



Canadian Agency for
Drugs and Technologies
in Health

RAPID RESPONSE REPORT: SUMMARY WITH CRITICAL APPRAISAL



TITLE: Yoga for the Treatment of Post-Traumatic Stress Disorder, Generalized Anxiety Disorder, Depression, and Substance Abuse: A Review of the Clinical Effectiveness and Guidelines

DATE: 22 June 2015

CONTEXT AND POLICY ISSUES

Post-traumatic Stress Disorder (PTSD), Generalized Anxiety Disorder (GAD), depression and substance abuse (SA) are mental health disorders that can lead to considerable impairments in the functioning of individuals worldwide. In Canada, the lifetime prevalence rate of PTSD, GAD, depression and substance abuse is 8%,¹ 9%,² 11%(major depressive episode)² and 22%(substance use disorder).² The first-line treatment for mental health disorders is often a combination of pharmacological and psychological therapies such as antidepressants and/or cognitive behavioural therapy.^{3,4} Not all patients have adequate responses to pharmacological treatment. Patients may develop side effects to first-line treatments and may be resistant to standard treatment strategies.⁵

Yoga is a form of mind and body medicine that can be classified as a complementary and alternative medicine (CAM).⁶ Yoga is believed to enhance the interaction between the body and the mind and has been studied in a number of therapeutic areas including low-back pain, falls prevention, mental illness, and insomnia.^{7,8} Several possible mechanisms of action have been proposed that may explain the effects of yoga. Reducing stress reactivity, improving sleep quality, decreasing rumination, and promoting adaptive thinking and behavioral activation have been suggested for improving symptoms of depression.⁹ Yoga can take on many forms, but generally consists of one or more of the following components: poses or postures, breathing techniques and/or meditation.^{7,10,11} Commonly used forms of yoga in Western countries include Hatha yoga, Iyengar yoga, Sudarshan Kriya Yoga (SKY), and meditative forms of yoga.¹¹

The purpose of this Rapid Response report is to review the clinical effectiveness of yoga for treating PTSD, GAD, depression and substance abuse, and to summarize the guidelines that are associated with the use of yoga for these conditions.

RESEARCH QUESTIONS

1. What is the clinical effectiveness of yoga as an intervention for the treatment of post-traumatic stress disorder, generalized anxiety disorder, depression, and substance abuse?
2. What are the evidence-based guidelines for the use of yoga as an intervention for the treatment of post-traumatic stress disorder, generalized anxiety disorder, depression, and substance abuse?

KEY FINDINGS

There is evidence to suggest that yoga may be beneficial as a monotherapy or adjunctive therapy for treating depression. The effectiveness of yoga for treating PTSD is unclear. One observational study found that a SKY yoga training course was effective in treating patients with GAD in an outpatient setting. Three RCTs of low methodological quality suggested that patients with substance abuse improved with respect to some symptoms with yoga. Five evidence based guideline documents considered the use of yoga in clinical practice. Three suggested that yoga may be useful as an adjunctive treatment for treating major depressive disorder (MDD), PTSD and GAD, if available.

METHODS

Literature Search Methods

A limited literature search was conducted on key resources including Ovid Medline, Ovid PsycINFO, PubMed, The Cochrane Library, University of York Centre for Reviews and Dissemination (CRD) databases, ECRI, Canadian and major international health technology agencies, as well as a focused Internet search. No filters were applied to limit the retrieval by study type. Where possible, retrieval was limited to the human population. The search was also limited to English language documents published between January 1, 2005 and May 22, 2015.

Rapid Response reports are organized so that the evidence for each research question is presented separately.

Selection Criteria and Methods

One reviewer screened citations and selected studies. In the first level of screening, titles and abstracts were reviewed and potentially relevant articles were retrieved and assessed for inclusion. The final selection of full-text articles was based on the inclusion criteria presented in Table 1.

Table 1: Selection Criteria	
Population	Adults with: <ul style="list-style-type: none"> • Post-traumatic Stress Disorder • Generalized Anxiety Disorder • Depression • Substance Abuse
Intervention	Yoga (any type)
Comparator	All comparators No comparator
Outcomes	Q1: Symptoms, remission, quality of life Q2: Recommendations from evidence-based guidelines
Study Designs	Health technology assessments, systematic review and meta-analysis, randomized controlled trials, observational studies, evidence based guidelines.

Exclusion Criteria

Articles were excluded if they did not meet the selection criteria outlined in Table 1, they were duplicate publications, or were published prior to 2005. Studies that included yoga as part of a mindfulness-based program where the impact of yoga alone could not be isolated were excluded.

Critical Appraisal of Individual Studies

The included systematic reviews were critically appraised using AMSTAR checklist,¹² randomized studies were critically appraised using Downs and Black tool,¹³ and guidelines were assessed with the AGREE II instrument.¹⁴ Summary scores were not calculated for the included studies; rather, a review of the strengths and limitations of each included study were described.

SUMMARY OF EVIDENCE

Quantity of Research Available

A total of 495 citations were identified in the literature search. Following screening of titles and abstracts, 413 citations were excluded and 82 potentially relevant reports from the electronic search were retrieved for full-text review. Five potentially relevant publications were retrieved from the grey literature search. Of these potentially relevant articles, 64 publications were excluded for various reasons, while 23 publications met the inclusion criteria and were included in this report. APPENDIX 1: Selection of Included Studies describes the PRISMA flowchart of the study selection.

Additional references of potential interest are provided in APPENDIX 5: Additional References of Potential Interest.

Summary of Study Characteristics

A detailed description of individual study characteristics is provided in Tables A1 to A4 of APPENDIX 2: Characteristics of Included Publications.

Two systematic reviews were identified that assessed the efficacy of yoga as a treatment for multiple medical conditions of relevance to this review.^{15,16} One systematic review originated in Canada and assessed the efficacy of yoga as a treatment for mood and anxiety disorders. The selection criteria included all study types, with or without a comparator group, and patients with PTSD, GAD and depression.¹⁵ The literature was assessed up to July 2008 and included all study types. Details of the inclusion and exclusion criteria were limited. A total of 34 relevant studies were identified. The other systematic review originated in the US and assessed the use of meditation techniques, including various forms of yoga, compared to a wait-list, placebo, or sham control group for the treatment of patients with a medical illness (including patients with depression, GAD, and substance dependence).¹⁶ Twenty RCTs published between March 2001 and November 2005 and meeting satisfactory methodological quality were included in the review.

Clinical effectiveness of yoga for adults with PTSD

One systematic review was identified in the literature that assessed the use of yoga as a treatment for PTSD.¹⁵ Details of this study are described above. No RCT evidence and four

open trials were identified in the review. Three of the four studies were based on the Iyengar yoga, a form of yoga derived from Hatha yoga which is defined by its emphasis on correctly executed postures combined with breathing and meditation.¹⁵ The remaining study did not specify the type of yoga provided.

Two RCTs that assessed the efficacy of yoga as a treatment for PTSD were identified in the literature search, both of which were conducted in the US and included adult women.^{17,18} van der Kolk et al.¹⁷ included women aged 18 to 58 years who had chronic PTSD and had been unresponsive to prior PTSD treatment (> 3 years). Sixty-four patients were randomized to receive either trauma-informed yoga (based on Hatha yoga which incorporates breathing, postures and meditation) or education classes, both at a frequency of one time per week for 10 weeks (60 minutes per session). Mitchell et al.¹⁸ included veteran or civilian women aged 18 to 65 years who screened positive for PTSD. Thirty-eight patients (including nine veterans) were randomized to receive either trauma-sensitive yoga (based on Hatha yoga) or assessments only, both at a frequency of one time per week for 12 weeks (75 minutes per session). Patients in the yoga intervention group were given the option of attending yoga sessions one time per week for 12 weeks or two times per week for 6 weeks. Both studies assessed PTSD and depressive symptoms, as well as affect regulation and emotional control,¹⁷ trauma,¹⁷ and state and trait anxiety¹⁸ pre and post-treatment. Mitchell et al.¹⁸ also assessed outcomes at one-month follow-up. Based on the study by Mitchell et al.,¹⁸ additional outcome data such as PTSD screening, awareness and attentiveness, psychological flexibility, alcohol risk behaviours, substance use and dependence and symptom perception and management, was reported in two related follow-up studies^{19,20}.

Clinical effectiveness of yoga for adults with GAD

Two systematic reviews were identified in the literature that assessed the efficacy of yoga as a treatment for GAD.^{15,16} Details of these studies are described above. In the first review, one trial was identified assessing the efficacy of Hatha yoga for the treatment of GAD or panic disorder.¹⁵ In the second review, no RCTs were identified.²¹

One open-label trial was identified in the literature search that assessed the efficacy of SKY yoga (for 22 hours over five or six days) in 41 patients aged 18 to 65 years old who had a primary diagnosis of GAD.²² SKY yoga is classified as a stress reduction program that incorporates postures, breathing and meditation as well as self-reflection, and cognitive-based strategies and education for coping with stress.²² Patients had to be receiving at least eight weeks of standard anxiolytic treatment. Anxiety, coping, depression and other outcomes were assessed during the week prior to the intervention and at one month.

Clinical effectiveness of yoga for adults with depression

Six systematic reviews were identified in the literature containing 18 relevant and unique RCTs.^{15,16,23-26} The details of two of the systematic reviews are described above.^{21,27} The four remaining systematic reviews originated from Germany,²³ China,²⁴ the UK,²⁵ and the US.²⁶ One review included pregnant women with either prenatal depression or no prenatal depression,²⁴ and the other reviews included patients with depression, depressive disorder or elevated levels of depression.^{23,25,26} All systematic reviews were broad in their definition of yoga. One review classified studies as assessing one of: complex yoga, exercise-based yoga, or meditation-based compared to usual care, relaxation or aerobic exercise,²³ while another review included exercise based or complex yoga of at least 12 weeks duration compared to usual care or other psychological or mental care such as antenatal exercises or social support.²⁴ Blasubramaniam et al.²⁶ included any sub-type of yoga and Pilkington et al.²⁵ included yoga and yoga-based

exercises but excluded meditation or combined and complex interventions. Levels of depression, depressive symptoms, or depression severity were outcomes of interest in all studies. Other outcomes included remission, anxiety, health related quality of life (HRQOL) and acceptability and tolerance.

Three additional RCTs were identified, two from the US,^{28,29} and one from Germany.³⁰ Two studies recruited women, one study specific to women with postpartum depression,²⁸ and one study for women from the community with MDD or dysthymia.²⁹ The remaining RCT included adult patients with MDD from an inpatient hospital ward.³⁰ The yoga intervention took the form of gentle vinyasa flow yoga (60 min, 16 classes for eight weeks and home practice (30 min, one time per week using a DVD) for women with postpartum depression.²⁸ Vinyasa flow yoga involved a sequence of four categories of poses/techniques: I. breathing and centering techniques, II, Warm-up poses, III. A set of stretches and poses defined as “integrative”, and IV. Floor stretches and relaxation.²⁸ The intervention in the other two studies was Hatha yoga of differing durations and adjunctive treatments.^{29,30} One study assessed quetiapine fumarate extended release (QXR) or escitalopram (ESC) + Hatha yoga (60 min, one time per week) for five weeks.³⁰ The community-based study assessed Hatha yoga group classes (75 min, one time per week) and home practice (daily with 10 min DVD segments and weekly handouts) for eight weeks.²⁹ Levels of depression, depressive symptoms, or depression severity were outcomes of interest in all studies. Other outcomes included response, stress, anxiety, HRQOL and rumination, and interpersonal sensitivity and hostility. One follow-up study to Kinser 2013²⁹ was also identified that assessed outcomes up to week 52,³¹ all other RCTs measured outcomes at pre-treatment, mid-treatment or immediately following treatment.²⁸⁻³⁰

Clinical effectiveness of yoga for adults with substance abuse

Two systematic reviews were identified in the literature that assessed the efficacy of yoga as a treatment for substance abuse.^{16,26} Details of these studies are described above, and both reviews identified one RCT each. One RCT assessed the efficacy of Hatha yoga as an adjunct to methadone treatment for treating patients with opiate dependence. The other RCT assessed the efficacy of SKY yoga for treating patients with alcohol dependence at a de-addiction centre.

Three RCTs were identified in the literature that assessed the efficacy of yoga as a treatment for patients with substance abuse.³²⁻³⁴ The three studies varied according to number of patients randomized, patient characteristics, yoga type, control group, and outcome measures assessed. In one study, 111 male patients with a diagnosis of substance dependence were recruited from a de-addiction ward in a prison setting and randomized to SKY yoga (one time per day for six weeks) or a control group where patients were instructed to sit for an equivalent amount of time and pay gentle attention to their breath. Functioning, general well-being, and severity of dependence were assessed at pre and post intervention.³² In another study, 81 female patients with heroin dependence were recruited from a residential drug-withdrawal rehabilitation centre and randomized to yoga (one time per day, five days per week for six weeks) plus routine hospital care or routine hospital care alone. Mood status and quality of life were assessed at pre-intervention, three months and six months.³³ In the third study, 18 adults with alcohol dependence were recruited from an outpatient clinical and were randomized to yoga (one time per week for ten weeks) plus treatment as usual, or treatment as usual alone (psychotherapeutic and pharmacological interventions). The level of alcohol use was the primary outcome assessed at baseline and six months.³⁴

Guidelines associated with the use of yoga for adults with PTSD, GAD, depression or SA

Five evidence-based guidelines were identified in the literature search. Two guidelines originated in Canada,^{4,35} one in the US,³⁶ one in Britain,³⁷ and one in Scotland.¹ Two guideline documents, one from Canada and one from Britain, provided recommendations for the pharmacological^{4,37} and psychological⁴ treatment of individuals with a variety of mental health disorders including GAD and PTSD. One guideline document from Veterans Affairs(VA)/Department of Defense(DoD) provided recommendations for pharmacological and psychotherapeutic treatments for PTSD.³⁶ The remaining two guideline documents, one from Scotland and one from Canada addressed complementary and alternative medicine for the treatment of patients with depression.^{35,38}

Summary of Critical Appraisal

A detailed description of individual study critical appraisal is provided in APPENDIX 3: Critical Appraisal of Included Publications.

Two systematic reviews were identified that assessed yoga as a treatment for multiple medical conditions of relevance to this review.^{15,16} One systematic review assessed the clinical efficacy of yoga for PTSD, GAD and depression,¹⁵ and the other systematic review assessed the clinical efficacy of yoga for depression, GAD, and substance dependence.¹⁶ No meta-analysis was performed in either review; findings were presented qualitatively. The characteristics and quality of the included studies were assessed and well documented, and the strength of the findings was discussed in the context of the quality of the included trials. Arias et al.¹⁶ had a well-defined objective and explicitly stated inclusion and exclusion criteria, while da Silva et al.¹⁵ provided limited details regarding their search strategy. Neither study reported searching the grey literature, and study selection was completed either by a single reviewer,¹⁶ or had uncertain selection methods.¹⁵

The quality of the remaining systematic reviews and clinical studies identified by the literature search will be presented according to the relevant condition.

Clinical effectiveness of yoga for adults with PTSD

The quality of the systematic review by da Silva et al.¹⁵ that assessed the clinical effectiveness of yoga for adults with PTSD is discussed above.

Two RCTs that assessed the efficacy of yoga as a treatment for PTSD were included.^{17,18} Due to the nature of the intervention, patient blinding in both studies was not possible. Assessor blinding did not occur in Mitchell et al.,¹⁸ and the details of allocation concealment were not described in van der Kolk et al.,¹⁷ so it is possible that study assessors may have become unblinded to patient treatment group in this study as well. The results were based on an intention to treat (ITT) analysis in both studies, however the study by Mitchell et al.¹⁸ was not adequately powered to detect differences between groups. In both studies, inclusion criteria were limited to women. Additionally, the source population used for recruitment was unclear, making it difficult to apply the intervention to the appropriate population in clinical practice.

Clinical effectiveness of yoga for adults with GAD

The quality of the systematic reviews by da Silva et al.¹⁵ and Arias et al.¹⁶ that assessed the clinical effectiveness of yoga for adults with GAD are discussed above.

One open-label trial that assessed the efficacy of yoga as a treatment for GAD was included.²² The study results were based on an ITT analysis, using a valid and reliable measure of anxiety (Hamilton depression rating scale for anxiety (HAM-A)) administered by a trained assessor. The quality of this study was limited by inherent study design limitations including the lack of randomization and blinding, and no comparison group. Patient compliance during the study was unknown, and 76% of patients completed the intervention.

Clinical effectiveness of yoga for adults with depression

Two meta-analyses were included that assessed the efficacy of yoga as a treatment for depression,^{23,24} both with well-defined objectives and clearly stated inclusion and exclusion criteria. The characteristics and quality of the included studies were assessed and documented, and the strength of the findings was discussed in the context of their quality. The reviews were limited by the high level of heterogeneity ($I^2 = 0\%$ to 86% ,²³ and $I^2 = 60\%$ ²⁴) between studies (populations and interventions). Subgroup analyses by intervention types and patient populations were completed; however the interpretation is limited due to the number of studies within each group ($n=2$ to 3 ,²³ $n=2$ to 4 ²⁴)

The quality of the systematic reviews by da Silva et al.¹⁵ and Arias et al.¹⁶ that assessed the clinical efficacy of yoga for adults with depression are discussed above. The remaining two systematic reviews^{25,26} had explicit objectives and inclusion and exclusion criteria. The characteristics and quality of the included studies were assessed and documented in both studies. Pilkington et al.²⁵ conducted a comprehensive search of the literature including grey literature, and quality appraisal was completed by two independent reviewers. Balasubramaniam et al.²⁶ did not undertake a search of the grey literature and it is uncertain if quality appraisal was completed by two reviewers. There was a high level of heterogeneity between studies (populations and interventions) included in the reviews. Between the two reviews, there was one study assessing the efficacy of laughter yoga, three for SKY yoga (two full SKY programs, one partial SKY program), one for Iyengar yoga, one for Shavasana yoga, one for Broota's technique and one unspecified type of yoga.^{25,26}

Three additional RCTs were identified that assessed the efficacy of yoga as a treatment for depression.²⁸⁻³⁰ Due to the nature of the intervention, patient blinding in all three studies was not possible. The study by Buttner et al.²⁸ was conducted with a 1:1 block randomization schedule, a blind assessor, additional analyses to account for missing data, and results based on an ITT analysis. The yoga intervention classes were taught by the primary investigator, and the source population was unclear. Results were also limited to women with postpartum depression. Sarubin et al.³⁰ did not provide sufficient detail regarding randomization or allocation concealment and there was no blinding of the outcome assessor. Patient compliance was unknown, and there was a differential rate of drop-outs between groups. The generalizability of the results was limited due to inadequate presentation of the Hatha yoga intervention. Similar to Sarubin et al.³⁰, the study by Kinser et al.²⁹ did not provide sufficient detail regarding randomization or allocation concealment and it was unclear if the outcome assessor was blinded to patient intervention group. Recruitment was based on volunteer participation which may result in systematic differences between the sample population and the underlying source population. Further, the number of patients who remained in the study for a 52 week follow-up assessment³¹ was disproportionate between the yoga intervention group and the control group ($n=7$ and $n=2$ respectively).

Clinical effectiveness of yoga for adults with SA

The quality of the systematic review by Arias et al.¹⁶ that assessed the clinical effectiveness of yoga for adults with SA is discussed above.

Three RCTs were identified in the literature that assessed the efficacy of yoga as a treatment for patients with substance abuse.³²⁻³⁴ Details of randomization methods were provided by all three studies. Due to the nature of the intervention, patient blinding in all three studies was not possible. Assessor blinding and methods for allocation concealment were described in one study,³³ however this study took place in a residential treatment centre, so despite the blinding and allocation concealment procedures, there was a risk of contamination between the intervention and control groups. Given the setting in two of the three studies (prison de-addiction ward³² and a residential treatment centre³³) compliance was high. Level of compliance in the outpatient setting in Hallgren et al.³⁴ was not reported and 78% of patients remained in the study to the end of the treatment period. These studies were based on very select patient populations so generalizability of the results is limited.

Guidelines associated with the use of yoga for adults with PTSD, GAD, depression or SA

All five evidence-based guidelines had an explicit scope and purpose.^{1,4,35-37} All guidelines followed a systematic search for relevant literature except for Baldwin et al.³⁷. All guideline documents had generally explicit recommendations that were linked to the existing evidence base. It was unclear if the preferences of the target population had been consulted in three guidelines.^{4,35,36} The Canadian guidelines⁴ included consultation with the Canadian psychiatric community, and there was a wide range of stakeholder involvement in the Scottish guidelines and VA/DoD guidelines.^{36,38}

Summary of Findings

A detailed summary of individual study findings is provided in APPENDIX 4: Main Study Findings and Author's Conclusions.

Clinical effectiveness of yoga for adults with PTSD

The systematic review by da Silva et al. that assessed the efficacy of yoga for patients with mood or anxiety disorders found that there was evidence for the use of yoga as a monotherapy or in combination with medication for treating patients with PTSD.¹⁵ This conclusion was based on evidence from a series of four open-label intervention trials (defined as level three evidence in the review: at least one prospective observational study with at least patients).

Two RCTs assessed yoga interventions (based on the core elements of Hatha yoga) for treating PTSD.^{17,18} Results from van der Kolk et al.¹⁷ suggested that women with chronic PTSD who had been non-responsive to therapy may benefit from a yoga program compared to supportive therapy. Mitchell et al.¹⁸ found clinically significant decreases in PTSD symptoms in the yoga intervention group but these clinically significant differences were also found in the assessment-control group. A follow-up study by Dick et al.¹⁹ found statistically significant improvements in psychological flexibility in the control group but not the intervention group, and another follow-up study by Reddy et al.²⁰ found non-statistically significant improvements in alcohol and drug use risk in the yoga intervention group compared to the assessment-only control group.

Clinical effectiveness of yoga for adults with GAD

Two systematic reviews were included,^{15,16} and both concluded that there was insufficient evidence to comment on the efficacy of yoga for treating patients with GAD. The variability in

the populations and intervention types of the studies for anxiety make it difficult to apply results clinically.¹⁵ One open-label trial assessed the effect of a SKY yoga training course in reducing anxiety in patients with GAD in an outpatient setting who had not previously achieved remission with CBT, mindfulness based training and anxiolytic medication.²² There were statistically significant improvements in levels of anxiety after the completion of the intervention. No comparator group was included in this study.

Clinical effectiveness of yoga for adults with depression

Six systematic reviews were included,^{15,16,23-26} all of which provide some evidence for the efficacy of yoga in treating depression. Cramer et al.²³ found statistically significant improvements in depression severity and remission rates versus usual care, depression severity, remission rates, anxiety and quality of life compared to relaxation, and statistically significant improvements in depression severity compared to aerobic exercise. Compared to pharmacological treatment and electroconvulsive therapy, massage, and social support, there were no statistically significant differences in changes to depression severity, remission rates, and anxiety respectively.²³ Gong et al.²⁴ found that yoga was effective in reducing depressive symptoms in pregnant women. Pilkington et al.²⁵ suggested that there may be benefits of yoga for depressive disorders. Balasubramaniam et al.²⁶ identified four low-quality RCTs (defined as Grade B evidence) for yoga in the acute treatment depression. da Silva et al.¹⁵ found level two evidence for the efficacy of yoga (monotherapy or in combination with antidepressants) as a second-line treatment in patients with mild to moderate major depression (defined in the review as at least one double-blind RCT with a placebo or active comparator group). In patients with severe depression, yoga was recommended as a third-line treatment. In patients with dysthymia, there was level 2 evidence for the efficacy of yoga as a monotherapy or adjunctive therapy depending on patient preference.¹⁵ Arias et al.¹⁶ found supportive evidence for the efficacy of SKY yoga (without meditation) and Shavasana yoga as an adjunct treatment for depression.¹⁶ The Shavasana protocol was not explicitly stated in the study, however Shavasana has been described as a “death pose” that typically occurs at the end of the yoga session. The pose involves lying on ones back with eyes closed, awareness of the breath, and consciously releasing any noticeable muscle tension.⁷

In two meta-analyses, subgroup analyses were possible.^{23,24} Results were the same regardless of patients being defined as having depressive disorder or having elevated levels of depression except when comparing yoga to usual care in patients with depressive disorder.²³ Women with a diagnosis of prenatal depression and those without a diagnosis both benefit from yoga therapy.²⁴ When analysis were divided by type of yoga intervention, results were statistically significant for meditation-based yoga interventions when comparing yoga to relaxation for depression and anxiety.²³ No statistically significant differences were found for complex yoga interventions or exercise-based yoga interventions compared to usual care.²³ The integrated yoga appears to be more effective than exercise-based yoga for decreasing depression scores.²⁴

Three RCTs were included that assessed the efficacy of yoga for patients with depression.²⁸⁻³⁰ Buttner et al.²⁸ provided evidence for the short-term efficacy of an eight week yoga intervention for improving depressive symptoms, anxiety and quality of life for women with postpartum depression. The long-term effects of this yoga intervention are unknown. Sarubin et al.³⁰ found that Hatha-based yoga as an add-on to pharmacological treatment did not result in statistically significant improvements in depressive symptoms for inpatients with MDD compared to pharmacological treatment alone. Kinser et al.²⁹ suggested that a community-based eight-week yoga program was an acceptable and feasible treatment for women with MDD. The results were

suggestive of greater improvements in rumination in the yoga group, a possible mechanism for improvements in depression that deserves further study. A follow-up study to Kinser et al.²⁹ found that completing approximately 75% of the recommended number of minutes of yoga practice (75 minutes, one time per week, 20 minutes all other days) over the course of eight weeks may offer benefits to patients with MDD by improving depression, ruminations, stress, anxiety and health related quality of life.³¹

Clinical effectiveness of yoga for adults with SA

The systematic review by Arias et al.¹⁶ found supportive evidence for the use Hatha yoga with methadone treatment for opiate dependence. These results were not superior to methadone treatment alone and there were acceptance and generalizability concerns associated with the yoga therapy.

Three RCTs assessed three different forms of yoga in three different patient populations for treating SA. Sureka 2015³² compared Sudarshan Kriya and Practices (SK&P) yoga (one time per day for six weeks) to a control group that were instructed to sit and pay gentle attention to their breath for the same duration of time. There were significant improvements in general well-being and anxiety for patients in the yoga intervention group compared to the control group. There were no significant differences between groups for depression, self-control or vitality. Hallgren et al.³⁴ found that yoga was a feasible adjunct treatment for treating alcohol dependence. Patients in the yoga intervention group had a higher baseline level of drinking compared to the control group and there were positive, non-significant changes in alcohol consumption at six month follow-up, numerically greater than that experienced by the control group. Zhuang et al.³³ found that yoga may be beneficial as an adjunct treatment for women undergoing outpatient detoxification treatment for heroin dependence. Women in the yoga treatment group experienced statistically significant improvements in quality of life and mood states after six months of yoga treatment.

Guidelines associated with the use of yoga for adults with PTSD, GAD, depression or SA

Five evidence-based guidelines were included,^{1,4,35-37} two of which did not find enough evidence for yoga to provide a recommendation.^{37,38} The other three guidelines identified a limited evidence base for which to provide recommendations and suggested that yoga may be useful in patients with GAD,⁴ may be considered as an adjunctive treatment in patients with PTSD,³⁶ and may be considered as a second-line adjunctive treatment in mild to moderate MDD, if available.³⁵

Limitations

There were a limited number of well-conducted studies to assess the efficacy of yoga for treating patients with PTSD, GAD and SA.

Six systematic reviews were available that assessed the efficacy of yoga in treating patients with depression; however, they are limited by the poor methodological quality of the included studies. Methods for allocation concealment were often not documented, and due to the nature of the intervention, patients participating in yoga interventions could not be blinded to treatment allocation arm. Studies often recruited highly selected patient populations, such as women with postpartum depression, patients in a residential substance abuse treatment facility, patients in a prison setting, or patients that were young and fit. Furthermore, given that all of the yoga interventions varied on some level – duration, frequency, components, or style - the pooling and generalization of the efficacy results was difficult.

CONCLUSIONS AND IMPLICATIONS FOR DECISION OR POLICY MAKING

Yoga is a form of complementary and alternative medicine with an emerging evidence base as a treatment for patients with mental health disorders including PTSD, GAD, depression and SA. The strongest evidence base exists for the use of yoga in treating depression. Two meta-analyses, four systematic reviews and three RCTs suggest that yoga may offer some benefit compared to usual care, relaxation interventions and aerobic exercises but may not offer additional benefits as an adjunct to pharmacological therapy compared to pharmacological treatment alone. The type of yoga provided appeared to influence the effectiveness of the intervention. Conclusions based on this collective evidence base are limited due to poor trial quality, the heterogeneity between studies and the highly selected patient populations.

The evidence for the efficacy of yoga as a treatment for individuals with SA was similarly limited by between study heterogeneity however three RCTs of low methodological quality suggest that patients with substance abuse improve on some symptoms, including general well-being, anxiety and mood states, with the practice of yoga.

The effectiveness of yoga in treating PTSD is unclear. Two RCTs found opposite effects in two dissimilar patient populations, while one systematic review concluded that yoga may be effective as a monotherapy or in combination with medication for treating patients with PTSD. Likewise, an open-label trial found improvements in anxiety scores for patients with GAD after the completion of a SKY yoga training course, while two systematic reviews concluded that there was insufficient evidence to comment on the efficacy of yoga for treating patients with GAD.

Five evidence-based guidelines considered the use of yoga in clinical practice, of which two stated that there was not enough evidence to provide a recommendation, and three suggest that yoga may be useful as an adjunctive treatment for treating MDD, PTSD and GAD. There is insufficient evidence to comment on the safety and long-term efficacy of yoga as a treatment for PTSD, GAD, depression or SA.

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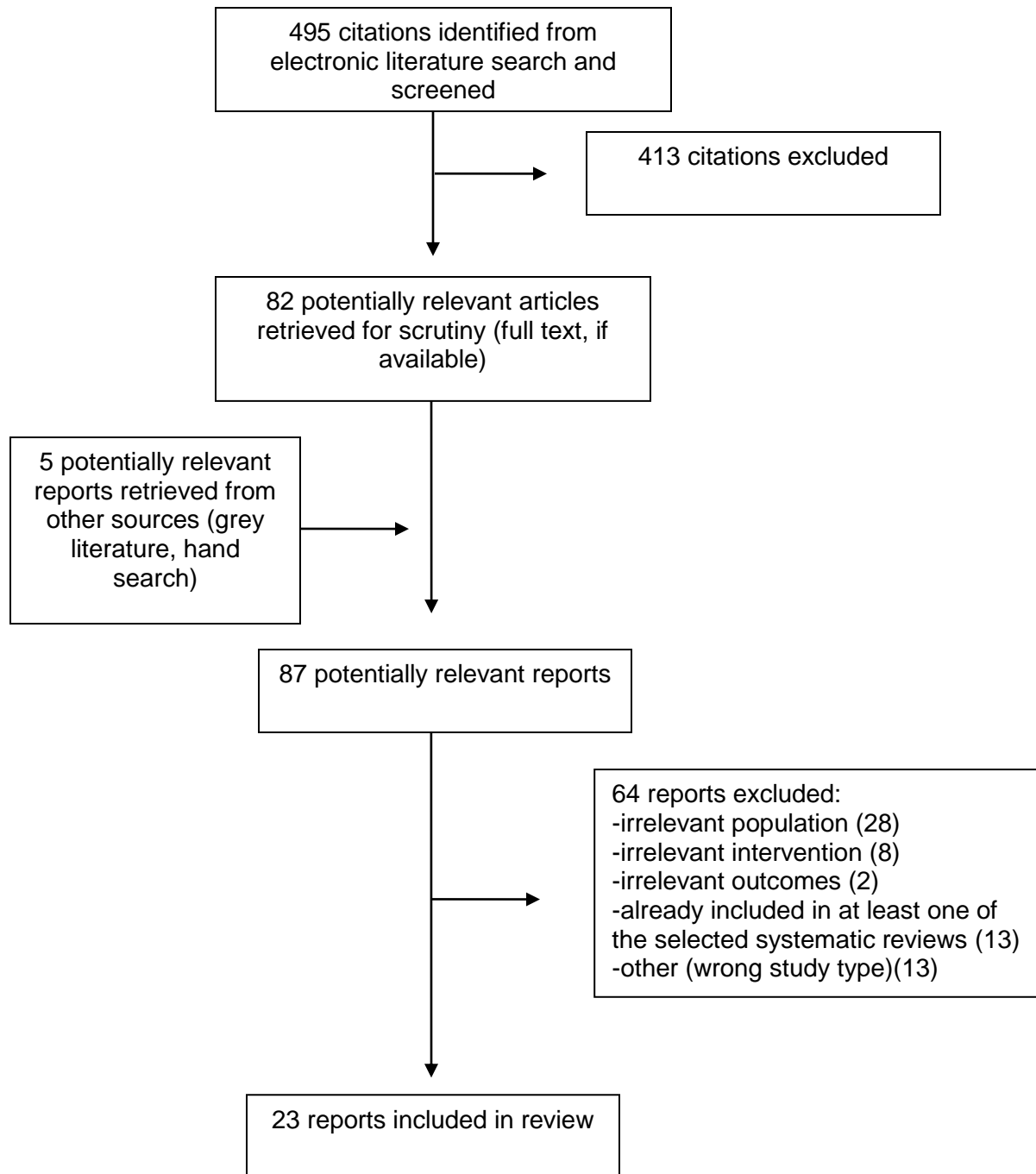
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APPENDIX 1: SELECTION OF INCLUDED STUDIES



APPENDIX 2: CHARACTERISTICS OF INCLUDED PUBLICATIONS

Table A1: Characteristics of Included Systematic Reviews and Meta-Analyses

First Author, Publication Year, Country	Types and numbers of primary studies included	Population Characteristics	Intervention	Comparator(s)	Clinical Outcomes, Length of Follow-Up
Gong, 2015, China ²⁴	6 RCTs	<p>4 RCTs included women with prenatal depression; 2 RCTs included patients who were not depressed prenatally.</p> <p><u>Inclusion criteria:</u> literature up to July 2014, RCTs, pregnant women who were either depressed or not depressed.</p> <p><u>Exclusion criteria:</u> nonrandomized, uncontrolled trials that included women with postpartum depression, and trials where the effects of the treatment on depression scores could not be isolated.</p>	Exercise-based or complex (which could include tai chi, relaxation, meditation and breathing), 12 weeks duration	Usual care or other physical or mental care such as antenatal exercises, social support.	<p>Level of depression.</p> <p><u>Assessment time points:</u> Not stated.</p>
Cramer, 2013, Germany ²³	12 RCTs (Includes 11 relevant RCTs that were not included in more recent SRs)	<p>6 studies included patients with a clinical diagnosis of depressive disorder; 6 studies included patients with elevated levels of depression.</p> <p><u>Inclusion criteria:</u> literature up to January 2013, RCTs, studying a yoga-based intervention in adults with a diagnosis of depression or with an elevated level of depression.</p> <p><u>Exclusion criteria:</u> studies that assessed depression as a secondary symptom.</p>	Complex yoga (physical exercise + at least one of: breath exercises, meditation or lifestyle advice), exercise-based yoga, or meditation-based (including at least one of: breath exercises, meditation or lifestyle advice).	Usual care, relaxation, and aerobic exercise.	<p>Depression severity, remission, anxiety, health-related quality of life.</p> <p><u>Assessment time points:</u> defined as short term (12 weeks after randomization) and long term (12 months after randomization)</p>

Table A1: Characteristics of Included Systematic Reviews and Meta-Analyses

First Author, Publication Year, Country	Types and numbers of primary studies included	Population Characteristics	Intervention	Comparator(s)	Clinical Outcomes, Length of Follow-Up
Balasubramanian, 2013, US ²⁶	16 RCTs (Includes 2 relevant RCTs that were not included in more recent SRs)	4 RCTs including patients with depression. <u>Inclusion criteria:</u> literature up to June 2011, RCTs, any sub-type of yoga in the treatment of: depression, anxiety or schizophrenia. Includes trials with patients who have a formal diagnosis or symptoms that suggest a diagnosis. <u>Exclusion criteria:</u> non-randomized trials, studies that include patients with sub-threshold symptoms.	Yoga types included in depression studies: Laughter yoga, complex yoga, SKY yoga, Iyengar yoga.	Not stated.	Self-reported changes in symptoms scores, acceptability and tolerance. <u>Assessment time points:</u> not stated
da Silva, 2009, Canada ¹⁵	34 studies (Includes 2 relevant RCTs that were not included in more recent SRs)	Patients with MDD, psychotic depression, bipolar disorder, dysthymia, chronic depression, OCD, PTSD, GAD, panic disorder, social anxiety disorder. <u>Inclusion criteria:</u> published up to July 2008, all study types.	Yoga	Not stated.	Effect size and strength of evidence for efficacy and tolerability. <u>Assessment time points:</u> not stated.
Arias, 2006, US ¹⁶	20 RCTs (Includes 1 relevant RCT that was not included in more recent SRs)	Patients with a medical illness (3 RCTs including patients with depression or substance dependence). <u>Inclusion criteria:</u> published between March 2001 and November 2005, randomized control trials, interventional studies in patients with a disease or symptoms of a disease, English language, quality >0.65 on	Meditation techniques including various forms of Yoga (e.g. SKY, Shavasana Yoga and Hatha yoga)	Wait-list, placebo, active, or sham.	No outcomes stated. <u>Assessment time points:</u> not stated.

Table A1: Characteristics of Included Systematic Reviews and Meta-Analyses

First Author, Publication Year, Country	Types and numbers of primary studies included	Population Characteristics	Intervention	Comparator(s)	Clinical Outcomes, Length of Follow-Up
		<p>the Reisch scale.</p> <p><u>Exclusion criteria:</u> studies with no control group, multi-modal therapies were the intervention of interest cannot be isolated</p>			
Pilkington, 2005, UK ²⁵	<p>5 RCTs</p> <p>(Includes 0 relevant RCTs that were not included in more recent SRs)</p>	<p>5 RCTs included patients with depression or depressive disorder.</p> <p><u>Inclusion criteria:</u> literature up to December 2004 and July 2005 (depending on database), RCTs, patients with depression or depressive disorder, yoga-based interventions.</p> <p><u>Exclusion criteria:</u> interventions that included only a meditation component or that included complex or multiple interventions.</p>	<p>Yoga and yoga-based exercises. No meditation or combined/complex interventions.</p>	Not stated	<p>Level of depression.</p> <p><u>Assessment time points:</u> Not stated.</p>

GAD = generalized anxiety disorder; MDD = major depressive disorder; OCD = obsessive compulsive disorder; PTSD = post-traumatic stress disorder; RCT = randomized controlled trial; SR = systematic review; SKY = Sudarshan Kriya Yoga; UK = United Kingdom; US = United States.

Table A2: List of relevant RCTs included in the Systematic Reviews and Meta-Analyses

RCTs			Systematic Reviews and Meta-Analyses					
			Gong 2015 ²⁴	Cramer 2013 ²³	Balasubramaniam 2012 ²⁶	da Silva 2009 ¹⁵	Arias 2006 ¹⁶	Pilkington 2005 ²⁵
			Prenatal Depression	Depression	Neuropsychiatric disorders	Mood and Anxiety Disorders	Medical Illness	Depression
Author, Year	Intervention	Population	Yoga	Yoga	Yoga	Yoga	Meditation techniques	Yoga
Newham 2014 ^{a39}	Hatha Yoga	Normal Pregnancy	x					
Satyapriya 2013 ^{a40}	Integrated Yoga ^b	Normal Pregnancy	x					
Field 2013 ⁴¹	NS	Depression	x					
Field 2013 ⁴²	Yoga poses	Depression	x	x				
Field 2012 ⁴³	Yoga poses ^c	Depression	x	x				
Lavretsky 2013 ⁴⁴	Kirtan Kriya Yoga	Depression		x				
Mitchell 2012 ⁴⁵	Yoga poses	Depression	x					
Shahidi 2010 ⁴⁶	Laughter Yoga	Depression		x	x			
Butler 2008 ⁴⁷	Hatha Yoga	Depression		x		x		
Krishnamurthy and Telles 2007 ⁴⁸	NS	Depression			x	x		
Oretzky 2007 ⁴⁹	NS	Depression				x		
Vedamurthachar 2006 ⁵⁰	SKY Yoga	SA			x			
Sharma 2005 ⁵¹	Sahaj Yoga	Depression		x		x		
Woolery 2004 ⁵²	Iyengar Yoga	Depression		x	x	x		x
Rohini 2000 ⁵³	SKY Yoga	Depression		x		x		x
Gangadhar 2000 ⁵⁴	SKY Yoga	Depression				x		
Janakiramaiah 2000 ⁵⁵	SKY Yoga ^d	Depression		x		x	x	x
Janakiramaiah 1998 ⁵⁶	SKY Yoga	Depression				x		
Shaffer 1997 ⁵⁷	Hatha Yoga	SA					x	
Khumar 1993 ⁵⁸	Shavasana Yoga	Depression		x		x	x	x

Table A2: List of relevant RCTs included in the Systematic Reviews and Meta-Analyses

RCTs			Systematic Reviews and Meta-Analyses					
			Gong 2015 ²⁴	Cramer 2013 ²³	Balasubramaniam 2012 ²⁶	da Silva 2009 ¹⁵	Arias 2006 ¹⁶	Pilkington 2005 ²⁵
Author, Year	Intervention	Population	Prenatal Depression	Depression	Neuropsychiatric disorders	Mood and Anxiety Disorders	Medical Illness	Depression
			Yoga	Yoga	Yoga	Yoga	Meditation techniques	Yoga
Veale 1992 ⁵⁹	NS	Depression		x				
Broota and Dhir 1990 ⁶⁰	Broota's Yoga	Depression		x		x		x

NS = not specified; RCT = randomized controlled trial; SA = substance abuse; x = RCT included in systematic review or meta-analysis.

^aIncluded in systematic review and discussed in the context of our report but did not meet inclusion criteria for our review.

^bInvolves lectures, breathing exercises, postures, meditation and a deep relaxation technique.

^cInvolves stretching in eight positions: sitting on the floor with legs crossed, on hands and knees, on knees, standing up, "sunset salutation", warrior poses, seated on floor, and prayer position.

^dno meditation.

Table A3: Characteristics of Included Clinical Studies

First Author, Publication Year, Country, Study Name	Study Design	Patient Characteristics	Intervention(s)	Comparator(s)	Clinical Outcomes
Depression					
Buttner, 2015, US ²⁸	RCT	57 patients were randomized Age: 29.8 (SD 5.2) for the yoga group; 32.5 (SD 4.8) for the control group. Past MDE: 70% for the yoga group; 55% for the control group. Number of months postpartum: 4.6 (SD 3.5) for the yoga group; 4.7 (SD 2.9) for the control group. <u>Inclusion criteria:</u> Women, 18 to 45 years, gave birth within one year, HDRS score ≥ 12, PHQ-9 ≥ 10.	Gentle Vinyasa Flow (60 min, 16 classes for 8 weeks and home practice (30 min, 1 x per week using a DVD) (n=28)	Wait-list control (n=29)	Depression and depression severity (PHQ-9, HDRS), depression and anxiety symptoms (IDAS), HRQOL (SF-36) <u>Assessment time points:</u> Pre-treatment, week 2, 4, 6 and post-treatment (week 8).

Table A3: Characteristics of Included Clinical Studies

First Author, Publication Year, Country, Study Name	Study Design	Patient Characteristics	Intervention(s)	Comparator(s)	Clinical Outcomes
		<u>Exclusion criteria:</u> co-existing psychiatric disorder, poorly controlled comorbid conditions.			
Sarubin, 2014, Germany ³⁰	RCT	60 patients were randomized Age: 40.3 years (SD 5.2) Sex: 66% male Duration of illness: 75 months (SD 116) <u>Inclusion criteria:</u> 18 to 65 years, inpatients with major depressive episode, HAMD-21 ≥ 18 . <u>Exclusion criteria:</u> patients with major comorbid conditions, pregnant women, previous treatment with medication for the index episode.	QXR 300 mg/day or ESC 10 mg/day + Hatha-yoga (60 min, 1 x per week) for 5 weeks (n=22)	QXR 300 mg/day or ESC 10 mg/day for 5 weeks (n=31)	Response (50% reduction on HAMD-21 from baseline) <u>Assessment time points:</u> Day 0, 4, 7, 21, 28, and 35.
Kinser, 2013, US ²⁹	RCT	27 patients were randomized Age: 43.3 years (SD 15.6) Current MDD or MDE: 81.5% of patients <u>Inclusion criteria:</u> Women from the community with a diagnosis of MDD or dysthymia, PHQ-9 score ≥ 10 (moderate to severe depression) <u>Exclusion criteria:</u> regular practice of yoga or meditation for greater than one month in the past five years, patient-identified difficulty with yoga, suicidality, psychosis or mania, changes to antidepressant medication in the past month.	Hatha-yoga group classes (75 min, 1 x per week) and home practice (daily with 10 min DVD segments and weekly handouts) for 8 weeks	Health education group sessions (75 min, 1 x per week) for 8 weeks	Depression severity (PHQ-9), stress (PSS-10), anxiety (STAI), rumination (RRS), interpersonal sensitivity and hostility (subscales of the BSI) <u>Assessment time points:</u> baseline, 4 weeks and 8 weeks. Depression severity was also measured at 2 weeks and 6 weeks.

Table A3: Characteristics of Included Clinical Studies

First Author, Publication Year, Country, Study Name	Study Design	Patient Characteristics	Intervention(s)	Comparator(s)	Clinical Outcomes
Kinser, 2014, US ³¹ Follow-up to Kinser 2013 ²⁹	RCT	9 patients continued in the 1 year follow-up study from 27 patients randomized. Age: 38.9 years (SD 12.6) <u>Inclusion criteria:</u> See Kinser 2013 ²⁹ <u>Exclusion criteria:</u> See Kinser 2013 ²⁹	See Kinser 2013 ²⁹ (n=7)	See Kinser 2013 ²⁹ (n=2)	Depression severity (PHQ-9), stress (PSS-10), anxiety (STAI), rumination (RRS), interpersonal sensitivity and hostility (subscales of the BSI) <u>Follow-up:</u> 52 weeks
PTSD					
van der Kolk 2014, US ¹⁷	RCT	64 patients were randomized. Age: 42.9 years (SD 12.0) Employed: 72% in the yoga group; 47% in the control group. <u>Inclusion criteria:</u> women, 18 to 58 years, chronic PTSD (CAPS>45; trauma occurring ≥12 years prior to intake), non-responsive to PTSD treatment (defined as at least 3 years of prior therapy) <u>Exclusion criteria:</u> prior yoga practice (5+ sessions), GAF<40. Not receiving ongoing supportive therapy	Trauma-informed yoga that included core elements of Hatha yoga (60 min, 1 x per week for 10 weeks) (n=32)	Education classes (60 min, 1 x per week for 10 weeks) (n=32)	PTSD (CAPS), affect regulation and emotional control (IASC), trauma (DTS), and depression (BDI-II). <u>Assessment time-points:</u> pre-treatment, week 5 (DTS and BDI-II only) and week 10.
Mitchell 2014, US ¹⁸	RCT	38 patients were randomized (9 veterans; 29 civilians). Age: 44.4 years (SD 12.4) <u>Inclusion criteria:</u> Veteran or civilian women aged 18 to 65 years and assessed positive on the PTSD screen.	Trauma-sensitive yoga based on Kripalu, a form of Hatha yoga (75 min, 1 or 2 x per week for 12 or 6 weeks) (n=20; 9 1 x per week and 11 2 x per week)	Assessments-only (1 x per week for 12 weeks) in groups of five (n=18).	Demographic questionnaire (TLEQ), PTSD symptoms (PCL-C), depression symptoms (CES-D), and state and trait anxiety (STAI-I). <u>Assessment time points:</u>

Table A3: Characteristics of Included Clinical Studies

First Author, Publication Year, Country, Study Name	Study Design	Patient Characteristics	Intervention(s)	Comparator(s)	Clinical Outcomes
		<u>Exclusion criteria:</u> yoga participation within six months, substance dependence within three months, change in psychiatric medication, or suicide risk.			baseline, post-treatment and 1 month follow-up.
Dick 2014 ¹⁹ Secondary analysis of data from Mitchell 2014 ¹⁸	RCT	See Mitchell 2014 ¹⁸ (n=38).	See Mitchell 2014 ¹⁸ (n=20)	See Mitchell 2014 ¹⁸ (n=18)	PTSD symptoms (PSS-I), PTSD screening (PCL-C, emotion regulation questionnaire (ERQ-R & ERQ-S), awareness and attentiveness (MAAS), psychological flexibility (AAQ-II) <u>Assessment time points:</u> baseline, post-treatment and 1 month follow-up.
Reddy 2014 ²⁰ Secondary analysis of data from Mitchell 2014 ¹⁸	RCT	See Mitchell 2014 ¹⁸ (n=38).	See Mitchell 2014 ¹⁸ (n=20)	See Mitchell 2014 ¹⁸ (n=18)	Alcohol risk behaviours (AUDIT), substance use and dependence (DUDIT), symptom perception and management. <u>Assessment time points:</u> baseline, post-treatment and 1 month follow-up.
Substance Abuse					
Sureka 2015 ³²	RCT	111 patients were randomized Age: 39.3 years (SD 10.5) in the intervention group; 38.8 years (SD 8.3) in the control group.	Sudarshan Kriya and practices (SK&P) yoga that involves three sets of breathing techniques: 1. Vijjayi: 8 minutes of	Control group of patients who sat with their eyes closed and instructed to pay gentle attention to	Functioning (GAF), general well-being (PGWB), clinical interview (SCAN), and severity of dependence (SDS).

Table A3: Characteristics of Included Clinical Studies

First Author, Publication Year, Country, Study Name	Study Design	Patient Characteristics	Intervention(s)	Comparator(s)	Clinical Outcomes
		<p><u>Inclusion criteria:</u> Male patients aged 18 to 65 years old with a diagnosis of substance dependence (ICD-10). Patients were admitted to a de-addiction ward in a prison setting.</p> <p><u>Exclusion criteria:</u> psychiatric disorder other than substance dependence.</p>	<p>slow, deep breathing (4 to 6 breaths per minute); 2. Bhastrika: 5 minutes of forceful deep breathing (20 to 30 breaths per minute); 3. SK: 10 minutes of multiple rounds of slow, medium and fast respiratory cycles. (n=55) (1 x per day for six weeks)</p>	<p>their breath (n=56) (1 x per day for six weeks)</p>	<p><u>Assessment time points:</u> pre and post intervention.</p>
Zhuang 2013 ³³	RCT	<p>81 patients were randomized.</p> <p>Age: 28.5 years (SD 7.6) Duration of heroin use: 7.3 years (SD 5.8) Length of abstinence: 2.6 years (SD 0.7)</p> <p><u>Inclusion criteria:</u> Women receiving treatment at a residential drug-withdrawal rehabilitation centre for heroin dependence, experiencing no other conditions that would influence quality of life or impact participation in an exercise program, had been receiving treatment for at least 6 months, and had a sedentary lifestyle.</p>	<p>Yoga (10 minutes of breathing and stretching, 30 minutes of poses, ending with 10 minutes of meditation and breathing) (50 minutes, 1 x per day, 5 days per week for 6 weeks) + routine hospital care. A DVD and instruction manual was also given to patients to help with individual practice (n=41).</p>	<p>Routine hospital care (n=40).</p>	<p>Mood status (POMS) and quality of life (SF-36)</p> <p><u>Assessment time points:</u> pre-randomization, 3 months and 6 months.</p>

Table A3: Characteristics of Included Clinical Studies

First Author, Publication Year, Country, Study Name	Study Design	Patient Characteristics	Intervention(s)	Comparator(s)	Clinical Outcomes
Hallgren 2014 ³⁴	RCT	<p>18 patients were randomized.</p> <p><u>Inclusion criteria:</u> Adults ≥18 years with alcohol dependence receiving treatment at an outpatient clinic.</p> <p><u>Exclusion criteria:</u> presence of social problems, history of withdrawal symptoms or serious mental illness.</p>	Yoga (1.5 hours, 1 x per week for 10 weeks) involving breathing techniques, postures, and meditation and deep relaxation + treatment as usual. Patients were also provided with instructions to encourage continued practice at home.	Treatment as usual (psychotherapeutic + pharmacological interventions).	<p>Alcohol use, alcohol dependence (SADD), depression and anxiety (HADS), quality of life (SDS), stress (PSS).</p> <p><u>Assessment time points:</u> baseline and 6 months.</p>
GAD					
Katzman 2012 ²²	Open-label trial	<p>41 patients were enrolled.</p> <p>Age: 42.6 years (SD 13.3)</p> <p><u>Inclusion criteria:</u> Patients aged 18 to 65 years attending an outpatient tertiary care clinic for mood and anxiety disorders who had a primary diagnosis of GAD. Patients had to have received at least eight weeks of standard treatment including an anxiolytic, CGI-S score of 5 to 7, and HAM-A total score ≥20.</p> <p><u>Exclusion criteria:</u> patients with drug or alcohol abuse or dependence, history of any other psychiatric disorder, significant risk of suicide, or undergone changes to medication use within two weeks of screening.</p>	SKY course (22 hours of training over five or six days) involving postures, breathing techniques, meditation, and other strategies.	None.	<p>Anxiety (HAM-A), worrying (PSWQ), other anxiety measures (ASI, BAI), coping (CISS), depression (BDI), and other outcomes for perfectionism, social phobia, social anxiety, avoidance and tolerance of uncertainty.</p> <p><u>Assessment time points:</u> during the week prior to the intervention and at one month.</p>

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AAQ = Acceptance and Action Questionnaire; ASI = anxiety sensitivity index; AUDIT = Alcohol Use Disorder Identification Test; BAI = Beck Anxiety Inventory; BDI = Beck Depression Inventory; BSI = Brief Symptom Inventory; CAPS = Clinician Administered PTSD Scale; CES-D = Center for Epidemiological Studies-Depression Scale; CISS = coping inventory for stressful situations; DTS = Davidson Trauma Scale; DUDIT = Drug Use Disorder Identification Test; ERQ = Emotion Regulation Questionnaire; ESC = escitalopram; GAD = generalized anxiety disorder; GAF = Global Assessment of Functioning; HADS = Hospital Anxiety and Depression Scale; HDRS, HAMD-21 = Hamilton Depression Rating Scale; HRQOL = health related quality of life; MAAS = Mindful Attention Awareness Scale; MDD = major depressive disorder; MDE = major depressive episode; IASC = Inventory of Altered Self-Capacities; ICD = International Classification of Diseases; IDAS = Inventory of Depression and Anxiety Symptoms; PCL-C = PTSD Checklist-Civilian; PGWB = Psychological General Well Being; PHQ-9 = nine-item Patient Health Questionnaire; POMS = profile of mood states; PSS-10 = Perceived Stress Scale-10; PSWQ = Penn state worry questionnaire; PTSD = post-traumatic stress disorder; QXR = Quetiapine fumarate extended release; RCT = randomized controlled trial; RRS = Ruminative Responses Scale; SA = substance abuse; SADD = Short Alcohol Dependence Data; SCAN = Schedule for Clinical Assessment of Neuropsychiatry; SD = standard deviation; SDS = Severity of Dependence Scale; SDS = Sheehan Disability Scale; SF-36 = Medical Outcomes Study 36-Item Short-Form Health Survey; SK&P = Sudarshan Kriya and practices; STAI = State-Trait Anxiety Inventory; TLEQ = Trauma Life Events Questionnaire; UK = United Kingdom; US = United States.

^aDefined as either one symptom in each symptom cluster, or all symptoms in at least two symptom clusters.

Table A4: Characteristics of Included Guidelines

Guideline Document, Origin, Year	Intended Users and Target Population	Guideline Development Methodology
<p>Canadian clinical practice guidelines</p> <p>Canada</p> <p>Katzman et al. 2014⁴</p>	<p><u>Intended users:</u> Health care professionals involved in the diagnosis and treatment of mental disorders.</p> <p><u>Target population:</u> Individuals with panic disorder, agoraphobia, specific phobia, SAD, GAD, OCD and PTSD.</p> <p><u>Interventions considered:</u> Psychological treatment and pharmacotherapy.</p> <p><u>Outcomes considered:</u> Not stated.</p>	<p>Evidence collection, Selection and Synthesis: Literature review and expert consensus.</p> <p>Evidence Quality and Strength: Levels of evidence (1-4), and treatment recommendation summary (First-line, Second-line, Third-line, Not recommended) (Page 2)</p> <p>Recommendations development and evaluation: Preliminary recommendations with evidence were reviewed at initial meeting, draft guidelines prepared by sup-panels and circulated to the entire group.</p> <p>Guideline validation: The Canadian psychiatric community was consulted for feedback on the preliminary recommendations.</p>
<p>A revision of the 2005 British Association for Psychopharmacology guidelines</p> <p>England</p> <p>Baldwin et al. 2014³⁷</p>	<p><u>Intended users:</u> Physicians in primary, secondary and tertiary medical care settings.</p> <p><u>Target population:</u> Individuals with GAD, panic disorder, specific or simple phobia, SAD, PTSD, OCD.</p> <p><u>Interventions considered:</u> Pharmacological treatments.</p> <p><u>Outcomes considered:</u> Not stated.</p>	<p>Evidence collection, Selection and Synthesis: Consensus meeting, literature review and expert consensus.</p> <p>Evidence Quality and Strength: Levels of evidence (I-IV), and strength of recommendations (A-D, and S 'Standard of clinical care') (Page 405, Table 1)</p> <p>Recommendations development and evaluation: Draft consensus statement with evidence circulated to subgroup of experts for comment. Not all members approved the final recommendations.</p> <p>Guideline validation: Not stated.</p>
<p>VA/DoD Clinical Practice Guideline For Management of Post-Traumatic Stress</p> <p>US</p> <p>The Management of Post-Traumatic Stress Working Group, 2010³⁶</p>	<p><u>Intended users:</u> Healthcare professionals in any VA or DoD clinical setting treating or facilitating services for patients with PTSD.</p> <p><u>Target population:</u> Adult patients with PTSD who are treated in VA or DoD clinical settings.</p> <p><u>Interventions considered:</u> Pharmacological and psychotherapeutic interventions.</p> <p><u>Outcomes considered:</u> quality of life, morbidity and mortality, long-term outcomes, patient satisfaction, co-morbidity,</p>	<p>Evidence collection, Selection and Synthesis: Identification of guideline areas in need of updates, review of the literature and evidence.</p> <p>Evidence Quality and Strength: Level of evidence (I, II-1, II-2, II-3, III), Overall quality (Good, Fair, Poor), Net Effect of Intervention (Substantial, Moderate, Small, Zero or Negative) Evidence Rating System (Strength of Recommendation: A, B, C, D, I 'Insufficient evidence') (Page 203)</p> <p>Recommendations development and evaluation: Working group, additional group meetings and conference calls, approval by all members of the working group.</p> <p>Guideline validation: Guidelines were reviewed by clinical experts in the VHA and the DoD.</p>

Table A4: Characteristics of Included Guidelines

Guideline Document, Origin, Year	Intended Users and Target Population	Guideline Development Methodology
<p>Non-pharmaceutical management of depression in adults: A national clinical guideline</p> <p>Scotland</p> <p>Scottish Intercollegiate Guidelines Network, 2010³⁸</p>	<p>symptom improvement.</p> <p><u>Intended users:</u> Healthcare professionals in primary and secondary care, patients and caregivers, other relevant health care service organizations or professionals.</p> <p><u>Target population:</u> Patients with a formal diagnosis of depression (ICD9 or ICD10).</p> <p><u>Interventions considered:</u> Complementary and alternative treatments that are not routinely available within the NHS (page 8).</p> <p><u>Outcomes considered:</u> Depressive symptoms, as well as illness duration, relapse, quality of life and patient satisfaction (page 9).</p>	<p>Evidence collection, Selection and Synthesis: Selection of topics, systematic literature review, and assessing quality of the evidence</p> <p>Evidence Quality and Strength: Levels of evidence (1++, 1+, 1-, 2++, 2+, 2-, 3, 4), Grades of Recommendation (A, B, C, D, Good Practice Point)</p> <p>Recommendations development and evaluation: Open meetings were used to discuss draft recommendations. Recommendations are posted online and open for feedback from stakeholders.</p> <p>Guideline validation: Peer review by independent experts. Guidelines are also reviewed by patient representatives.</p>
<p>CANMAT Clinical guidelines for the management of major depressive disorder in adults</p> <p>Canada</p> <p>Ravindran et al. 2009³⁵</p>	<p><u>Intended users:</u> Mental health professionals.</p> <p><u>Target population:</u> Adults with unipolar major depressive disorder</p> <p><u>Interventions considered:</u> Complementary and alternative medicine treatments</p> <p><u>Outcomes considered:</u> Not stated.</p>	<p>Evidence collection, Selection and Synthesis: Working committee identified a list of questions, systematic literature search, grading of evidence.</p> <p>Evidence Quality and Strength: Level of evidence (1-4), line of treatment (First-line, second-line, third-line).</p> <p>Recommendations development and evaluation: Drafts of the guidelines were circulated to members, external content experts reviewed later drafts, and final guidelines were approved by all members.</p> <p>Guideline validation: Reviewed by external content experts.</p>

CANMAT = Canadian Network for Mood and Anxiety Treatments; DoD = Department of Defense; GAD = generalized anxiety disorder; NHS = National Health Service; OCD = obsessive compulsive disorder; ICD = International Classification of Diseases; PTSD = post-traumatic stress disorder; SAD = social anxiety disorder; UK = United Kingdom; US = United States; VHA = Veterans Health Administration; VA = veterans affairs

APPENDIX 3: CRITICAL APPRAISAL OF INCLUDED PUBLICATIONS

Table A5: Strengths and Limitations of Systematic Reviews and Meta-Analyses using AMSTAR¹²	
Strengths	Limitations
Cramer 2013²³	
<ul style="list-style-type: none"> • Explicitly stated objective and inclusion and exclusion criteria. • Comprehensive literature search including grey literature with duplicate study selection and data extraction. • The characteristics and quality of the studies were assessed and documented. • Results were summarized according to levels of evidence (strong, moderate, limited, conflicting, none) based on study type, quality and consistency of evidence. 	<ul style="list-style-type: none"> • Number of studies to assess subgroups of interest was either two or three in each subgroup. • High level of heterogeneity between studies (populations and interventions) ($I^2 = 86\%$, 0%, and 68%).
Gong 2015²⁴	
<ul style="list-style-type: none"> • Explicitly stated objective and inclusion and exclusion criteria. • Duplicate data extraction and quality assessment. • The characteristics and quality of the studies were assessed and documented. • Strength of the findings was discussed in the context of the quality of the included trials. 	<ul style="list-style-type: none"> • No mention if duplicate study selection took place. • Number of studies to assess subgroups of interest was between two and four in each subgroup. • No grey literature search. • High level of heterogeneity between studies ($I^2 = 60\%$).
Pilkington 2005²⁵	
<ul style="list-style-type: none"> • Explicitly stated objective and inclusion and exclusion criteria. • Comprehensive literature search including grey literature. • Data extraction and appraisal were conducted by two independent reviewers. • The characteristics and quality of the studies were assessed and documented. 	<ul style="list-style-type: none"> • No quantitative summary of the results from the included studies was conducted. • High level of heterogeneity between studies (populations and interventions).
Balasubramaniam 2013²⁶	
<ul style="list-style-type: none"> • Explicitly stated objective and inclusion and exclusion criteria. • The characteristics and quality of the studies were assessed and documented. • The strength of the findings was discussed in the context of the quality of the included trials. 	<ul style="list-style-type: none"> • A search of the grey literature was not conducted. • It was not explicitly stated if study selection, data extraction and quality appraisal was completed in duplicate by two independent reviewers. • Number of studies was small especially for each variation of yoga (one study for laughter yoga, one study for SKY yoga, one study for Iyengar yoga, and one study did not specify the type of yoga). • Authors stated that there was a high level of heterogeneity between studies (populations and interventions). • No quantitative summary of the results from the included studies was conducted.
da Silva 2009¹⁵	
<ul style="list-style-type: none"> • The characteristics and quality of the studies were assessed and documented. • The strength of the findings was discussed in the context of the quality of the included trials. 	<ul style="list-style-type: none"> • Inclusion and exclusion criteria were not explicitly stated. • A search of the grey literature was not conducted. • It was not explicitly stated if study selection, data

	<p>extraction and quality appraisal was completed in duplicate by two independent reviewers.</p> <ul style="list-style-type: none"> • Authors stated that there was a high level of heterogeneity between studies (diagnoses and interventions). • No quantitative summary of the results from the included studies was conducted.
Arias 2006¹⁶	
<ul style="list-style-type: none"> • Explicitly stated objective and inclusion and exclusion criteria. • The characteristics and quality of the studies were assessed and documented. • The strength of the findings was discussed in the context of the quality of the included trials. • Studies that met a quality score >0.65 using the Reisch scale were included. Quality ratings were performed independently by two raters. 	<ul style="list-style-type: none"> • A search of the grey literature was not conducted. • Study selection was completed by a single reviewer. • Arbitrary cut-off for inclusion based on study quality. • Authors stated that there was a high level of heterogeneity between studies (diagnoses and interventions). • No quantitative summary of the results from the included studies was conducted.

Table A6: Strengths and Limitations of Randomized Controlled Trials using Downs and Black¹³

Strengths	Limitations
Buttner 2015²⁸	
<ul style="list-style-type: none"> • 1:1 block randomization (8 participants in each block to ensure allocation concealment). • Blinded assessor for compliance and outcomes. • A separate analysis of the impact of missing data did not change the treatment effect. • The primary outcome measure (HDRS) is a validated outcome measure for depression severity. • Results were based on an ITT analysis. 	<ul style="list-style-type: none"> • Blinding of patients was not possible. • Yoga classes were taught by the primary investigator. • No harms outcomes were reported. • Source population was not explicitly stated.
Sarubin 2014³⁰	
<ul style="list-style-type: none"> • Authors stated that a pre-defined randomization plan was used. • Baseline characteristics were similar between the intervention and control groups. • The primary outcome measure (HDRS) is a validated outcome measure for depression severity. 	<ul style="list-style-type: none"> • Randomization methods or methods for ensuring allocation concealment were not provided. • No details of the Hatha-yoga intervention were presented. • No harms outcomes were reported. • No blinding of patients or assessors. • Level of patient compliance with the intervention was unknown. • There were a greater number of patients who dropped out of the study in the QXR+/-yoga group compared to the ESC+/-yoga group.
Kinser 2013,²⁹ Kinser 2014³¹	
<ul style="list-style-type: none"> • Used random number generator for the randomization procedure. • Adherence to treatment was measured and was similar between the intervention and control group. 	<ul style="list-style-type: none"> • Methods for allocation concealment were not described. • It was not stated if the assessor was blinded to the patients' treatment allocation. • There were a greater number of patients who

Table A6: Strengths and Limitations of Randomized Controlled Trials using Downs and Black¹³

Strengths	Limitations
<ul style="list-style-type: none"> Adverse events (suicidality) were monitored using the PHQ-9. 	<ul style="list-style-type: none"> dropped out of the study in the attention-control group compared to the yoga intervention group. Recruitment was based on a volunteer participation which may result in systematic differences from the source population. Small sample size and disproportionate numbers retained in the yoga intervention group compared to the control group (n=7 and n=2 respectively) for the 52-week follow-up study.³¹
van der Kolk 2014 ¹⁷	
<ul style="list-style-type: none"> Results were based on an ITT analysis. There were no differences in the characteristics of patients who dropped out (n=6%) of the study and those that completed the study. Assessors were trained and blind to treatment arm. 	<ul style="list-style-type: none"> Source population was not explicitly stated. No details of the randomization methods or methods for ensuring allocation concealment were provided. Level of patient compliance with the intervention was unknown. No harms outcomes were reported.
Mitchell 2014, ¹⁸ Dick 2014, ¹⁹ Reddy 2014 ²⁰	
<ul style="list-style-type: none"> Used random number generator for the randomization procedure. Results were based on an ITT analysis. No adverse events were reported. 	<ul style="list-style-type: none"> Source population was unclear. Methods for allocation concealment were not described. Blinding of patients and assessors did not occur. Primary outcome was not stated. Non-completers had higher baseline PTSD symptom scores. Study not sufficiently powered (<10% power) to detect differences in outcomes.
Sureka 2015 ⁶¹	
<ul style="list-style-type: none"> 1:1 randomization of patients to intervention and control group by an investigator not involved in treatment or assessment. Authors reported that patient compliance to the intervention was high. 	<ul style="list-style-type: none"> Blinding of patients was not possible. Methods for allocation concealment were not described. The primary outcome was not stated. Results are not compared between groups according to change from pre to post intervention. No harms outcomes were reported.
Zhuang 2013 ³³	
<ul style="list-style-type: none"> 1:1 block randomization using a computer generated randomization schedule. Group allocation was concealed using opaque envelopes and distributed by a research assistant who did not participate in recruitment. Outcome assessor was blind to patient group allocation. Likely that compliance to intervention was high. 	<ul style="list-style-type: none"> Blinding of patients was not possible. Possible contamination between intervention and control groups due to treatment setting (residential hospital). The primary outcome was not stated. No harms outcomes were reported.
Hallgren 2014 ³⁴	
<ul style="list-style-type: none"> A random number generator was used to perform randomization. 	<ul style="list-style-type: none"> Blinding of patients was not possible. Methods for allocation concealment were not

Table A6: Strengths and Limitations of Randomized Controlled Trials using Downs and Black¹³

Strengths	Limitations
<ul style="list-style-type: none"> Primary outcome measure was stated as the level of alcohol consumption. 	<p>described.</p> <ul style="list-style-type: none"> 14/18 (78%) patients remained in the study throughout the treatment period. Patients in the yoga intervention group had a higher baseline level of alcohol use compared to the control group. No power calculations performed; study likely underpowered to detect differences between treatment groups. No mention of patient or assessor blinding. No harms outcomes reported.
Katzman 2012 ²²	
<ul style="list-style-type: none"> Primary outcome measures (HAM-A) is a valid measure for assessing anxiety. Assessments were administered by trained individuals. Results were based on an ITT analysis. 	<ul style="list-style-type: none"> No randomization or comparison group. No blinding of patients or assessors. 31/41 (76%) patients completed the study. Level of patient compliance was unknown.

HAM-A = Hamilton depression rating scale for anxiety; HDRS = Hamilton Depression Rating Scale; ESC = escitalopram; ITT = intention to treat; PHQ-9 = nine-item Patient Health Questionnaire; PTSD = post-traumatic stress disorder; QXR = Quetiapine fumarate extended release

Table A7: Strengths and Limitations of Guidelines using AGREE II¹⁴

Strengths	Limitations
Katzman 2014, ⁴ Canadian clinical practice guidelines	
<ul style="list-style-type: none"> Explicitly stated scope and purpose. Guideline development involved ten psychiatrists, seven psychologists and consultation with the Canadian psychiatric community. Systematic methods used to search for the relevant literature. Recommendations were explicit and in combination with the supporting evidence. Recommendations drafted and reviewed internally and externally. 	<ul style="list-style-type: none"> Did not state if the preferences of the target population were sought. Methods for selecting the relevant literature were not described. No discussion about the application of the recommendations in clinical practice
Baldwin 2014, ³⁷ A revision of the 2005 British Association for Psychopharmacology guidelines	
<ul style="list-style-type: none"> Explicitly stated scope and purpose. The preferences of the target population were sought. Recommendations were explicit and in combination with the supporting evidence. Health risks were considered in formulating recommendations. 	<ul style="list-style-type: none"> The search for the evidence was done non-systematically and the criterion for selecting the evidence was not described. Consensus on recommendations by all working group members was not required. No discussion about the application of the recommendations in clinical practice. The details of potential conflicts of interest were not described.
The Management of Post-Traumatic Stress Working Group 2010, ³⁶ VA/DoD Clinical Practice Guideline For Management of PTSD	
<ul style="list-style-type: none"> Explicitly stated scope and purpose. Wide range of stakeholder involvement. Details of the guideline development process including literature search, selection of 	<ul style="list-style-type: none"> Did not state if the preferences of the target population were sought. Editorial independence was unclear.

Table A7: Strengths and Limitations of Guidelines using AGREE II¹⁴

Strengths	Limitations
evidence, and formulation of recommendations were explicit. <ul style="list-style-type: none"> • Systematic search of the literature. • Treatment algorithms were provided. 	
Scottish Intercollegiate Guidelines Network 2010, ³⁸ Non-pharmaceutical management of depression in adults: A national clinical guideline	
<ul style="list-style-type: none"> • Explicitly stated scope and purpose. • Wide range of stakeholder involvement including the preferences of the target population. • Details of the guideline development process including literature search, selection of evidence, and formulation of recommendations were explicit. • Systematic search of the literature. • Implementation strategies were described. • Funding and competing interests were documented and polices were available for their handling. 	
Ravindran 2009, ³⁵ CANMAT Clinical guidelines for the management of MDD in adults	
<ul style="list-style-type: none"> • Explicitly stated scope and purpose. • Systematic search of the literature. • Consensus on recommendations was required by all working group members. • No external support requested or received; conflicts of interest disclosed. • Conflicts of interest and funding sources were disclosed. 	<ul style="list-style-type: none"> • Did not state if the preferences of the target population were sought. • No discussion about the application of the recommendations in clinical practice.

CANMAT = Canadian Network for Mood and Anxiety Treatments; DoD = Department of Defense; PTSD = post-traumatic stress disorder; VA = veterans affairs

APPENDIX 4: MAIN STUDY FINDINGS AND AUTHOR’S CONCLUSIONS

Table A8: Summary of Findings of Included Studies		
Author, Year	Main Study Findings	Author’s Conclusions
Systematic Reviews and Meta-analyses		
Cramer, 2013 ²³	<p>Depression severity</p> <ul style="list-style-type: none"> • Yoga vs. usual care (+) <ul style="list-style-type: none"> ○ moderate evidence; SMD -0.69 (95% CI -0.99 to -0.39); Considerable heterogeneity • Yoga vs. relaxation (+) <ul style="list-style-type: none"> ○ Limited evidence; SMD -0.62 (95% CI -1.03 to -0.22); No heterogeneity • Yoga vs. aerobic exercise (+) <ul style="list-style-type: none"> ○ Limited evidence; SMD -0.59 (95% CI -0.99 to -0.18); Substantial heterogeneity <p>Remission rates</p> <p><i>Short term:</i></p> <ul style="list-style-type: none"> • Yoga vs. usual care: more patients free from depression in the yoga group (+) • Yoga vs. pharmacological treatment and ECT: no significant differences • Yoga vs. relaxation: significantly favoring Yoga (+) <p><i>Long term:</i></p> <ul style="list-style-type: none"> • Yoga vs. usual care: more patients free from depression in the yoga group (+) • Yoga vs. group therapy: no significant differences <p>Anxiety</p> <ul style="list-style-type: none"> • Yoga vs. usual care (neutral) <ul style="list-style-type: none"> • No evidence; SMD -0.59 (95% CI -0.99 to -0.18); Considerable heterogeneity • Yoga vs. relaxation (+) <ul style="list-style-type: none"> • Limited evidence; SMD -0.79 (95% CI -1.3 to -0.26); Low heterogeneity <p><i>Short term & Long-term</i></p> <ul style="list-style-type: none"> • Yoga vs. massage; Yoga vs. social support groups: no significant differences <p>Quality of life</p>	<p>Overall, there were statistically significant improvements for the yoga intervention group for depression severity and remission rates versus usual care, depression severity, remission rates, anxiety and quality of life compared to relaxation, and statistically significant improvements in depression severity compared to aerobic exercise. Compared to pharmacological treatment and ECT, massage, and social support, there were no statistically significant differences in changes to depression severity, remission rates, and anxiety respectively.</p> <p>Results were the same regardless of patients being defined as having depressive disorder or having elevated levels of depression except when comparing yoga to usual care in patients with depressive disorder.</p> <p>When analysis were divided into type of yoga intervention, results were statistically significant for meditation-based yoga interventions when comparing yoga to relaxation for depression and anxiety. No statistically significant differences were found for complex yoga interventions or exercise-based yoga interventions compared to usual care.</p> <p>There was a high risk of bias in the included studies. No study had adequate allocation concealment. High amount of heterogeneity.</p>

Table A8: Summary of Findings of Included Studies

Author, Year	Main Study Findings	Author's Conclusions
Gong, 2015 ²⁴	<p>Yoga vs. relaxation: more patients with 50% improvement in mental QOL in the yoga group (+)</p> <ul style="list-style-type: none"> The quality of the included studies was poor and there was significant heterogeneity ($I^2 = 60\%$) Overall, there were statistically significant improvements in depression scores for the yoga groups compared to control groups (SMD = -0.59, 95% CI -0.94, -0.25). Results were also statistically significant for the yoga intervention groups compared to controls for studies that only included women who were prenatally depressed (SMD -0.46; 95% CI -0.90, -0.03). Three studies assessed the effects of exercise-based yoga versus control on depression scores, and there were no statistically significant differences between groups in these studies (SMD -0.41; 95% CI -1.10, 0.18) Three studies assessed the effects of integrated yoga versus control on depression scores, and there were statistically significant differences for integrated yoga (SMD -0.79, 95% CI -1.07, -0.51), however only one of the three studies included women with prenatal depression. 	<p>Yoga is effective in reducing depressive symptoms in pregnant women. Women with a diagnosis of prenatal depression and those without a diagnosis both benefit. The integrated yoga appears to be more effective than exercise-based yoga for decreasing depression scores.</p>
Pilkington, 2005 ²⁵	<ul style="list-style-type: none"> Broota and Dhir: Broota's relaxation technique: four exercises adapted from yoga: there was a statistically significantly greater reduction in symptoms for the yoga-based group vs. the progressive relaxation group. Sudarshan Kriya Yoga (SKY): three specified rhythms of breathing: there were significant reductions in symptoms for yoga group and comparators (ECT and imipramine). No significant differences between full and partial (no cyclical breathing) SKY. Shavasana Yoga: rhythmic breathing and relaxation (30 min/day, 30 days): patients experienced statistically significant differences versus no intervention. Iyengar Yoga: poses and postures 60 min in the morning 2x/week, 5 weeks: patients in the intervention group experienced a statistically significant decrease in symptoms. These effects were not seen in the control group. 	<p>There may be benefits of yoga on depressive disorders, but it is difficult to ascertain what components of the yoga programs had the effects because of the variety among programs. The generalizability of the programs and results of the included studies is limited because the documentation of trial methodology was sparse (e.g. levels of compliance and attrition rates), and the population included in the trials was typically young and fit.</p>

Table A8: Summary of Findings of Included Studies

Author, Year	Main Study Findings	Author's Conclusions
Balasubramaniam, 2012 ²⁶	<ul style="list-style-type: none"> • Trial quality was low. • Laughter yoga (10 sessions of yoga, breathing and stretching): Statistically significant improvements in depression scores; no statistically significant difference compared to exercise therapy. • Yoga (30 min weekly for a total of 7 hours involving postures, relaxation, and breathing exercises): Statistically significant decrease in depression scores for the yoga group versus the Ayurveda group. • Sudarshan Kriya Yoga (SKY) (three breathing patterns for two weeks): significant reductions in symptoms for yoga group compared to controls. • Iyengar Yoga (yoga postures, 1 hour per week for 5 weeks): Statistically significant decreases in symptoms in the intervention group. 	<p>There is Grade B (4 low-quality RCTs) evidence for yoga in the acute treatment depression. Evidence is emerging to support yoga for treating depression. No adverse events were reported but it is often unclear how they were documented.</p>
da Silva 2009 ¹⁵	<ul style="list-style-type: none"> • Major depression and Dysthymia <ul style="list-style-type: none"> • Nine RCTs, six open trials and one case series suggest that yoga is beneficial as a monotherapy (SKY, Hatha yoga) or as an adjunct treatment to antidepressant therapy (Iyengar yoga, Hatha yoga) in reducing symptoms of depression and anxiety. Other types of yoga such as Shavasana yoga, Vinyasa yoga, Sahaj yoga have evidence for effectiveness, but are supported by a much smaller evidence-base. • Three open trials suggest that SKY (as monotherapy) and Hatha yoga (as monotherapy and as an adjunct to antidepressants) are effective for improving symptoms of dysthymia. • Anxiety disorders <ul style="list-style-type: none"> • There was limited data available for assessing the efficacy of yoga for treating GAD. One open trial using the postural components of Hatha yoga as a monotherapy or in combination with medication significantly improved anxiety and depressive symptoms in patients with GAD or panic disorder over the short term and long term (3 year follow-up). • PTSD 	<p>There is level 2 evidence (≥ 1 double-blind RCT), for the use of Yoga as a second-line treatment (monotherapy or in combination with antidepressants) in patients with mild to moderate major depression. In patients with severe depression, Yoga is recommended as a third-line treatment (as an adjunct therapy). In patients with dysthymia, there is level 2 evidence for the use of Yoga as a monotherapy or adjunctive therapy depending on patient preference.</p> <p>There was no evidence level provided for the use of Yoga for GAD. The variability in the populations and intervention types in studies for anxiety make it difficult to apply results clinically.</p> <p>There is level 3 evidence (prospective uncontrolled trial with ≥ 10 patients) for the use of yoga (as a monotherapy or in combination with medication) in treating patients with PTSD.</p>

Table A8: Summary of Findings of Included Studies

Author, Year	Main Study Findings	Author's Conclusions
	<ul style="list-style-type: none"> A set of four open pilot trials (three involving Iyengar yoga) assessed yoga as an adjunct to antidepressant treatment in a sample of Vietnam War veterans with PTSD and found significant improvements in depression and PTSD symptoms, but no significant differences in anxiety. In the fourth study, Yoga (type was not specified) combined with qi gong had significant improvements in outcomes compared to qi gong alone. 	
Arias 2006 ¹⁶	<ul style="list-style-type: none"> Two studies were included that assessed the use of Yoga for treating depression. <ul style="list-style-type: none"> Sudarshan Kriya Yoga (SKY) without the meditation component was found to offer significant clinical improvement for patients with major melancholic depression. Comparator groups, imipramine and ECT also offered significant clinical improvements. ECT was superior to imipramine and SKY. Shavasana Yoga was found to offer significant improvement compared to the control group for patients with severe depression. Results were suggestive of clinically significant changes. One study was included that assessed the use of Hatha yoga for treating opiate dependence. Hatha yoga as an adjunct to methadone treatment was not superior to methadone treatment alone, but both groups had improved outcomes. Acceptance and generalizability concerns associated with the yoga therapy were noted. 	<p>There is supportive evidence for the use of SKY (without meditation), Shavasana yoga and hatha yoga as an adjunct treatment for depression (SKY, Shavasana yoga) and opiate dependence (Hatha yoga, with methadone treatment).</p> <p>There is no data available to comment on the use of Yoga in the treatment of generalized anxiety disorder.</p>
RCTs		
Buttner 2015 ²⁸	<ul style="list-style-type: none"> There was a statistically significant steeper decline in depressive symptoms for the yoga intervention group compared to wait-list control group ($t=-2.94$, $p=0.005$). There were statistically significant steeper improvements for the yoga group compared to the wait-list control group on several all components of the IDAS scale ($p<0.005$ for IDAS general depression; $p<0.05$ for IDAS traumatic intrusions, IDAS social anxiety and IDAS well-being) except for IDAS panic scale ($t=-$ 	<p>This study provides evidence for the short-term efficacy of an eight week yoga intervention for improving depressive symptoms, anxiety and quality of life for women with postpartum depression. The long-term effects of this yoga intervention are unknown.</p>

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Author, Year	Main Study Findings	Author's Conclusions
	<p>1.11, $p=0.272$)</p> <ul style="list-style-type: none"> There were steeper increases in health related quality of life for the yoga intervention group compared to the wait-list control group ($t=5.09$, $p<0.001$). 	
Sarubin 2014 ³⁰	<ul style="list-style-type: none"> 59% of patients in the QXR/ESC + Yoga group were responders; 58% in the QXR/ESC group were responders. There were no significant differences in the ratio of responders to non-responders between the two groups ($p=0.862$). There was a statistically significant improvement in depressive symptoms over time in both groups ($p<0.001$). 	There was no evidence to suggest that Hatha-yoga as an add-on to pharmacological treatment results in statistically significant improvements in depressive symptoms for inpatients with MDD.
Kinser 2013 ²⁹	<ul style="list-style-type: none"> 80% of patients in the intervention group completed treatment; 50% of patients in the control group completed treatment. Depression scores decreased over time ($p<0.05$), however there were no statistically significant differences in depression scores between the intervention and control group. There was a trend towards decreased rumination scores (defined as $p<0.1$) in the intervention group compared to the control group. There were no statistically significant differences in anxiety, stress, and interpersonal sensitivity/hostility between the intervention and control group at 8 weeks. 	This study provides evidence for the acceptability and feasibility of a yoga program for a community based 8 week yoga program for women with MDD. The results are suggestive of greater improvements in rumination in the yoga group, a possible mechanism for improvements in depression that deserves further study.
Kinser 2014 ³¹	<ul style="list-style-type: none"> Nine out of 27 patients were available for long-term follow-up at week 52. There was a statistically significant greater decrease in depression scores and rumination for the yoga intervention group compared to the control group ($p=0.0017$; $p=0.0172$). There were no statistically significant differences in anxiety, stress, and interpersonal sensitivity/hostility between the intervention and control group at 52 weeks. 	Yoga practice (even minimal participation) may offer benefits to patients with MDD by improving depression, ruminations, stress, anxiety and HRQOL.
van der Kolk 2014 ¹⁷	<ul style="list-style-type: none"> The yoga intervention group experienced a statistically significantly greater decrease in CAPS severity compared to the control group from pre to post-treatment (group x time interaction $\beta=-14.74$; effect size = -0.41). 	<p>Study demonstrated that women with PTSD may benefit from a yoga program.</p> <p>Results suggest a more sustained response with yoga compared to the supportive therapy.</p>

Table A8: Summary of Findings of Included Studies

Author, Year	Main Study Findings	Author's Conclusions
Mitchell 2014 ¹⁸	<ul style="list-style-type: none"> • Significant decreases in PCL scores for both the intervention and control groups, but no statistically significant group effect ($\beta=-0.03$, $p=0.591$). • Between-group effect sizes were small to medium, ranging between 0.08 (hyper-arousal) and 0.31 (re-experiencing) for PCL scores. • No statistically significant decreases in CES-D scores for either the intervention or control groups. The between group effect size for CES-D was small (0.15). • There were statistically significant decreases in STAI-S scores, but no group effect ($\beta=0.01$, $p=0.727$). The between group effect size for STAI-S was small (0.12). • There were statistically significant decreases in STAI-T scores, but no group effect ($\beta=0.01$, $p=0.704$). The between group effect size for STAI-T was small (0.10). 	<p>There were clinically significant decreases in PTSD symptoms (PCL score change 10-20) in the yoga intervention and assessment control groups during the course of the study.</p> <p>There were no between group differences in PTSD symptoms, depression scores or state and trait anxiety.</p>
Dick 2014 ¹⁹	<ul style="list-style-type: none"> • There were improvements in levels of mindfulness during the study period, but no statistically significant differences between the intervention and control groups ($p=0.73$). • There were statistically significant improvements in psychological flexibility over time ($p=0.001$), but no statistically significant differences between the intervention and control groups. • There were statistically significant decreases in expressive suppression during the treatment period, with the yoga intervention group experiencing statistically significant improvements compared to the control group. • There were no statistically significant changes over time or between groups for reappraisal scores ($p=0.99$; $p=0.35$). • There was a statically significant association between PTSD symptoms and measures of psychological flexibility for the yoga group. There were no statistically significant associations between PTSD symptoms and the measured outcomes (MAAS,AAQ-II,ERQ-S/R) in the control group. 	<p>The improvements in psychological flexibility in the control group and not the yoga intervention group suggest the need for improvements in measurement sensitivity.</p> <p>Future interventions may want to target expressive suppression and psychological flexibility given the significant improvements in the yoga group for expressive suppression, and the significant association between psychological flexibility and PTSD symptoms.</p>

Table A8: Summary of Findings of Included Studies

Author, Year	Main Study Findings	Author's Conclusions
Reddy 2014 ²⁰	<ul style="list-style-type: none"> • There was a numerical decrease in AUDIT and DUDIT scores in the yoga intervention group and a numerical increase in scores in the assessment control group. • There was no statistically significant difference in change in AUDIT ($\beta=0.0057$, $p=0.59$) or DUDIT ($\beta=0.0004$, $p=0.95$) scores between the yoga intervention group and the assessment control group over time. • 69% of patients in the yoga intervention group reported noticing their PTSD symptoms less; 18% of patients in the assessment control group reported noticing their PTSD symptoms less. • 92% of patients in the yoga intervention group being able to handle their PTSD symptoms better; 9% of patients in the assessment control group reported being able to handle their PTSD symptoms better. 	The findings suggest that the yoga intervention may be beneficial in decreasing alcohol and drug use risk compared to an assessment-only intervention; however this finding was not statistically significant.
Sureka 2015 ³²	<ul style="list-style-type: none"> • There were statistically significant differences in GAF scores, and the anxiety, positive well-being, general health and total score of the PGWB scale at post intervention for the SK&P group compared to the control group. • There were no statistically significant differences between post interventions scores for the SK&P group compared to the control group for depressed mood, self-control or vitality (PGWB subdomains). 	In the prison hospital setting, SK&P yoga appears to improve general well-being and anxiety in male patients with substance abuse.
Hallgren 2014 ³⁴	<ul style="list-style-type: none"> • Patients in the yoga intervention group had a higher baseline level of drinking compared to the control group. • There was a larger numerical decrease in alcohol consumption in the intervention group compared to the control group. There were no statistically significant differences between the two groups on any of the measured outcomes (alcohol use, alcohol dependence, depression and anxiety, quality of life, or stress). 	The authors conclude that yoga is a feasible adjunct treatment for treating alcohol dependence. There were positive, non-significant changes in the alcohol consumption at six month follow-up.
Zhuang 2013 ³³	<ul style="list-style-type: none"> • There was a statistically significant improvement in all mood states over the 6 month intervention period for the yoga intervention group ($p<0.01$). There was also a statistically significant group by time interaction effect ($p<0.01$). • There was a statistically significant improvement in all subscales of the SF-36 over the 6 month intervention period for the yoga 	Patients in the yoga intervention group experienced statistically significant improvements in quality of life and mood states after 6 months of yoga treatment. Yoga may be beneficial as an adjunct treatment for women undergoing outpatient detoxification treatment for heroin

Table A8: Summary of Findings of Included Studies

Author, Year	Main Study Findings	Author's Conclusions
	intervention group ($p < 0.01$). There was also a statistically significant group by time interaction effect ($p < 0.01$).	dependence.
Katzman 2012 ²²	<ul style="list-style-type: none"> • There were statistically significant improvements in HAM-A total score after completion of the SKY course ($p < 0.01$). There was also evidence of improvement in anxiety as measured by the ASI ($p < 0.01$), worry as measured by the PSWQ ($p < 0.01$), and in emotion-oriented coping ($p < 0.02$). • The response rate was 73% and the remission rate was 41% after completion of the yoga course. 	The 22-hour SKY training course was effective in reducing anxiety in patients with GAD in an outpatient setting who had not previously achieved remission with CBT, mindfulness based training and anxiolytic medication.

AAQ = Acceptance and Action Questionnaire; ASI = anxiety sensitivity index; AUDIT = Alcohol Use Disorder Identification Test; CAPS = Clinician Administered PTSD Scale; CBT = Cognitive behavioural therapy; CES-D = Center for Epidemiological Studies-Depression Scale; CI = confidence interval; DUDIT = Drug Use Disorder Identification Test; ECT = electroconvulsive therapy; ERQ = Emotion Regulation Questionnaire; ESC = escitalopram; GAD = generalized anxiety disorder; GAF = Global Assessment of Functioning; HAM-A = Hamilton depression rating scale for anxiety; HRQOL = health related quality of life; IDAS = Inventory of Depression and Anxiety Symptoms; MAAS = Mindful Attention Awareness Scale; MDD = major depressive disorder; PCL = PTSD Checklist; PGWB = Psychological General Well Being; PTSD = post-traumatic stress disorder; RCT = randomized controlled trial; SK&P = Sudarshan Kriya and practices; SKY = Sudarshan Kriya Yoga; SMD = standardized mean difference; STAI = State-Trait Anxiety Inventory; QOL = quality of life; QXR = Quetiapine fumarate extended release.

Table A9: Summary of Findings of Included Studies

Main Study Findings	Author's Conclusions
Katzman et al. 2014 ⁴ , Canadian clinical practice guidelines	
<ul style="list-style-type: none"> One open-label study found that yoga-based treatments may be valuable in patients with GAD (Level 3 evidence: uncontrolled trial with ≥ 10 patients). 	<ul style="list-style-type: none"> "These therapies may be useful for some patients; however, more data are needed...Alternative therapies:...Open-label studies suggest that adjunctive meditation and yoga-based treatments may be useful in patients with GAD (Level 3)" (pages 25 and 26)
Baldwin, 2014 ³⁷ , A revision of the 2005 British Association for Psychopharmacology guidelines	
<ul style="list-style-type: none"> One non-experimental study found that a yoga-based breathing programme offered benefits to patients with GAD. 	<ul style="list-style-type: none"> Not enough evidence to provide a recommendation.
The Management of Post-Traumatic Stress Working Group, 2010 ³⁶ , VA/DoD Clinical Practice Guideline For Management of PTSD	
<ul style="list-style-type: none"> The acceptance of CAM therapies has increased over the past 10 years, however the evidence base is still lacking. No RCTs supporting the use of yoga as a treatment for PTSD were found. 	<ul style="list-style-type: none"> "CAM approaches that facilitate a relaxation response (e.g. mindfulness, yoga, acupuncture, massage, and others) may be considered for adjunctive treatment of hyperarousal symptoms, although there is no evidence that these are more effective than standard stress inoculation techniques. [I]" (page 180)
SIGN, 2010 ³⁸ , Non-pharmaceutical management of depression in adults: A national clinical guideline	
<ul style="list-style-type: none"> One systematic review that included five RCTs found that treatment with yoga (various forms) resulted in improvements in depressive symptoms. Interpretation of these results was difficult due to poor reporting of trial methodology, patient characteristics, and the differences in outcome measures used. 	<ul style="list-style-type: none"> Not enough evidence to provide a recommendation.
Ravindran, 2009 ³⁵ , CANMAT Clinical guidelines for the management of MDD in adults	
<ul style="list-style-type: none"> Systematic reviews, RCTs, and open trials have been published, however trial quality is poor. It is difficult to differentiate the effects of group-based therapy from the yoga practice itself. 	<ul style="list-style-type: none"> "yoga may be considered a second-line adjunctive treatment in mild to moderate MDD, if available." (page S57)

CANMAT = Canadian Network for Mood and Anxiety Treatments; CAM = complementary and alternative medicine; DoD = Department of Defense; GAD = generalized anxiety disorder; MDD = major depressive disorder; RCT = randomized controlled trial; SIGN = Scottish Intercollegiate Guidelines Network; VA = veterans affairs.

APPENDIX 5: ADDITIONAL REFERENCES OF POTENTIAL INTEREST

Evidence Map

1. Coeytaux RR, McDuffie J, Goode A, Cassel S, Porter WD, Sharma P, et al. Evidence map of yoga for high-impact conditions affecting veterans [Internet]. Washington (DC): Department of Veterans Affairs (US); 2014 Aug. [cited 2015 Jun 2]. (VA Evidence-based Synthesis Program Reports). Available from: <http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0068332/pdf/TOC.pdf>