive controls in adult patients meeting structured criteria for depressive disorders or with elevated levels of depressive symptoms as measured by a validated questionnaire (see Online Supplemental Table 6 for detailed characteristics of included RCTs). Eligible interventions included any style of yoga for any duration or at any intensity. Eligible outcomes were depression symptom severity, remission rates, anxiety symptoms, health-related quality of life, and adverse effects. Summary treatment effects were estimated using fixed-effect meta-analyses. Of 12 included RCTs, data from 9 studies were used for meta-analyses, conducted separately for yoga compared with usual care or versus relaxation controls; 3 RCTs were excluded because of differences in quality. Cramer et al²⁹ determined 3 RCTs to be at low risk of bias and 9 to be at high risk.

Among RCTs included by Cramer et al,²⁹ most enrolled young to midlife adults (median age, 34 years) who met the criterion standard for a depressive disorder; participants were predominantly

women (median female, 77%). Yoga was conducted by certified yoga teachers in 5 RCTs and clinical psychologists in 1 RCT; the remaining studies did not report the instructors' qualifications. Yoga interventions were delivered in programs lasting a median of 8 weeks (range, 3 days to 12 weeks), with a median of 11 total hours of yoga practice (range, 4 to 18 hours). Antidepressant medication was allowed in 3 studies, any cointervention was allowed in 1 study, no cointerventions were used in 6 studies, and cointerventions were not reported in 2 studies. A variety of comparators were used, including relaxation in 4 studies, aerobic exercise in 2 studies, and waitlist control in 2 studies. One study compared yoga with either a tricyclic antidepressant or electroconvulsive therapy. Outcomes were assessed at a median of 10 weeks (range, 3 days to 9 months).

Cramer et al²⁹ found that compared with usual care, yoga improved short-term depressive symptoms (SMD, -0.69, 95% confidence interval [CI], -0.99 to -0.39, data from 5 RCTs), although effects varied substantially across studies ($I^2 = 86%$). Yoga also improved short-term depressive symptoms more than relaxation (SMD, -0.59, 95% CI, -1.03 to -0.22, $I^2 = 0%$, data from 3 RCTs) and aerobic exercise (SMD, -0.59, 95% CI, -0.99 to -0.18, data

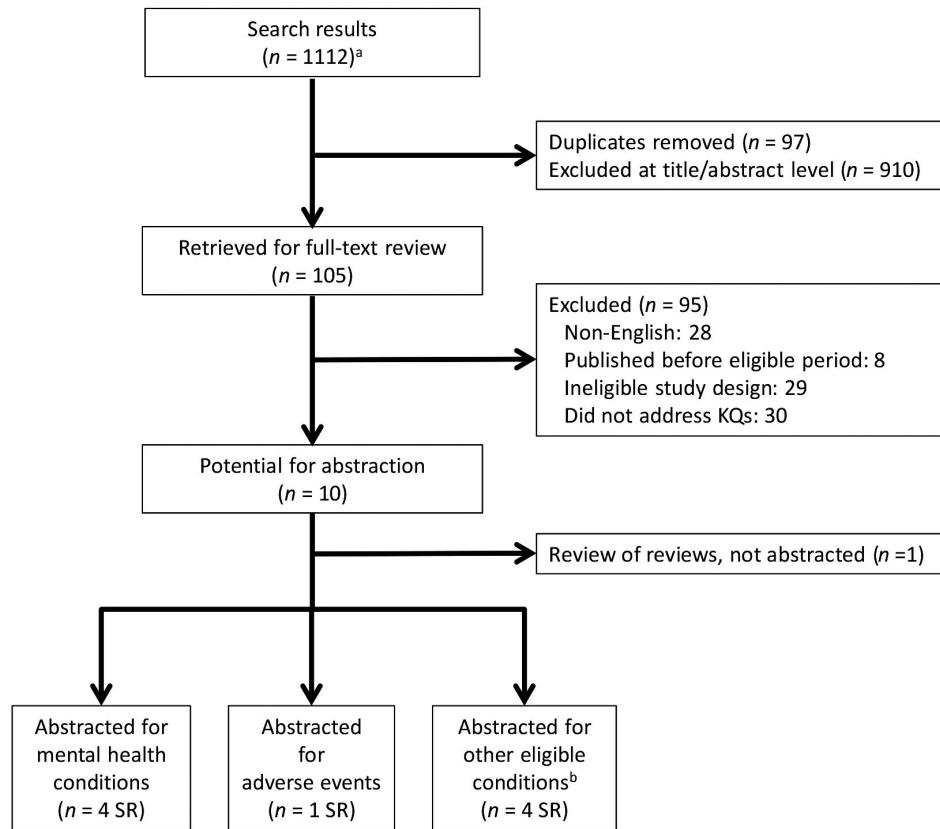


Figure 1 — Summary of search and study selection for included systematic reviews. Abbreviations: KQ, key question; SR, systematic review. ^a Search results include those identified from Pubmed, Cochrane Database of Systematic Reviews and EMBASE for all eligible conditions (776 references), results from the Allied and Complementary Medicine Database for yoga in general (199), studies from PubMed on adverse effects (n = 126), and references from bibliographies of key articles (11). ^b Other eligible conditions for larger report included low back pain and prevention of falls.

from 2 RCTs). Remission rates were reported infrequently and were inconsistently affected by yoga treatment. One RCT reported that health-related quality of life was more likely to improve by 50% in participants assigned to yoga compared with those assigned to relaxation control. Although adverse effects were prespecified as outcomes of interest, no results on this topic were reported by Cramer et al.²⁹

To explore the observed variability in short-term effects on depression severity, Cramer et al.²⁹ conducted a variety of subgroup analyses. The subgroups compared included participants with depressive disorders by structured criteria versus those with only elevated depressive symptoms, different categories of yoga interventions (ie, exercise-based [postures only], nonphysical [no postures], or complex [postures in addition to breathing and/or meditation]), and different comparators (ie, usual care, relaxation, or aerobic exercise). These subgroup analyses suggested that yoga may be more effective in individuals who have elevated depressive symptoms but do not meet structured criteria for a depressive disorder, although subgroup sizes were very small. The effects of yoga also appeared similar across different comparator subgroups.

Cramer et al.²⁹ concluded: “Despite methodological drawbacks of the included studies, yoga could be considered an ancillary treatment option for patients with depressive disorders and individuals with elevated levels of depression.” However, there was a high risk of bias in a majority of included RCTs, unexplained variability in treatment effects, and little information on remission rates and

long-term functional outcomes. In addition, statistical methods to assess publication bias were not used because there were too few studies, and there was no search of clinical trial registries to look for completed but unpublished trials. Thus, although we agree that current data support considering yoga for depressive disorders, we have low confidence in the estimated treatment effect.

We separately identified 2 small RCTs of yoga for depression^{38,39} that were not included in the review by Cramer et al.²⁹ These trials did not find improvement in depression symptoms associated with yoga, but given the small sample sizes, these results may be interpreted as inconclusive and unlikely to change the overall conclusions reached by Cramer et al.²⁹

Yoga for Generalized Anxiety Disorder and Panic Disorder

We identified 2 eligible systematic reviews that addressed multiple mental health conditions and included studies on anxiety disorders; however, only da Silva et al.³² evaluated studies relevant to GAD or PD (Table 1). The poor-quality review by da Silva et al.³² included studies of any design that evaluated yoga of any style for mood disorders, anxiety disorders, and PTSD. Yoga styles included Hatha yoga, SKY, Iyengar, Vinyasa, and Vivekananda. Active and inactive comparators were included. Meta-analysis was not performed, and qualitative synthesis was limited to brief descriptions of primary study findings. Practice elements of the intervention, as well as session number, duration, and frequency, were not reported. Of

Table 2 Summary of Included RCTs^a

Characteristic	Depressive Disorders (n)	GAD/PD (n)	PTSD (n)
Total RCTs	14	1	3
Total participants for all RCTs	706	12	110
Geographical location			
North America/Europe	8	—	3
Asia	6	—	—
Participants per RCT			
1–50	9	1	2
> 50	5	—	1
Yoga style			
Hatha	3	—	2
Other	8	1	1
Not reported	3	—	—
Treatment duration			
≤ 4 weeks	3	1	—
5–12 weeks	1	—	—
Not reported	1	—	1
Treatment intensity			
<10 hours	4	—	—
10–21 hours	7	1	3
Not reported	3	—	—
Outcome assessment timing			
≤ 4 weeks	4	—	—
> 4 weeks	9	—	2
Not reported	1	1	1

Abbreviations: GAD, generalized anxiety disorder; PD, panic disorder; PTSD, posttraumatic stress disorder; RCT, randomized, controlled trial.

^a Includes primary RCTs from eligible systematic reviews and separately identified RCTs.

4 primary studies relevant for GAD or PD (n = 174 total), 3 enrolled patients with “anxiety neurosis”^{40–42} (an older term mapping best to a combination of GAD and PD) and 1 studied GAD⁴³ (see Online Supplemental Table 4 for information about primary studies). Study designs included 2 nonrandomized comparative studies,^{40,41} a single-arm trial,⁴² and a case series.⁴³ The overall age range of participants was 18 to 47 years, and both sexes were enrolled. In all 4 studies, yoga interventions were delivered over 3 months and included breathing exercises,⁴⁰ an Asana series,⁴¹ and transcendental meditation.⁴² All of the studies showed some positive effects of yoga for anxiety symptoms, but statistically significant differences were not always sustained and attrition was high. Da Silva et al³² concluded that the evidence supporting use of yoga for anxiety disorders remains preliminary.

Separately, we identified 1 very small RCT (n = 12) that compared yoga with a combination of diaphragmatic breathing and acupuncture for the treatment of GAD; there was no significant difference in improvement of anxiety symptoms between the 2 treatment groups.³⁷ In contrast to this very small published study, there

is 1 large ongoing trial of yoga for GAD (NCT01912287, planned n = 230, Online Supplemental Table 5), which has the potential to provide important data on the efficacy of yoga for GAD.

Yoga for Posttraumatic Stress Disorder

Two eligible systematic reviews^{31,32} evaluated yoga for treatment of PTSD or PTSD symptoms but both included multiple mental health conditions and were of poor quality (Table 1). Collectively, these reviews identified 1 very small RCT (n = 8)³⁴ and 2 nonrandomized studies (n = 22 total).^{44,45} The small primary RCT did not report treatment effects between groups.³⁴ Neither systematic review drew conclusions specific to the efficacy of yoga for PTSD.^{31,32} Our independent search identified 2 additional RCTs (n = 102 total, Table 2) that evaluated meditation, postures and breathing.^{35,36} van der Kolk et al³⁵ randomized 64 women with chronic, treatment-resistant PTSD to 10 sessions (1 hour per session) of trauma-informed yoga or supportive women’s health education; women randomized to yoga were less likely to meet criteria for PTSD (15 of 31, 48%) compared with those assigned to the education control (23 of 29, 79%). Mitchell et al³⁶ randomized 38 women to 12 sessions (75 minutes per session) of Hatha yoga or assessment only; both groups improved, but there were no between-group differences for PTSD or depressive or anxiety symptoms. A post hoc power analysis by Mitchell et al³⁶ showed very low power to detect small treatment effects. Overall, the small number of studies for PTSD and relatively few included participants preclude any definitive conclusions regarding the potential benefit of yoga for PTSD. Results from 1 completed but unpublished study (NCT00962403, n = 108; Online Supplemental Table 5) and 1 ongoing study (NCT01512303, planned n = 200; Online Supplemental Table 5) could substantially change the state of evidence for PTSD treatment, particularly if these RCTs are of high quality.

Adverse Effects of Yoga

We found 1 good-quality systematic review specifically addressing adverse effects associated with yoga practice in any population,³³ but among systematic reviews included for mental health conditions of interest, none reported adverse effects. The systematic review by Cramer et al³³ included case reports and case series describing adverse effects experienced by individuals engaged in any type of yoga practice or posture. Cramer et al³³ searched multiple databases through February 15, 2013; they identified 35 case reports and 2 case series, representing 76 individual adverse events. Most of the reports (n = 20) came from North America, whereas a quarter (n = 9) were from Asian countries. The age range of individuals was 14 to 87 years, and 67% were women. Nine adverse effects were exacerbations of established medical conditions, 1 occurred in someone with congenital hyperelasticity, and 66 people had no reported baseline disorders or abnormalities. Six cases occurred with meditation or breathing alone, whereas 7 involved more exercise-based techniques (Hatha, Vinyasa, or Bikram Yoga); Bikram Yoga, a form of hot yoga, was associated with 3 events, including 1 case of hyponatremia. However, most reports did not specify the type of yoga being performed. Among specific postures, headstand (Sirsasana) was associated most commonly with adverse outcomes (10 cases), whereas 3 reports involved the shoulder stand; most reports did not clearly identify the postures involved. Musculoskeletal injuries were reported in 27 cases, whereas orbital involvement (9 cases, including new and worsening glaucoma and optic vascular events) and headache (7 cases) were the next most common types of events. Notably, 7 events involving the eye and 2 of 3 reports

concerning the posterior cerebrovascular system occurred during inversion poses (head or shoulder stand). In conclusion, Cramer et al³³ found no evidence to support discontinuation of yoga by healthy people, but they warned beginner practitioners against headstand, lotus position, and advanced breathing techniques. In people with a history of glaucoma, they advised avoiding any inversion posture, whereas for those with baseline musculoskeletal disorders, they cautioned against “forceful or competitive yoga forms.”³³

Discussion

Yoga for Depression, GAD, PD, and PTSD

To address KQ1, we identified 4 systematic reviews that evaluated the effectiveness of yoga for one or more eligible mental health conditions. These reviews identified and summarized 13 small RCTs, conducted primarily in middle-aged women with depressive disorders or elevated symptoms. Interventions typically provided a total of 10 to 21 hours of yoga instruction and assessed outcomes across a wide range of follow-up periods. Meta-analyses showed consistent benefits of yoga for short-term depressive symptoms, but effects varied substantially across studies, and the majority of these studies were judged to be at high risk of bias (Table 3). For GAD, PD, and PTSD, there are few published RCTs; collectively, these studies are inconclusive (Table 3).

Overall, systematic reviews and primary studies reported very limited information about the training of yoga instructors, the level of instruction provided to subjects, the amount of time subjects practiced yoga during interventions, and other information necessary

to evaluate the dosing of yoga interventions. Most of the identified studies also sought to evaluate the independent effects of yoga, although yoga is typically practiced along with other interventions (eg, relaxation, exercise, dietary changes). In addition, important outcomes such as health-related quality of life or functional status were infrequently measured.

Regarding yoga for treatment of depressive disorders, there is a paucity of large, high-quality RCTs with longer term outcomes that include depression severity, functional status, and adverse effects (Table 4). In developing these new studies, careful consideration should be given to the appropriate comparator, because yoga may require a time commitment similar to evidence-based short-term psychotherapies. Additional classes of antidepressants (eg, selective serotonin-reuptake inhibitors) should also be included among future comparators. For subsyndromal depression, yoga may be a reasonable option as monotherapy, and comparators could include attention control or active treatments. For major depressive disorder, yoga could be an alternative to other active treatments or used as an add-on therapy for patients treated with antidepressants. A literature scan in 3 to 5 years could be done to reevaluate whether new data merit an updated systematic review.

There are few published RCTs for GAD, PD, and PTSD, and most of these are very small (Table 4). For both GAD and PD, pilot trials may be needed before larger, high-quality RCTs can be carried out, although there is 1 ongoing clinical trial for GAD with a planned enrollment of 230 participants. Given that there are 4 unpublished RCTs for PTSD (1 completed, 3 ongoing), a systematic review on this condition may be warranted when results from these studies become available.

Table 3 Key Findings by Clinical Condition

Condition	Key Findings
Depressive disorders	Yoga improved short-term depressive symptoms (SMD, -0.69 ; 95% CI, -0.99 to -0.39 , estimate based on 5 RCTs), but trials were heterogenous ($I^2 = 86\%$) and had high risk of bias. There are insufficient data on remission rates, health-related quality of life, and long-term outcomes.
GAD/PD	Data are inconclusive for the treatment of anxiety disorders, but there may be important information in the future from 1 large ongoing trial of yoga for GAD.
PTSD	Data are inconclusive for the treatment of PTSD, but there may be information in the future from 1 ongoing study and 1 completed but unpublished trial of yoga in PTSD.

Abbreviations: SMD, standardized mean difference; CI, confidence interval; RCT, randomized controlled trial; GAD, generalized anxiety disorder; PD, panic disorder; PTSD, posttraumatic stress disorder.

Table 4 Key Research Gaps and Recommendations by Clinical Condition

Condition	Gap	Recommended Study Designs	Outcomes
Depressive disorders	Existing RCTs, poor quality lack of comparison with diverse classes of antidepressants (eg, SSRI)	Large RCTs, including pragmatic comparative effectiveness trials	Long-term functional status
GAD/PD	No good-quality SR, few RCTs	Pilot trials	Standardized outcome measures
PTSD	No good-quality SR, few RCTs	Systematic review when ongoing RCTs completed	Standardized outcome measures

Abbreviations: RCT, randomized, controlled trial; SSRI, selective serotonin-reuptake inhibitors; GAD, generalized anxiety disorder; PD, panic disorder; SR, systematic review; PTSD, posttraumatic stress disorder.

Adverse Effects of Yoga

For KQ2, we identified only 1 good-quality systematic review of adverse effects associated with yoga practice, and this review included case reports or case series of events from all types of practitioners. In this review, most reports lacked sufficient information about yoga techniques or postures associated with adverse events; among those reports that provided adequate descriptions, inversion postures were most commonly implicated. None of the eligible systematic reviews on mental health conditions included data on adverse events, and we found no additional information in separately identified RCTs. It remains unclear whether adverse effects were truly not detected in RCTs or such events were not addressed by the original study protocols and thus not captured. Overall, we recommend more rigorous protocols for RCTs to detect and report adverse events, as well as consideration for a public registry that could better capture rare events.

Limitations

There are several limitations to our approach. We evaluated only English-language systematic reviews and recently published RCTs, thus possibly missing pertinent information written in other languages or from observational studies not included in published systematic reviews. Although we verified selected data from the primary studies, we largely relied on information provided by included systematic reviews; there may have been undetected errors of data abstraction or synthesis in one or more of the systematic reviews. We included studies that used the term “yoga” to describe interventions, potentially missing those that involved yoga but referred to their interventions using other names. Finally, our methodology was designed to identify studies of individuals with clinical disorders or sufficient symptoms that placed them at high risk for the conditions of interest (eg, positive on depression screening). Therefore, we excluded studies evaluating yoga for wellness or general health, even if some of the assessed outcomes included symptoms of depression, anxiety, or sleep quality. Although not eligible for this review, such investigations could provide useful information on how yoga affects healthy individuals and promotes positive mental health.

Conclusion

We conclude that there is potential benefit for yoga in young to midlife adults with depressive disorders or elevated depressive symptoms. Consistent with a recent umbrella review of yoga for acute and chronic health conditions,⁴⁶ our results provide limited evidence to address whether yoga may be beneficial for patients with GAD, PD or PTSD. Although current evidence suggests potential benefit, we need high-quality longer-term trials before yoga can be recommended as an evidence-based treatment for these conditions.

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