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Abstract

Depression is one of the most prevalent mental health conditions worldwide. Despite continual advances in the fields of psychiatry and psychology, hundreds of millions of individuals continue to suffer due to ineffective treatment, adverse effects, lack of access to care, and the relapsing nature of the disease. Depression extends beyond the affected individual and burdens families, healthcare systems, and societies. Yoga is a mind-body modality, growing in popularity, that has been cited in the literature as a promising treatment for depression. The purpose of this paper is to systematically review recent literature on the impact of yoga on depression management in adults. Five databases were searched, yielding 56 research studies published between 2014 and 2019, which were subsequently narrowed to 13 final studies per strict inclusion and exclusion criteria. The 13 studies included four systematic reviews, three randomized controlled trials, two randomized controlled dose finding trials, three prospective cohort randomized controlled trials, and one qualitative descriptive study. The majority of studies report that yoga is as effective as current standard treatments for the short-term symptom management of depression. Research highlights yoga's safety profile and tolerability. More research is needed regarding the long-term impact of yoga, especially in populations such as the elderly, pregnant women, and cancer patients who would benefit from non-pharmacological treatment options. Current and future healthcare providers must be informed on current research in order to provide high quality patient care to adult patients with depression. Healthcare policy and educational systems (including workplaces) should support the dissemination and integration of evidenced based research into practice.

Keywords: yoga, depression, depressive disorder, major depression

The Impact of Yoga on Symptom Management in Adults with Depression

Depression is one of the leading causes of disability worldwide, contributes significantly to the global disease burden, and is on the rise (World Health Organization [WHO], 2020). Depression sufferers may be affected in a variety of contexts: decreased mental, emotional, physical, and sexual health; impaired relationships; decreased work attendance, capacity and productivity; and financial strain can all result from untreated depression (Anxiety and Depression Association of America, 2018). Thankfully, depression is treatable (WHO, 2020). Despite this, there is a lack of access to affordable, tolerable treatments at the global level (WHO, 2020). Additionally, social determinants of health affect depression diagnosis and treatment (WHO, 2020). An estimated 76-85% of individuals in low and middle-income countries do not get treatment for depression (WHO, 2020). Untreated depression may lead to a variety of negative outcomes, the most severe being suicide (WHO, 2020). Globally, there is a need for effective depression treatments that are also tolerable and sustainable, and health care providers need to be knowledgeable about treatment options and be equipped to provide evidence-based recommendations. Yoga is generally regarded as a well-tolerated, safe, mind-body practice that is growing in global popularity and has been suggested to improve depression symptoms for sufferers (Cramer et al., 2017).

This paper will explore the impact of yoga on symptom management in adults diagnosed with major depressive disorder. First, the importance of studying potential treatments for depression will be explored and an overview of the current medical standards for depression treatment will be provided. The reader will be introduced to a brief history of yoga, how it is thought to impact depression, and an overview of risks and benefits. A clinical question will be

posed, and methods to answer the question will be described in detail. A literature review of studies published from 2014-2019 will be conducted and will include reviewing study characteristics, synthesizing the research findings, studying quality indicators, and identifying gaps in literature. Implications for future research, primary care providers, education, and policy will then be explored, followed by a conclusion and recommendation based on the answer to the clinical question of significance.

Background

Clinical Phenomena of Interest

Yoga and depression were chosen as the clinical phenomena of interest, and will be described below.

Depression

Depression is broadly defined as "a common and serious medical illness that negatively affects how you feel, the way you think, and how you act...it can lead to a variety of emotional and physical problems and can decrease a person's ability to function at work and at home" (American Psychiatric Association [APA], 2017, para 1). Globally, more than 264 million people suffer from depression, an estimated one in 15 adults (6.7%) are affected during any given year, and 16.6% of adults are estimated to be impacted during their lifetime (APA, 2017; WHO, 2020). Women are disproportionately affected, with up to 25% of women being diagnosed with depression during their lifetime, compared to 12% of men (Cramer et al., 2017). Depression has significant financial implications to society as well. The total economic burden of major depressive disorder was estimated at $210.5 billion annually in 2015, and is on the rise (Center for Workplace Mental Health, 2020).

There are numerous different diagnostic classifications under the umbrella term depression. This paper will focus on major depressive disorder, though will be referred to simply as depression. The diagnosis of major depressive disorder, as outlined in the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition,* requires five or more of the following symptoms be present during a two-week period and must represent a change from the previous level of functioning: (a) depressed mood most of the day nearly every day as evidenced by subjective report or objective observation; (b) anhedonia; (c) significant weight loss, weight gain, or appetite change without changing eating habits; (d) daily insomnia or hypersomnia; (e) psychomotor agitation or retardation that is observable to others and experienced nearly every day; (f) decreased energy or fatigue nearly every day; (g) feeling excessively guilty or worthless nearly every day; (h) indecisiveness or diminished ability to think or concentrate nearly every day; and (i) recurrent thoughts of death, recurrent suicidal ideation with or without a plan, or a suicide attempt (Lyness, 2019). Symptoms must cause significant distress or impaired functioning (Lyness, 2019). Additionally, an organic or medical cause of the symptoms must be excluded prior to making the diagnosis of depression (Lyness, 2019). The cause of depression is thought to be a complex interaction of biological, psychological, and social factors (WHO, 2020).

The current conventional standard of care for depression treatment is based on depression severity and utilizes psychotherapy, medications, or a combination of both (APA, 2017). Electroconvulsive therapy, involves a brief electrical stimulation to the brain while the patient is under anesthesia, is reserved for patients with severe depression who do not respond to standard treatment (APA, 2017). Conventional care for depression is often difficult to obtain due to a shortage of providers, financial concerns, accessibility barriers such as location or lack of

transportation, and due to the intrinsic nature of depressive symptoms such as lack of motivation, apathy, and fatigue, that may make it difficult for sufferers to seek treatment. Only 20% of Americans complete the full course of prescribed care for treating depression according to the current standards of care for depression in the United States (Prathikanti et al., 2017). Established standards of care do not equate to successful treatment for all. Conventional treatment dropout rates are estimated at 20-47%, and remission rates after one course of conventional care range from only 28-48% (Prathikanti et al., 2017). Individuals often have to trial multiple different classes of medications, while potentially enduring adverse effects, before finding a medication at an optimal dose that is tolerable and effective (Prathikanti et al., 2017). Research suggests that the effects of conventional care may be overestimated due to a bias towards publishing positive studies (Prathikanti et al., 2017). Additionally, some individuals want alternatives to conventional care, and look to complementary and alternative medicine (CAM) for answers.

Yoga

A variety of CAM modalities such as meditation, yoga, stress reduction, relaxation techniques, and acupuncture have been cited for being potentially helpful in the treatment of depression (Anxiety and Depression Association of America, 2018b). Yoga, an ancient Indian practice dating back 5000 years ago, has been gaining in popularity over the past decade and is a promising adjunctive treatment for depression (Cramer et al., 2017).

Yoga can be described as "a collection of spiritual and physical practices aimed at achieving greater union with the divine or true self" (Duan-Porter et al., 2016, para 3). The Hindu leader Patanjali compiled the classical Sanskrit work called the *Yoga Sutras*, which describes the eight limbs or components of yoga (ethical behavior, self- discipline, physical

postures, breath regulation, sensory withdrawal, concentration, meditation, and a state of oneness) in approximately 200 BCE (Prathikanti et al., 2017). In Western society, most modern yoga practices are rooted in Hatha, an ancient style of yoga derived from the *Yoga Sutras* emphasizing physical postures, know as asana, and breath regulation, known as pranayama (Duan-Porter et al., 2016). Some examples of popular styles of yoga under the Hatha umbrella include Vinyasa, Ashtanga, Iyengar, Kripalu, and Kundalini (Duan-Porter et al., 2016). Many new styles of yoga include aspects of modern fitness training, such as weight lifting and cardiovascular exercise, including power yoga and hot yoga (Duan-Porter et al., 2016).

Based on a 2012 study, an estimated 20 million adults in the United States (8.7% of the population) reported having practiced or currently practicing yoga, and that number is predicted to continue increasing (*Yoga Journal*, as cited by Duan-Porter et al., 2016). Practitioners of yoga cite practicing for a variety of reasons: specific health conditions, physical health, mental health, and overall wellbeing to name a few (Duan-Porter et al., 2016). As yoga is a mind-body practice by definition, the impact of yoga on mental health conditions, specifically depression, has been studied increasingly over the past decade. Yoga is generally regarded as safe with transient musculoskeletal soreness being the most commonly cited adverse effect (Bridges & Sharma, 2017). The positive physical side effects of practicing yoga are well studied and may include increased flexibility and strength, improved posture, relaxation of tight muscles, increased energy, improved blood flow, reduced resting heart rate and breathing rate, decreased blood pressure and cortisol levels, spiritual well being, and an increased sense of calmness (Bridges & Sharma, 2017; Duan-Porter et al., 2016).

Clinical Question

Based on the phenomena of interest, the following Population-Intervention-Outcome (PIO) question was developed to guide research and investigation: *Among adults with depression (P), what impact does yoga (I) have on symptom management (O)?* The question was formulated to guide research-investigating treatments that primary care providers could use in conjunction with current standards of care, or as a stand-alone treatment if deemed appropriate through joint decision making with the patient. After reviewing the literature during the study abstraction process, it was evident that there is significant heterogeneity among comparison or control groups, even within the result pool obtained after narrowing the initial search results for the desired inclusion criteria. Due to the variety of types of depression and numerous potential combinations for classification of duration and severity of depression (mild, moderate, or severe; and initial or recurrent, and partial or full remission), as well as high level of heterogeneity within the intervention groups, a PIO question was chosen instead of a PICO question. Selection of a PIO versus a PICO question also allowed for the inclusion of high-quality qualitative research, which provides insight into the personal experiences of yoga participants and provides depth, detail, and a humanistic look at what is often a very intimate, hidden, and vulnerable experience.

Clinical Significance for Advanced Practice

Primary care providers have the advantage of establishing long-term, trusting relationships with patients and families. They are in an ideal position to screen, diagnose, and treat depression across the lifespan. An estimated 20% of all visits to primary care providers address mental health concerns through one or more of the following actions: screening, psychotherapy or other mental health counseling, mental health diagnosis as the visit chief complaint, or psychotropic medication prescription management or counseling (Centers for

Disease Control and Prevention [CDC], 2014). Primary care providers will see depression in clinical practice regardless of care setting and in patients across the lifespan. It is imperative for providers to have knowledge of evidence-based recommendations for complementary or integrative therapies that provide holistic care for patients suffering from depression. This includes having knowledge of treatment options for patients who have failed or refuse standard interventions. The current standard of care, antidepressant medication and/or psychotherapy, have potential pitfalls. Antidepressants can have numerous undesirable side effects, slow onset of therapeutic effect, and varying levels of tolerability, and there is a generalized consensus that their effectiveness has been overestimated (Duan-Porter et al., 2016; Prathikanti et al., 2017). Psychotherapy can be effective and has fewer negative side effects when compared to antidepressants, though requires a strong commitment to participation and motivation to work through problems and make changes in thinking and actions (Duan-Porter et al., 2016). Due to the side effect profiles of current antidepressant medications, as well as the commitment and personal drive required to participate in psychotherapy, many individuals seek alternative treatments for depression. Additionally, despite advances in pharmacology and the field of psychology, many depression sufferers do not achieve remission and experience frequent relapses and recurrent symptoms (Kinser et al., 2014). Health care providers must be knowledgeable about safety, risks, benefits, and efficacy of CAM treatments, such as yoga, due to the growing popularity trends (Duan-Porter et al., 2016).

Methods

An extensive literature search was conducted between October 1st, 2019 and November 15th, 2019, on the phenomenon of interest. The databases used in this search were selected based on relevance to the topic and potential to yield useful results (see *Database Selection*

below). Initially, a ten-year publication period was utilized, spanning publication dates from 2009-2019. Due to the volume of applicable articles, the publication date range was narrowed to a five-year range between 2014 and 2019. Studies were systematically reviewed to identify those that could best inform the clinical question, and 13 studies were selected for inclusion in the literature review.

Database Selection

Databases with content pertinent to the phenomenon of interest were selected. Five databases were chosen and included: CINAHL, Cochrane, PsycINFO, Physical Education Index, and Alt Health Watch. These five databases were specifically chosen because they contain a wide variety of subject matter spanning physical and mental health to psychology and alternative health. Table 1 (see *Appendix*) details the general subject matter contained in each database along with the search restrictions applied to each including the five-year publication date window (2014 to 2019).

Keyword Abstraction Process

The keywords "yoga" and "depression" were searched initially, which yielded large numbers of studies. The term "yoga therapy" was searched, but did not yield an adequate number of studies. During the research process, it was also realized that the term "yoga therapy" refers to a specific advanced certification that is beyond the scope of traditional yoga instruction; thus, the term "yoga therapy" was not utilized in conjunction with other keywords for further inquiry (Kung, 2016). The terms "asana" and "pranayama" were searched as they are the two most commonly practiced limbs of the eight limbs of yoga (Bridges & Sharma, 2017). Asana refers to physical postures and pranayama refers to conscious modification of the breath or intentional breathing (Bridges & Sharma, 2017). "Asana" and "pranayama" did not yield an adequate

number of results (less than 25 combined total hits across five databases) to further pursue. The following variations on the keyword "depression" were pursued including "major depression" and "depressive disorder." Each of these key terms yielded greater than 1000 combined hits across five databases (see *Table 2* of *Appendix* for further detail on the keywords and keyword combinations used and the corresponding results per database). The final keyword combinations utilized were "yoga and depression," "yoga and major depression," and "yoga and depressive disorder." All studies resulting from those search term combinations were selected for inclusion in *Table 3* and for further review.

Study Abstraction Process

A total of 56 studies were retrieved for review (see *Table 3* of *Appendix* for citations and rationale for inclusion or exclusion). Studies that did not meet criteria to be classified as Level I through V of Melnyk and Fineout-Overholt's rating system for the hierarchy of evidence were excluded (2019). The adult population was selected to study the impact of yoga on depression symptom management; thus, studies including children or adolescents (under age 18) were excluded. Four studies included participants with either depression or anxiety, but did not have the requirement of both, and thus were excluded. Studies that did not have a primary outcome measure of depression severity, symptomatology, or management were excluded. Additionally, studies that looked at physiological markers potentially related to depression, such as cortisol, brain-derived neurotrophic factor, interleukin 6, or HPA-axis response were also excluded. Finally, 16 studies were duplicates and therefore were excluded.

Study Review Process

The 13 studies that met inclusion criteria for the literature review were read in their entirety and reviewed to obtain the following information: purpose, sample size, setting, study

design, level of evidence, intervention and control group detail, findings, implications for practice and further research, and study limitations (see *Table 4* of *Appendix* for details). Three studies were randomized controlled trials, two were randomized controlled dose finding trials, three were prospective cohort randomized controlled trials, and one was a qualitative descriptive study. Four systematic reviews were also included. The lack of a second reviewer throughout the data abstraction and study review process may have resulted in bias from the reader, but every effort was made to remain objective and systematic in the study selection and review process (Holly et al., 2011).

Literature Review

This literature review will compile and analyze high-quality research published between 2014 and 2019 investigating the impact of yoga on depression in the adult population. First, study characteristics will be addressed. Next, research will be synthesized and findings abstracted. Quality indicators will be discussed, and the literature review will conclude with a discussion on the gaps in the literature.

Study Characteristics

The overarching primary outcome of the studies was to investigate the efficacy of yoga on reduction or remission of depressive symptomatology. All studies commented on the safety of yoga as an intervention and one study had a secondary outcome measure of effect on suicidal ideation (Nyer et al., 2018). Kinser et al. (2014) looked at depression plus secondary measures of perceived stress level, anxiety, and rumination. Prathikanti et al. (2017) studied the impact of yoga on depression as well as secondary outcomes of perceived self-efficacy and self-esteem. All studies utilized quantitative study design with the exception of one qualitative study, which

investigated the experience of participating in yoga in older adults with depression (Lee et al., 2018).

Study Design, Level of Evidence, Population, Sample Size, and Setting Detail

A total of 13 studies containing level I through V evidence were reviewed, including three randomized controlled trials, two randomized controlled dose finding trials, three prospective cohort randomized controlled trials, one qualitative descriptive study, and four systematic reviews. Three of the four systematic reviews included only randomized controlled trials and meta-analyses (Cramer et al., 2017; Duan-Porter et al., 2016; Gong et al., 2015). Bridges and Sharma (2017) included randomized controlled trials, quasi-experimental studies, and pretest/posttest studies, but note that the majority of the studies included in their systematic review were randomized controlled trials. Study sample sizes (n) ranged from nine to 122 participants. The four systematic reviews analyzed a total number of studies ranging from six to 23, which looked at sample sizes (n) ranging from 240 to 706 total participants, although one study did not indicate the total number of participants across all included studies but did provide individual study sample sizes (n) ranging from 14 to 136 across the 23 studies (Bridges & Sharma, 2017). All studies looked at an outpatient population with the exception of one study that included participants in both outpatient and inpatient settings (Rao et al., 2015).

Instruments

A current diagnosis of depression (established by a health care provider using DSM-IV or DSM-V criteria and by an objective measurement tool administered by a trained clinician) was established as criterion for inclusion of studies in this literature review. A variety of depression screening tools were used across the studies and include: the Beck Depression Inventory (BDI), Beck Depression Interview II (BDI-II), Center for Epidemiological Studies Depression Scale

(CES-D), Patient Health Questionnaire-9 (PHQ-9), Hamilton Rating Scale for Depression (HAM-D), Quick Inventory of Depression Symptomatology (QIDS), and the Edinburgh Postnatal Depression Scale (EPDS). One study utilized qualitative information from face to face visits and the PHQ-9 to verify and monitor the diagnosis of depression, and also used the Perceived Stress Scale 10 (PSS-10), State Trait Anxiety Inventory (STAI) and the Ruminative Responses Scale (RRS) to measure those respective secondary outcomes (Kinser et al., 2014). Prathikanti et al. (2017) used the BDI-II and clinician evaluation with the Mini International Neuropsychiatric Interview (MINI) to measure the primary outcome of depression, along with the General Self-Efficacy Scale (GSES) and the Rosenberg Self-Esteem Scale (RSES) to measure those respective secondary outcomes at baseline and at the eight week mark. One study looked at suicide risk severity and utilized the Suicide Severity Rating Scale (C-SSRS), along with clinical evaluations, at the start and completion of the yoga intervention (Nyer et al., 2018).

Sample Detail

All participants were adults age 18 or older. With the exception of studies looking exclusively at the prenatal population, one study looking at yoga and breast cancer in females, and one study specifically looking at mindfulness-based yoga in women with depression, the other studies attempted to recruit female and male participants. Multiple authors also noted that their sample pools were predominantly Caucasian (Kinser et al., 2014; Nyer et al., 2018; Schuver & Lewis, 2016; Uebelacker et al., 2017). Subjects in the included systematic reviews had a wide range of mental health and physical health co-morbidities including cancer, addiction, stroke, hemiparesis, low back pain, as well as low socioeconomic status and other population factors such as being elderly, pregnant or postpartum, being a student, or being a caregiver (Bridges & Sharma, 2017; Cramer et al., 2017; Duan-Porter et al., 2016; Gong et al., 2015). The randomized

controlled trials reviewed generally applied more stringent inclusion and exclusion criteria regarding co-morbidities. For example, some allowed co-morbid mental health diagnoses and continuation of current pharmacologic or psychotherapeutic treatment, while others specified current or recent treatment as an exclusion criteria, which may be seen as a limitation to this literature review as it adds to the heterogeneity of the total sample pool.

Study Follow-up

Subject follow up intervals to reassess depression symptoms and severity varied from two weeks post intervention to three months post intervention. One study utilized a 12 month follow up point but noted their sample size was small (n=27) and that larger studies with long term follow up are needed (Kinser et al., 2014). A lack of longer-term follow up was noted by multiple authors as a limitation and will be further discussed in the *Gaps in Literature* section of this paper (Bridges et al., 2017; Nyer et al., 2018; Prathikanti et al., 2017). Details of the yoga interventions varied and will be discussed next as these findings help dictate the direction of recommendations for patients.

The Effects of Yoga

Intervention Details.

Style of Yoga. The majority of studies in this literature review utilized Hatha yoga which is the most popular type of yoga in the western world and typically combines elements of asana (physical postures), pranayama (breathing techniques), and dyana (meditation) (Cramer et al., 2017). Most studies commented that they utilized Hatha yoga or aspects of yoga drawn from Hatha (Bridges & Sharma, 2017; Cramer et al., 2017; Duan-Porter et al., 2016; Kinser et al., 2014; Prathikanti et al., 2017; Uebelacker et al., 2017). Other types of yoga varied widely and included viniyoga, antenatal, anusara, Iyengar, kriya, integrated yoga, home practice with a

DVD, and yoga with tai chi (Bridges & Sharma, 2017; Cramer et al., 2013; Rao et al., 2015). Lee et al. (2019) utilized mindful yoga, which they describe as yoga techniques with a mindfulness-based stress reduction approach in their study of the impact of mindful yoga in the depressed older adult population. Schuver and Lewis (2016) also utilized mindfulness-based yoga, which consisted of physical postures, breath modification, and meditation delivered by DVD format, along with telephone based mindfulness education. Nyer et al. (2018) and Streeter et al. (2017) used Iyengar yoga and coherent breathing, which is long, slow, controlled breathing. Prenatal yoga was studied by Gong et al. (2015) in a systematic review, as well as by Uebelacker et al. (2016) in a randomized controlled trial.

Instructor Qualifications. Although specific yoga teacher certification is not a legal prerequisite to call oneself a yoga teacher, Yoga Alliance is the main certifying body for yoga instructors in the United States and recommends that yoga instructors obtain certification (Yoga Alliance, 2020). Teachers of various disciplines attend Yoga Alliance affiliated yoga training programs and must maintain certification status with Yoga Alliance in order to call themselves Registered Yoga Teachers (RYT) (Yoga Alliance, 2020). Instructors must pay money to maintain RYT status, which may be a drawback of certifying with Yoga Alliance as an RYT, especially for instructors who do not teach full time.

Uebelacker et al. (2016) utilized Yoga Alliance certified RYTs with previous experience teaching prenatal yoga in their randomized controlled trial. They also noted that instructors followed a detailed manual and were encouraged to teach breath awareness, mindfulness, utilize props, pose modifications, and encourage home practice in participants, which strengthened their intervention (Uelebacker et al., 2016). Multiple studies commented that a qualified yoga instructor gave yoga instruction, but the studies did not mention specific instructor qualifications

or a certifying body (Cramer et al., 2017; Kinser et al., 2014; Lee et al., 2018; Lee et al., 2019). One study was extremely specific in the yoga instructor training requirements and noted that instructors had completed the Iyengar Introductory Level II certification exam, had more than five years of teaching experience, received breath work training, used an instructional manual, and were assessed on a quarterly basis by the study's principal investigator (Nyer et al., 2018). Teachers in another study were Iyengar certified and were required to have at least five years of teaching experience (Streeter et al., 2018). One systematic review noted that one study utilized a physical therapist instead of a yoga instructor to teach yoga (Sarubin et al. as cited by Cramer et al., 2017). Another systematic review included studies with and without certified yoga teachers, and also included studies where yoga was taught by clinical psychologists (Duan-Porter et al., 2016). Kinser et al. (2014) report that the study investigators designed a manual with pre-prescribed asana, pranayama, and relaxation sequences that changed on a weekly basis. They note that yoga was taught by experienced instructors, but did not specify a type of yoga instructor certification (Kinser et al., 2014). Lee et al. (2019) required that teachers be experienced but did not define how much or what type of experience. The principle investigator in one study traveled to India and made site visits to two well-established centers of expertise in designing research and clinical trials on yoga to guide creation of a sequence of postures to use as the study protocol (Prathikanti et al., 2017). Details on the yoga instructors' background training or baseline education were not given (Prathikanti et al., 2017). Uebelacker et al. (2017) specified that all yoga instructors were registered yoga teachers (RYT) with Yoga Alliance and received study-specific training, and note that fidelity to teaching style and class content specific to desired study content were excellent. Three studies did not comment on the training or certification of yoga instructors (Bridges & Sharma, 2017; Rao et al., 2015; Schuver & Lewis,

2016). Gong et al., (2015) did not comment on the qualifications of instructors teaching prenatal yoga in their research study.

Practice Time. Practice time across studies varied, but yoga was practiced weekly at a minimum. Bridges and Sharma (2017) utilized studies that required a minimum of one hour of practice per week in their systematic review. Cramer et al. (2017) note that yoga sessions averaged 75 minutes and participants practiced one to six times weekly, with a median of twice weekly sessions. Duan-Porter et al. (2016) reported a median total number of practice hours (11) across included studies instead of an average practice time per day or week. Gong et al. (2015) did not comment on practice time in their research on yoga in the prenatal population. Prenatal women in a randomized controlled trial by Uebelacker et al. (2016) attended a 75 minute class weekly and were encouraged to practice at home. Rao et al. (2015) utilized a 60 minute per day integrated yoga intervention as the goal, but accepted a minimum of three, 60 minute sessions weekly. Participants in a study by Rao et al. (2015) undergoing breast cancer treatment had sessions of an unspecified time duration with an instructor while hospitalized and were given an audiotape with the instructor's voice to follow once they were discharged and initiated a home practice. Participants were also informed about how practical themes from the yoga practice, such as relaxation, letting go, and calming, could be applied to stressful situations in daily life (Rao et al, 2015). Kinser et al. (2014) utilized a weekly 75 minute in-person intervention plus daily home practice following a written manual or DVD that followed pre-prescribed series of asana, pranayama, and relaxation designed by the principal investigators. Lee et al. (2019) required weekly sessions lasting 3 hours plus home practice between 30 and 45 minutes daily utilizing a practice manual over the course of the intervention, which lasted 8 weeks. The older adult participants in that study also took a 15 minute recess period during the 3 hour in person

intervention for structured socialization (Lee et al., 2019). Weekly topics were provided to facilitate discussion on depression and how being depressed affected participants' interactions with others (Lee et al., 2019). Nyer et al. (2018) had two arms to their study: a high dose group which took three 90-minute classes per week plus four 30-minute home practice sessions, and a low dose group which took two 90-minute sessions plus three 30-minute home practice sessions per week. Subjects in a study by Prathikanti et al. (2017) attended 90 minute in person Hatha yoga sessions twice weekly. Schuver and Lewis (2016) asked participants to practice yoga with a DVD for 60-75 minutes twice weekly. Uebelacker et al. (2017) invited participants to attend one to two 80 minute yoga classes per week.

Duration of Yoga Intervention. The duration of intervention varied across studies, but an 8 week duration of intervention was most common (Cramer et al., 2017; Duan-Porter et al., 2016; Kinser et al., 2014; Lee et al., 2019; Prathikanti et al., 2017). Uebelacker et al. (2016) utilized a 9 week long intervention in their study with the prenatal population. Uebelacker et al. (2017) utilized a 10 week intervention in their study of yoga versus health education for persistent major depression. Multiple researchers utilized a 12 week duration of intervention (Gong et al., 2015; Nyer et al., 2018; Schuver & Lewis, 2016; Streeter et al., 2018). One study utilized a 24 week yoga intervention for subjects undergoing breast cancer treatment (Rao et al., 2015). One group of researchers noted that the duration of interventions included in studies in their systematic review ranged between 1 and 32 weeks (Bridges & Sharma, 2017).

Control Groups. Control groups varied across studies. Three systematic reviews cited a variety of control groups across the studies included in their research: physical exercise, physical therapy, non-yogic breathing, walking, phone counseling, counseling or therapy, tai chi, assessment only, relaxation CD, antidepressant medication, standard care, electroconvulsive

therapy, or no control group (Bridges & Sharma 2017, Cramer et al., 2017, Duan-Porter, 2016). Gong et al. (2015) utilized standard prenatal care as a control, which they specify as potentially also including standard antenatal exercise and getting social support. Uebelacker et al. (2016) also looked at the prenatal population and utilized a mom-baby wellness workshops of the same duration (75 minutes weekly) as the yoga intervention arm. Kinser et al. (2014) utilized a health education control group where participants attended 75 minute long weekly sessions of lecture, videos, and discussion about health topics with a registered nurse and received a take home manual elaborating on topics discussed in class sessions. Lee et al. (2019) did not utilize a control group in their research. Nyer et al. (2018) also did not use a control group because their study was a dose finding study, which looked at high versus low doses of yoga as the intervention comparison groups. Prathikanti et al. (2017) utilized twice weekly 90 minute attention control education groups. Rao et al. (2015) utilized supportive expressive therapy with education as the control during hospital visits, adjuvant chemo or radiation treatment sessions, and post cancer treatment with stage II and III breast cancer patients. The participants were encouraged to talk with their counselors at any time during the study (Rao et al., 2015). Schuver and Lewis (2016) utilized a home-based walking plus health education control group and encouraged participants to keep logs with exercise time and duration among the control group and the yoga group. Uebelacker et al. (2017) utilized a healthy living workshop control group and the following topics were discussed during the 60 minute long weekly sessions: alcohol, nicotine, caffeine, being a smart patient, nutrition, brain disease, cancer prevention, germs/cold/flu, sleep, physical pain, depression, heart protection, and diabetes protection.

Synthesis of Research

Effect on Depression

Results on the impact of yoga on depression and associated management varied across studies. Bridges and Sharma (2017) yoga found to be beneficial in the majority of intervention groups; both intervention and control group saw benefit in six studies, and no significant changes in either group in three studies. Bridges and Sharma (2017) also found that yoga reduced depression symptoms in the caregiver population. Cramer et al. (2017) found that yoga is as efficacious as other interventions. Duan-Porter et al. (2016) found that yoga is effective for reducing depression symptoms on a short-term basis and noted that yoga was more efficacious compared to relaxation or aerobic exercise. They also found that remission rates were not frequently reported and yoga did not seem to have a major positive impact on remission (Duan-Porter et al., 2016). Gong et al. (2015) found prenatal yoga helpful in partly reducing depressive symptoms in pregnant women. They found asana combined with pranayama, meditation, or deep relaxation to be more effective at reducing depression symptoms than asana alone, results significant ($p<0.00001$) versus non-significant (Gong et al., 2015). They also found that yoga performed in a yoga setting (presumably a yoga studio) yielded a greater reduction in depressive symptoms than yoga performed outside of a yoga setting (Gong et al., 2015). Uebelacker et al. (2016) found that depression scores decreased in the prenatal yoga group and the mom-baby wellness workshop control, but favored the prenatal yoga group, although intra-group differences were not significant. Prathikanti et al. (2017) found a statistically significant ($p = 0.034$) reduction in depression symptom severity and remission rates in the yoga group versus the attention control education group. Nyer et al. (2018) found reductions in depressive symptoms on the BDI-II as well as decreased suicidal ideation in the low dose and high dose yoga group. A greater reduction in depressive symptoms was noted in the high dose group versus the low dose group, but no difference in suicidal ideation was found between the two groups (Nyer et al.,

2018). Lee et al. (2019) utilized qualitative methodology and concluded that mindful yoga may be a safe and effective modality for improving the physical and mental health of older adults with depression. Six themes emerged from their research: improved physical health, active involvement in the community, positive psychological effects, perceived therapeutic ingredients, facilitators of practicing mindful yoga, and barriers to practicing mindful yoga (Lee et al., 2019). Participants in that study found that the socialization and group aspect of the study was helpful; they were able to make new friends and re-engage in their community, which, in turn, helped their mood, improved communication skills, and resulted in decreased feelings of loneliness (Lee et al., 2019). Mental health benefits noted by participants included an increased sense of calmness, ability to focus on the present moment, being less judgmental about self or others, self-acceptance, and improved ability to let go of worry (Lee et al., 2019). Kinser et al. (2014) only measured long-term follow up, which will be discussed in the *Long-Term Follow-up* section of this literature review. Participants in the Kinser et al. (2014) study reported qualitative commentary about how practicing yoga was helpful in mood regulation regardless of whether or not they were currently practicing yoga. Participants referred to yoga as a tool in the toolbox to help manage stress and depression symptoms (Kinser at al., 2014). Rao et al. (2015) noted that the antidepressant effects of yoga are thought to be attributed to stress reduction rather than the social aspect of doing yoga. Participants in the yoga group ($p<0.001$) and the walking control group ($p<0.01$) exhibited statistically significantly reductions in depressive symptoms at post-intervention and at the one-month follow up point, but there were no significant differences between depression reduction across the two groups (Schuver & Lewis, 2016). In a dose-finding study, Streeter et al. (2018) noted statistically significant decreases in BDI-II scores ($p<0.0001$) in the low dose and high dose yoga groups at the 12-week follow-up point. They noted that

slightly more participants in the high dose group had BDI-II scores of less than 10 at the 12-week point compared to those in the low dose group (Streeter et al., 2018). Uebelacker et al. (2017) did not find a significant difference between the Hatha yoga group and the healthy living control group at the 10 week immediate post-intervention marker, but found lower depression severity and higher level of treatment response in the yoga group at the three month and six month post intervention follow-up points. In summary, most studies found a reduction in depression symptoms in the short term or found yoga to be of similar efficacy to other interventions, though studies with long-term follow-up are lacking.

Effect on Secondary Outcomes

Various secondary outcomes were measured across studies and include: suicidal ideation, anxiety, perceived stress, rumination, self-efficacy, self-esteem, role functioning, and markers of physical health. Duan-Porter et al. (2016) reported that evidence on the efficacy of yoga in management of anxiety symptoms remains preliminary due to poor study design and high attrition rates. Kinser et al. (2014) reported decreases in rumination and stress levels in participants as evidenced by decreased scores on the PSS-10, STAI, and RSS. Lee et al. (2019) found that in addition to potential mental health benefits, participants in their study showed improved physical health in the form of increased flexibility and muscle strength, improved sleep quality, and reduction in chronic pain as evidenced by participant self-report and qualitative interviews. Nyer et al. (2018) found a reduction in suicidal ideation in low and high dose yoga groups. Prathikanti et al. (2017) noted that self-efficacy improved in the yoga group and the attention education control group, but that self-esteem improvement was only seen in the yoga group. Schuever and Lewis (2016) reported a decrease in the secondary outcome of rumination at post-intervention follow-up in the yoga group but not in the walking control group, and found

no decrease in rumination in either group at the one month follow up. Improvements in social, work, and role functioning, as well as health perception, were seen among yoga participants as compared to healthy living workshop participants in one study (Uebelacker et al., 2017).

Long-Term Follow-up

A lack of long-term follow-up, beyond one year, was found across studies and was widely cited as a limitation to the existing body of research (Bridges & Sharma, 2017; Cramer et al., 2017; Duan-Porter et al., 2016; Lee et al., 2018; Nyer et al., 2018; Prathikanti et al., 2017; Uebelacker et al., 2017). Gong et al. (2015) did not report long-term outcomes from the prenatal yoga intervention, which would have added significantly to the usefulness of the body of literature on yoga and prenatal depression because prenatal depression is cited as the strongest predictor for postpartum depression, which significantly affects many women and their families. Kinser et al. (2014) conducted the only study in this literature review to utilize a one-year or beyond follow-up point. They found a significant decrease in long-term depression scores in the yoga group compared to the health education group (Kinser et al., 2014). Uebelacker et al. (2017) followed participants until 6 months post-intervention, at which point they found that yoga participants had lower levels of depression severity compared to their control group. The authors noted that longer-term follow up is needed in future research (Uebelacker et al., 2017).

Safety and Feasibility

Yoga is generally regarded as safe in the outpatient population, although its safety profile is often underreported (Cramer et al., 2017; Duan-Porter et al, 2016; Nyer et al., 2018; Streeter et al., 2018). The most commonly cited adverse effects are musculoskeletal in nature and include muscular soreness, which can be expected with physical exercise especially if the individual is not accustomed to that particular type of exercise (Nyer et al., 2018; Streeter et al., 2018). One

study noted that no adverse effects were reported, but two musculoskeletal injuries were sustained outside of the yoga class setting during the intervention period, which had an impact on participants' ability to practice yoga (Prathikanti et al., 2017).

Duan-Porter et al. (2016) reported exacerbations of established medical conditions such as headaches and glaucoma, along with reports of acute musculoskeletal injuries. Duan-Porter et al. (2016) recommended that beginners avoid specific poses such as headstand pose, lotus pose, and advanced breathing techniques. They also advised against inversions (where the feet are elevated above the level of the heart) in those with glaucoma, and power-style yoga in those with pre-existing musculoskeletal conditions (Duan-Porter et al., 2016). Headaches and one nosebleed most likely related to a pre-existing condition were also reported (Nyer et al., 2018). Regarding safety in the prenatal population, Gong et al. (2015) and Uebelacker et al. (2016) did not report any adverse effects.

Regarding feasibility, Kinser et al. (2014) noted that yoga practice requires a significant time commitment and may require a financial commitment as well. Yoga can be practiced at home, but, as previous authors have mentioned, it may be more therapeutic and beneficial to practice in a yoga setting (Gong et al., 2015). Patient learning style should be taken into consideration when designing an intervention. Lee et al. (2019) utilized the WhatsApp messaging platform to allow communication between participants for the duration of the study. Participants report that this helped them stay motivated to practice daily by reporting on their practice sessions, and it provided them with a platform for socialization (Lee et al., 2019). Some participants noted that the time commitment associated with daily practice was a barrier (Lee et al., 2019). Two male participants in the study reported concerns with stereotypes about yoga, citing that they thought yoga was exercise only for women due to the flexibility needed (Lee et

al., 2019). Participants in this study also noted that they sometimes felt like a failure if they were unable to hold the posture as long as the instructor desired, and this would trigger other negative thought patterns (Lee et al., 2019). Another consideration regarding feasibility of yoga as a treatment modality is the impact of anhedonia on motivation to practice and participation. It has been postulated that anhedonia may negatively affect participation, but this was found to be untrue through qualitative feedback received by participants in one study (Prathikanti et al., 2017). In fact, participants in that study cited wanting to practice yoga more frequently than the practice time and per week frequency utilized during the study intervention period (Prathikanti et al., 2017).

Subpopulations

The Elderly. Yoga in the depressed elderly population has been recommended as a feasible intervention and as an area for further research because yoga has the advantage of being a non-pharmacologic intervention (Lee et al., 2019; Prathikanti et al., 2017). The elderly are more susceptible to the side effects of medications due to alterations in organ function, decreased metabolism, and alterations in body composition (Rosenthal & Burchum, 2018). Nonpharmacologic interventions such as yoga prevent undesirable side effects that may arise from either from individual medications or from polypharmacy. Prathikanti et al. (2017) note that various other subpopulations including adolescents, perinatal patients, and those with medication sensitivities could also benefit from yoga because it is a non-pharmacological intervention. Another benefit of yoga for the elderly is that physical postures can be easily modified to accommodate limited mobility or other physical limitations (Lee et al., 2019). Yoga was found to be a safe and effective intervention for improving mental health and physical functioning of elderly adults, and was found to be well tolerated and enjoyed (Lee et al., 2019).

Perinatal Women. Yoga was found to be an effective intervention for reducing depression in pregnant women, although mixed results have been cited regarding efficacy of yoga in reducing postpartum depression (Bridges & Sharma, 2017). Gong et al. (2015) found integrated yoga (physical postures plus structured breathing techniques and meditation) to yield a statistically significant reduction in depressive symptoms ($p<0.00001$) in the prenatal population. They found that prenatal depression scores on the QIDS and EPDS decreased in the yoga and mom-baby prenatal workshop groups, but that scores decreased more in the yoga group (Uebelacker et al., 2016). Prenatal yoga has been cited as an exciting alternative to standard care because it is accessible, safe, has potential positive mental and physical health benefits, and has been well accepted by prenatal women (Uebelacker et al., 2016). Further investigation is needed on the impact of yoga in the prenatal population because of a lack of literature studying this special population (Uebelacker et al., 2016).

Women Undergoing Breast Cancer Treatment. Studies looking at yoga as a modality to treat depression in women undergoing breast cancer treatment have yielded mixed results. Bridges and Sharma (2017) found no significant reduction in depressive symptoms among women with breast cancer who participated in a yoga intervention versus those who received standard care. In contrast, Rao et al. (2015) report significant decreases in depression scores before ($p=0.01$) and during ($p=0.01$) radiation therapy, and before ($p=0.05$) and during ($p=0.001$) chemotherapy in patients with stage II or III breast cancer. Rao et al. (2015) conclude that yoga is beneficial at reducing self-reported symptoms of depression in patients with stage II or III breast cancer undergoing chemotherapy or radiation therapy. Further research in this sub-population is warranted.

Quality Indicators

To assess research quality, study design and level of evidence must first be reviewed. The 13 studies identified for this literature were identified because they met strict inclusion criteria (see *Methods*), and the studies ranged from level I through V of Melnyk and Fineout-Overoholt's (2019) hierarchy of evidence rating system. The highest quality evidence came from four systematic reviews and five randomized controlled trials, two of which were dose-finding studies.

All four of the systematic reviews noted that small sample sizes limited power for statistical analysis and that larger RCTs are needed (Bridges & Sharma; 2017; Cramer et al., 2017; Duan-Porter et al., 2016; & Gong et al., 2015). Small sample sizes were noted as a limitation of the RCTs in this literature review as well (Kinser et al., 2014; Nyer et al., 2018; Rao et al., 2015; Streeter et al., 2017, & Uebelacker et al., 2017). Small samples sizes limit the detection of effect and generalizability of findings to broader populations. Significant heterogeneity among study control groups was also cited as a major limitation in the systematic reviews (Bridges & Sharma; 2017; Cramer et al., 2017; Duan-Porter et al., 2016; & Gong et al., 2015). As evidenced in the *Intervention Details* section of this literature review, there is also significant heterogeneity among yoga interventions in existing research studies.

The risk of bias in studies must also be assessed. Bridges and Sharma (2017) utilized Cochrane guidelines for systematic reviews to evaluate quality and found high risk of bias in five studies, a low risk of bias in four studies, and an unknown risk in the remaining 14 studies. Duan-Porter et al. (2016) noted a high risk for bias in addition to potentially undetected errors when reviewing systematic reviews included in their own systematic review. Duan-Porter et al. (2016) mention utilizing a second reviewer for the study abstraction and methodological assessment process, which strengthens the quality of their research by reducing individual bias

(Holly et al., 2011). Studies that use non-probability based sampling methods, such as volunteer sampling, inherently have bias.

The next quality indicator to be assessed is the instrumentation used to measure depression. The wide variety of instruments used to objectively measure depression symptoms and severity adds to the heterogeneity of the research. Gong et al. (2015) noted that depression scales used to measure symptom severity in the perinatal population may actually overestimate depression because they include physical symptoms that may be inherent to pregnancy, such as feeling tired and lacking energy. The authors suggest that the EPDS should be utilized within this sub-population to provide the most accurate assessment of depression (Gong et al., 2015). Similarly, Rao et al. (2015) note that the BDI may overestimate depression severity in patients with cancer due to symptoms inherent to the physiological process of cancer, such as lack of energy, fatigue, anorexia, and weight loss. The wide variety of instruments used to measure depression can be reviewed in *Table 4 of Appendix.*

The sample detail also needs to be considered when assessing study quality. While no limitations were placed on sex, race, ethnicity, or socioeconomic status, multiple authors note that their samples included mainly Caucasian females and lack subjects from minority ethnic groups and of low socioeconomic class (Nyer et al., 2018; Uebelacker et al., 2017). Kinser et al. (2014) utilized volunteer sampling and acknowledged how that may have led to volunteer bias. Larger RCTs with tighter control of sample detail would yield more accurate results, but would then limit findings to those particular sub-populations.

Gaps in Literature

A number of gaps in the literature on the impact of yoga on depression management have been cited. First, a lack of long-term follow up was widespread across studies (Bridges &

Sharma, 2017; Cramer et al., 2017; Lee et al., 2018; Nyer et al., 2018). Knowledge of the long-term impact of an intervention is necessary in order to recommend an optimal duration of intervention. Kinser et al. (2014) utilized a one-year follow-up period, but noted that their study utilized a very small sample size and thus the results have limited generalizability. Therefore, further research on the long-term impact of yoga on depression is needed.

Another gap in the literature is the optimal "dose" of yoga, which involves multiple factors that need to be addressed in future research. A significant detail left out of much of the reviewed research was the selection and order of postures practiced during the yoga sessions. Repeating a pre-designed sequence of postures may have a different effect versus doing a different practice each session. Also, there may be differences in outcomes if participants do a self-guided practice alone versus going to a studio and practicing with an instructor and other yoga students. Duan-Porter et al. (2016) reported a greater positive impact on depression symptoms in those who practiced yoga in a yoga setting. Much is also unknown about how specific styles of yoga and aspects of yoga affect the mind and body and, in turn, affect depression symptoms and outcomes (Bridges & Sharma, 2017). Bridges and Sharma (2017) noted that a limitation of much of the existing research is that none of the intervention groups utilized behavioral therapy methods to help participants adhere to their yoga practice. The combination of utilizing behavioral methods like cognitive behavioral therapy (which is part of the current standard of care for depression) along with yoga may have a synergistic effect and should be studied further (Bridges & Sharma, 2017).

A wide variety of control groups were utilized across the reviewed studies (see *Literature Review*). Prathikanti et al. (2017) make an excellent point about the suitability of control groups and difficulty choosing an appropriate control:

> In theory, an optimal control would account for non-specific mood effects of a mind-body practice, but without obscuring or confounding any specific mood effects deriving from the 'active ingredient' of that practice. In reality, however, it may be difficult to distinguish the non-specific effects of a mind-body therapy from its specific effects, and to identify the active ingredient(s) producing those specific effects (p. 8, para 1).

Additionally, yoga should be studied in comparison to current treatment modalities such as specific classes of antidepressants, psychotherapy, and the combination of the two (Duan-Porter et al., 2016). Optimal studies would include a research-based effective dose of standard care interventions compared to a research-based optimal dose of yoga.

The quality of yoga instructor training must also be considered. Multiple studies commented that a qualified yoga instructor gave yoga instruction, but these studies do not mention specific instructor qualifications or a certifying body (Cramer et al., 2017; Kinser et al., 2014; Lee et al., 2018). Additionally, continuity of the instructor (versus having multiple instructors or different instructors for each session) could potentially impact outcomes, and thus further studies controlling for these variables are warranted. Also, instructor training has the ability to greatly impact teaching, and thus, participant benefit. Additionally, further research is needed in special populations such as cancer patients, perinatal women, the elderly, and caregivers (Bridges & Sharma, 2017; Gong et al., 2015). These gaps in the literature demonstrate the need for further research in these areas.

Discussion

Depression has a significant negative impact on individuals and society as a whole (WHO, 2020). The current standard of care (antidepressants, psychotherapy, or a combination of the two) may be effective in many cases, but has also been cited with carrying high dropout rates

and low remission rates (Cramer et al., 2017). As noted by the WHO (2020), health care providers must address potential side effects and respect individual preferences when creating a plan of care for an individual with depression, and health care systems should address lack of access to care collectively, as well as on a policy level. CAM modalities, such as yoga, are growing in popularity and show promise as adjunct therapies for moderate to severe cases, or potential as monotherapy for mild to moderate cases (Bridges & Sharma, 2017; Cramer et al., 2017; Duan-Porter et al., 2016). The current evidence certainly has limitations, but also shows great promise for yoga as an alternative or adjunct modality for depression treatment.

One tremendous benefit of mind-body methods, such as yoga, is that they lack the side effect profile of pharmacotherapy. This is a critical consideration when creating a treatment plan for the elderly, perinatal women, or adolescents, all of whom are at higher risk for adverse effects associated with pharmacotherapy (Bridges & Sharma, 2017; Gong et al., 2015). Yoga is also an excellent treatment modality because it can be done by individuals of any age group and can be modified if individuals have physical restrictions or injuries (Lee et al., 2018; Prathikanti et al., 2017). It is also a highly accessible form of treatment as it can be done anywhere once the participant has received preliminary instruction, which can also be done in the home through written or electronic instruction (Bridges & Sharma, 2017).

Yoga practice may have limitations, such as time and financial commitment if practicing in a studio (Kinser et al., 2014). The minimum time commitment to see benefit in depression symptoms from practicing yoga may be a similar time commitment to participating in weekly psychotherapy sessions (Duan-Porter et al., 2016). Some individuals may not wish to utilize their time in this way, and may prefer to try a pharmacotherapeutic option to treatment, which is a choice that should be respected. Health care providers should work in collaboration with

patients and utilize joint decision making. Interestingly, participants in one study cited that they wanted health care providers to prescribe yoga, and may have been more motivated to practice if they were specifically told to practice yoga by their health care provider (Kinser et al., 2014). While this does not mean that yoga would be more efficacious if a recommendation did indeed come from a healthcare professional, it brings up the importance and value of specific recommendations coming from a healthcare professional, and the need for healthcare providers to be knowledgeable about CAM interventions for depression.

Future Directions

Research

The outcomes of the yoga interventions were varied, in part due to the heterogeneity of the yoga interventions and sample populations utilized in the studies. Despite the fact that the evidence reviewed in this literature review is high quality (levels I through V), large, adequately powered randomized controlled studies are needed to help establish definite recommendations on the benefits of yoga (Cramer et al., 2017; Duan-Porter et al., 2016). Randomized controlled trials that utilize a research-based effective "dose" of yoga (including style of yoga, certified instructors, minutes of practice per session, and number of sessions per week) need to be studied for efficacy in depressed patients not undergoing any standard therapy who wish to use yoga as their primary depression management intervention. Yoga should also be studied in a population of patients taking antidepressant medications, as well as in patients undergoing cognitive behavioral therapy, and in patient populations who utilize both antidepressants and therapy modalities in their depression management plan. The need for large, adequately powered randomized controlled trials investigating a standardized yoga intervention in special populations such as caregivers, cancer patients, elderly, perinatal patients, youth, and various ethnic, cultural,

occupational groups, and specifically in male versus female gender groups is supported by current research (Bridges & Sharma, 2017; Cramer et al., 2017; Duan-Porter et al., 2016; Gong et al., 2015).

FNP Clinical Practice

Health care providers will be faced with challenges posed by depression and its treatment, such as the management of patients who suffer from adverse effects of medications, the relapsing nature of the disease, the variability in severity of the disease, and patients' individual preferences and values regarding treatment not always being congruent with preferences and values of health care providers. As evidenced by this literature review, yoga shows promise as a modality to aid in the reduction and management of depression symptoms.

Health care providers must be prepared to answer questions about alternatives to standard treatment, and it would be wise to be aware of the most common CAM alternatives. Yoga is increasingly recommended in the mass media as being helpful in the self-management of depression. *Yoga Journal*, which describes itself as "America's Number One Yoga Magazine" is published in 12 international editions across 28 countries, and has over 3.5 million followers on social media (Yoga Journal, 2020). *Yoga Journal's* popularity provides an example of how patients are exposed to yoga through mass media. Patients will present to outpatient clinics with some prior knowledge of CAM practices, such as yoga. Health care providers will benefit from knowledge of what the research-based evidence says about the usefulness of yoga on the self-management of depression. Providing patients with evidence-based recommendations is far more useful than providing generic, non evidence-based advice. Health care providers should utilize the best available evidence to work in collaboration with patients, using joint decision-making to formulate individualized plans of care.

Education

Nurse practitioner and other healthcare professional students should be educated on CAM modalities to treat mental health conditions such as depression. Yoga has the advantage of being modifiable to patients of different age groups, co morbid health conditions, mobility levels, which is not the case with some other interventions (Lee et al., 2019; Gong et al., 2015; Rao et al., 2015). Awareness of highly tolerable, safe, and effective interventions, such as yoga, will allow current and future healthcare providers to better serve patients by being able to offer evidence based alternatives for those who do not, for whatever reason, tolerate or desire standard treatment modalities. Yoga has also been found to be a safe adjunct treatment to standard treatment, and current and future providers should be aware of this finding (Bridges & Sharma, 2017; Cramer et al., 2017; Duan-Porter et al., 2016; Gong et al., 2015; Streeter et al., 2017). Research also supports recommending that current healthcare providers consider how to integrate recommendations for mind-body modalities into practice, supporting the need to educate future and current providers (Kinser et al., 2014). In the workplace, in-services or online learning activities could help disseminate knowledge.

Policy

The full integration of CAM modalities into the current medical system poses significant challenges, but also offers great opportunities to improve the health of individuals and communities. Approximately 38% of Americans have utilized some form of CAM, and that percentage is estimated to continue increasing (National Center for Complementary and Integrative Health, 2017). Therefore, it is necessary for policy to support the investigation of effectiveness of these modalities, and promote dissemination and integration into the current medical system as appropriate. The National Center for Complementary and Integrative Health

(NCCIH) presented a strategic plan in 2016 which outlined objectives aimed at advancing science related to CAM, improving hard to manage symptoms (depression was specifically noted under this objective), fostering health promotion and disease prevention, improving the CAM research workforce, and disseminating objective, evidence- based knowledge of CAM interventions (NCCIH, 2017). The NCCIH provides funding through the National Institutes of Health to support grants to meet these objectives, and research in this country continues to evolve (NCCIH, 2017). The Cochrane Collaboration is an international organization with members from over 80 countries that support the development and dissemination of high-quality, evidence-based research on a variety of topics including CAM modalities such as yoga (Institute of Medicine, 2005). Organizations such as the Cochrane Collaboration highlight the importance of policy supporting CAM research and integration into practice at the national and global levels. As further research is conducted and results are integrated into clinical practice recommendations, healthcare payers should follow suit and support the integration of these modalities into practice and patient's lives from a financial perspective.

Conclusion

Depression can have a significant negative impact on individuals, families, and societies, and is highly burdensome on the national and global level (CDC, 2014; Center for Workplace Mental Health, 2020; WHO, 2020). Current standard treatments often lack tolerability and sustainability, and many in need to not have access to care. CAM modalities, such as yoga, are growing in popularity and show promise as monotherapy or adjunctive therapy to help manage depression symptoms in a variety of populations. Although the current body of research has gaps and limitations, yoga has been found to be a safe, tolerable, and feasible modality to utilize in the management of depression. For short-term (under one year) management, yoga is as effective in

treating depression as a variety of other treatments, including standard medical care (Bridges & Sharma, 2017; Cramer et al., 2017; Duan-Porter et al., 2016; Gong et al., 2015). Yoga has the benefits of being non-pharmacological, accessible, and modifiable to different age groups, ability levels, and co-morbid conditions. The long-term impact of yoga on depression symptomatology, as well as remission rates, remains understudied. Additional areas for further research include special populations such as the elderly, perinatal patients, adolescents, and different socioeconomic groups. Current and future healthcare providers have a duty to provide high-quality, evidenced-based care for patients suffering from depression. Education on efficacious CAM modalities, such as yoga, should be integrated into educational programs and information should be disseminated in the form of continuing education or workplace in-services for established providers. Healthcare policy must continue to support new and ongoing research because preliminary research has been promising and there is substantial need for efficacious, tolerable, and feasible treatments for depression.

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Rao, R. M., Raghuram, N., Nagendra, H. R., Usharani, M. R., Gopinath, K. S., Diwakar, R. B., Patil, S., Bilimagga, R. S., & Rao, N. (2015). Effects of integrated yoga program on self-reported depression scores in breast cancer patients undergoing conventional treatment: A randomized controlled trial. *Indian Journal of Palliative Care, 21*(2), 174-181. http://doi.org/10.4103/0973-1075.156486

Rosenthal, L. D., & Burchum, J. (2018). *Lehne's Pharmacotherapeutics for Advanced Practice Providers.* Elsevier.

Schuver, K. J., & Lewis, B. A. (2016). Mindfulness-based yoga intervention for women with depression. *Complementary Therapies in Medicine, 26,* 85-91. http://doi.org/10.1016/j.ctim.2016.03.003

Streeter, C. C., Gerbarg, P. L., Whitfield, T. H., Owen, L., Johnston, J., Silveri, M. M., Gensler, M., Faulkner, C.L., Mann, C., Qixted, M., Hernon, A.M., Nyer, M.B., Brown, E., Richard, P., & Jensen, J. E. (2017). Treatment of major depressive disorder with iyengar yoga and coherent breathing: A randomized controlled dosing study. *The Journal of Alternative and Complementary Medicine, 23*(3), 201-207. http://doi.org/10.1089/acm.2016.0140

Uebelacker, L. A., Battle, C. L., Sutton, K. A., Magee, S. R. & Miller, I. W. (2016). A pilot randomized controlled trial comparing prenatal yoga to perinatal health education for antenatal depression. *Archives of Women's Mental Health, 19*(3)*,* 543-547. http://doi.org/10.1007/s00737-015-0571-7

Uebelacker, L. A., Tremont, G., Gillette, L. T., Epstein-Lubow, G., Strong, D. R., Abrantes, A. M., Turka, A. R., Tran, T., Guadiano, B. A., & Miller, I. W. (2017). Adjunctive yoga v. health education for persistent major depression: A randomized controlled trial. *Psychological Medicine, 47*(12), 2130-2142. http://doi.org/10.1017/S0033291717000575

World Health Organization. (2020). *Depression.* https://www.who.int/news-room/fact-sheets/detail/depression

Yoga Alliance. (2020). *Overall implementation timeline.* https://www.yogaalliance.org/New_RYS_Standards/Overall_Standards_Timeline

Yoga Journal. (2020). *Yoga journal.* https://www.yogajournal.com/page/about-us

Appendix

Table 1

Database Search Description

Database	Restrictions Added to Search	Dates Included in Database	General Subjects Covered by Database
CINAHL	Full text, academic journal, keywords in title, English	2014-2019	Literature about all aspects of nursing and allied health.
COCHRANE	Keywords in title	2014-2019	Collection of systematic reviews
PsycINFO	Peer reviewed, scholarly, keywords in title, English	2014-2019	Literature about psychology and related disciplines including psychiatry, education, nursing, and medicine.
Physical Education Index	Peer reviewed, scholarly, keywords in title	2014-2019	Literature about all aspects of physical education, including business and marketing, coaching and training, dance, health education, kinesiology, motor learning, physical education curricula, physical therapy, recreation, sport law, sport sociology/psychology, sports equipment, sports medicine, and standardized fitness tests.
Alt Health Watch	Full text, scholarly, academic journal, keywords in title, English	2014-2019	Literature on complementary, holistic and integrated approaches to health care and wellness.

Table 2

Data Abstraction Process ****BOLDED terms selected for review***

Search Term(s)	CINAHL	Cochrane	PsycInfo	PhysEdIndex	Alt Health Watch
yoga	590	10	415	198	284
"yoga therapy"	17	0	8	6	34
asana	0	0	0	0	0
pranayama	6	0	8	4	6
depression	4970	21	20,017	666	102
"major depression"	171	0	1226	23	1
"depressive disorder"	265	1	2409	41	10
yoga and depression	**10**	0	**22**	**6**	**5**
yoga AND "major depression"	**1**	0	**4**	0	0
yoga AND "depressive disorder"	**2**	0	**3**	**2**	**1**

Table 3

Reviewed Studies with Inclusion and Exclusion Criteria

Reference	Included/Excluded	Rationale
Battle, C. L., Uebelacker, L. A., Magee, S. R., Sutton, K. A., & Miller, I. W. (2015). Potential for prenatal yoga to serve as an intervention to treat depression during pregnancy. *Women's Health Issues, 25*(2), 134-141. http://dx.doi.org/10.1016/j.whi.2014.12.003	Excluded	Brief report; full pilot study published in 2016 (see Uebelacker et al., 2016)
Battle, C. L., Uebelacker, L. A., Sutton, K., Magee, S. R., & Miller, I. W. (2015). A Pilot Randomized Controlled Trial of Prenatal Yoga as an Intervention for Depression during Pregnancy. *International Journal of Yoga Therapy, 25*, 23. Retrieved from https://search-ebscohost-com.ezproxy.mnsu.edu/login.aspx?direct=true&db=awh&AN=115234442	Excluded	Pilot RCT- abstract only
Bressington, D., Mui, J., Yu, C., Leung, S. F., Cheung, K., Wu, C. S. T., Bollard, M., & Chien, W. T. (2019). Feasibility of a group-based laughter yoga intervention as an adjunctive treatment for residual symptoms of depression, anxiety and stress in people with depression. *Journal of Affective Disorders, 248*, 42-51. http://doi.org/10.1016/j.jad.2019.01.030	Excluded	Studied laughter yoga; did not meet inclusion criteria)
Bridges, L., & Sharma, M. (2017). The efficacy of yoga as a form of treatment for depression. *Journal of Evidence-Based Complementary & Alternative Medicine, 22*(4), 1017-1028. http://doi.org/10.1177/2156587217715927	Included	Systematic review of RCTs, quasi-experimental studies, and studies using pre/post tests
Cramer, H., Anheyer, D., Lauche, R., & Dobos, G. (2017). A systematic review of yoga for major depressive disorder. *Journal of Affective Disorders, 213*, 70-77. http://doi.org/10.1016/j.jad.2017.02.006	Included	Systematic review of RCTs
De Manincor, M. (2015). CIC #2b: Yoga for Reducing Depression and Anxiety, and Improving Wellbeing - Deciding What Approaches and Techniques in Research and Therapeutic Interventions. *International Journal of Yoga Therapy, 25*, 53. Retrieved from https://search-ebscohost-com.ezproxy.mnsu.edu/login.aspx?direct=true&db=awh&AN=115234436	Excluded	Community proposal for research piece
De Manincor, M., Bensoussan, A., Smith, C.A., Barr, K., Schweickle, M., Donoghoe, L.L., Bourchier, S., & Fahey, P. (2016). Individualized yoga for reducing depression and anxiety, and improving well-being: A randomized controlled trial. *Depression and Anxiety, 33,* 816-828. http://doi.org/10.1002/da.22502	Excluded	Participants with depression or anxiety; did not meet inclusion criteria
Do, D. & Saper, R. (2014). Impact of yoga on depression and anxiety. *Journal of Alternative and Complementary Medicine, 20*(5), A55. https://doi.org/10.1089/acm.2014.5143.abstract	Excluded	Abstract only for pilot study; not enough information available at this time
Duan-Porter, W., Coeytaux, R. R., McDuffie, J. R., Goode, A. P., Sharma, P., Mennella, H., Nagi, A., & Williams, J. W. (2016). Evidence map of yoga for depression, anxiety, and posttraumatic stress disorder. *Journal of Physical Activity & Health, 13(*3), 281-288. http://doi.org/10.1123/jpah.2015-0027	Included	Systematic review of RCTs
Falsafi, N. (2016). A randomized controlled trial of mindfulness versus yoga: Effects on depression and/or anxiety in college students. *Journal of the American Psychiatric Nurses Association, 22*(6), 483-497. http://doi.org/10.1177/1078390316663307	Excluded	Participants with depression or anxiety; did not meet inclusion criteria.

Genovese, J. E. C., & Fondran, K. M. (2016). Depression and anxiety decline after participation in a semester long yoga class. Psychology and Education: An Interdisciplinary Journal, 53(3-4), 52-54. Retrieved from http://ezproxy.mnsu.edu/login?url=https://search-proquest-com.ezproxy.mnsu.edu/docview/1845056902?accountid=12259	Excluded	Short journal article- study did not end up happening as planned but authors published a small portion of their research
Gong, H., Ni, C., Shen, X., Wu, T., & Jiang, C. (2015). Yoga for prenatal depression: A systematic review and meta-analysis. *BMC Psychiatry, 15*(14), 1-8. http://doi.org/10.1186/s12888-015-0393-1	Included	Systematic review of RCTs
Haas, W.C. (2016). Yoga for prenatal depression. *Integrative Medicine Alert,19*(2), 22-23.	Excluded	Short report; not enough information
Kinser, P. A., Elswick, R. K., & Kornstein, S. (2014). Potential long-term effects of a mind–body intervention for women with major depressive disorder: Sustained mental health improvements with a pilot yoga intervention. *Archives of Psychiatric Nursing, 28(*6), 377-383. http://doi.org/10.1016/j.apnu.2014.08.014	Included	RCT pilot with long term prospective cohort follow up
Kinser, P., & Masho, S. (2015). "I just start crying for no reason": The experience of stress and depression in pregnant, urban, African American adolescents and their perception of yoga as a management strategy. *Women's Health Issues, 25*(2), 142-148. http://doi.org/10.1016/j.whi.2014.11.007	Excluded	Studied adolescents; did not meet inclusion criteria
Lee, K.C., Tang, W.K., & Bressington, D. (2018). The experience of mindful yoga for older adults with depression. *Journal of Psychiatric and Mental Health Nursing, 26,* 87-100. http://doi.org/10.111/jpm.12517	Included	Qualitative, descriptive study of yoga in older adult population
Louie, L. (2014). The effectiveness of yoga for depression: A critical literature review. *Issues in Mental Health Nursing, 35*(4), 265-276. http://doi.org/10.3109/01612840.2013.874062	Excluded	Review of select literature; not systematic.
Mathersul, D.C. & Rosenbaum, S. (2016). The roles of exercise and yoga in ameliorating depression as a risk factor for cognitive decline. *Evidence-Based Complementary and Alternative Medicine, 2016,* 1-9. http://doi.org/10.1155/2016/4612953	Excluded	Review of select literature; not systematic.
Nauphal, M., Mischoulon, D., Uebelacker, L., Streeter, C., & Nyer, M. (2019). Yoga for the treatment of depression: Five questions to move the evidence-base forward. *Complementary Therapies in Medicine, 46*, 153-157. http://doi.org/10.1016/j.ctim.2019.08.012	Excluded	Journal article; not original research or systematic review of original research.
Naveen, G. H., Varambally, S., Thirthalli, J., Rao, M., Christopher, R., & Gangadhar, B. N. (2016). Serum cortisol and BDNF in patients with major depression—Effect of yoga. *International Review of Psychiatry, 28*(3), 273-278. http://doi.org/10.1080/09540261.2016.1175419	Excluded	Research focus on cortisol and bdnf levels; not specific to depression symptoms, management, or scale-based outcomes; did not meet inclusion criteria
Newham, J.J., Wittkowski, A., Hurley, J., Aplin, J.D., & Westwood, M. (2014). Effect of antenatal yoga on maternal anxiety and depression: A randomized controlled trial. *Depression and Anxiety, 31*, 631-640. http://doi.org/10.1002/da.22268	Excluded	Participants with depression or anxiety; did not meet inclusion criteria
Nugent, N. R., Brick, L., Armey, M. F., Tyrka, A. R., Ridout, K. K., & Uebelacker, L. A. (2019). Benefits of yoga on il-6: Findings from a randomized controlled trial of yoga for depression. *Behavioral Medicine*, http://doi.org/10.1080/08964289.2019.1604489	Excluded	Research focus on IL-6 mediated inflammation; not specific to depression symptoms, management, or scale-based outcomes; did not meet inclusion criteria

Nyer, M., Gerbarg, P. L., Silveri, M. M., Johnston, J., Scott, T. M., Nauphal, M., Owen, L., Nielsen, G.H., Mischoulon, D., Brown, R.P., Fara, M., & Streeter, C. C. (2018). A randomized controlled dosing study of iyengar yoga and coherent breathing for the treatment of major depressive disorder: Impact on suicidal ideation and safety findings. Complementary Therapies in Medicine, 37, 136-142. http://dx.doi.org/10.1016/j.ctim.2018.02.006	Included	RCT examining yoga and suicidal ideation and depressive symptoms
Pradhan, B., Parikh, T., Makani, R., & Sahoo, M. (2015). Ketamine, transcranial magnetic stimulation, and depression specific yoga and mindfulness based cognitive therapy in management of treatment resistant depression: Review and some data on efficacy. *Depression Research and Treatment, 2015,* 1-14. http://doi.org/10.1155/2015/842817	Excluded	Studied yoga in combination with ketamine and magnetic therapy; did not meet inclusion criteria
Prathikanti, S., Rivera, R., Cochran, A., Tungol, J. G., Fayazmanesh, N., & Weinmann, E. (2017). Treating major depression with yoga: A prospective, randomized, controlled pilot trial. *PLoS ONE, 12*(3), 36. https://doi.org/10.1371/journal.pone.0173869	Included	RCT
Rao, R.M., Raghuram, N., Nagendra, H.R., Usharani, M.R., Gopinath, K.S., Diwakar, R.B., Patil, S., Bilimagga, R.S., & Rao, N. (2015). Effects of integrated yoga program on self-reported depression scores in breast cancer patients undergoing conventional treatment: A randomized controlled trial. *Indian Journal of Palliative Care, 21*(2), 174-181. http://doi.org/10.4103/0973-1075.156486	Included	RCT
Sarubin, N., Nothdurfter, C., Schüle, C., Lieb, M., Uhr, M., Born, C., Zimmermannc, R., Buhner, M., Konopka, K., Ruppercht, R., & Baghai, T. C. (2014). The influence of Hatha yoga as an add-on treatment in major depression on hypothalamic-pituitary-adrenal-axis activity: A randomized trial. *Journal of Psychiatric Research, 53,* 76-83. http://doi.org/10.1016/j.jpsychires.2014.02.022	Excluded	Outcome measure was HPA-axis activity; not specific to depression symptoms, management, or scale-based outcomes; did not meet inclusion criteria
Schuver, K. J., & Lewis, B. A. (2016). Mindfulness-based yoga intervention for women with depression. *Complementary Therapies in Medicine, 26,* 85-91. http://doi.org/10.1016/j.ctim.2016.03.003	Included	Prospective pilot RCT
Skowronek, I.B., Mounsey, A., & Handler, L. (2014). Can yoga reduce symptoms of anxiety and depression? *The Journal of Family Practice, 63*(7),398-407.	Excluded	Journal article; not original research or systematic review of original research
Slomski, A., M.A. (2019). Yoga for anxiety and depression associated with Parkinson disease: *The Journal of the American Medical Association, 322(*4), 296. http://doi.org/10.1001/jama.2019.10369	Excluded	News piece/clinical trial update
Streeter, C. C., Gerbarg, P. L., Whitfield, T. H., Owen, L., Johnston, J., Silveri, M. M., Gensler, M., Faulkner, C.L., Mann, C., Qixted, M., Hernon, A.M., Nyer, M.B., Brown, E., Richard, P., Jensen, & Jensen, J. E. (2017). Treatment of major depressive disorder with iyengar yoga and coherent breathing: A randomized controlled dosing study. *The Journal of Alternative and Complementary Medicine, 23*(3), 201-207. http://doi.org/10.1089/acm.2016.0140	Included	RCT (dose finding)
Tejvani, R., Metri, K. G., Agrawal, J., & Nagendra, H. R. (2016). Effect of Yoga on anxiety, depression and self-esteem in orphanage residents: A pilot study. *AYU: An International Quarterly Journal of Research in Ayurveda, 37*(1), 22 -25. https://doi.org/10.4103/ayu.AYU_158_15	Excluded	Studied children/adolescents; did not meet inclusion criteria
Toschi-Dias, E., Tobaldini, E., Solbiati, M., Costantino, G., Sanlorenzo, R., Doria, S., . . . Montano, N. (2017). Sudarshan kriya yoga improves cardiac autonomic control in patients with anxiety-depression disorders. *Journal of Affective Disorders, 214*, 74-80. https://doi.org/10.1016/j.jad.2017.03.017	Excluded	Participants with depression or anxiety; did not meet inclusion criteria
Uebelacker, L.A., Battle, C.L., Sutton, K.A., Magee, S.R. & Miller, I.W. (2016). A pilot randomized controlled trial comparing prenatal yoga to perinatal health education for antenatal depression. *Archives of Women's Mental Health, 19*(3)*,* 543-547. http://doi.org/10.1007/s00737-015-0571-7	Included	Pilot RCT

Uebelacker, L. A., Kraines, M., Broughton, M. K., Tremont, G., Gillette, L. T., Epstein-Lubow, G., Abrantes, A.M., Battle, C., & Miller, I. W. (2017). Perceptions of Hatha yoga amongst persistently depressed individuals enrolled in a trial of yoga for depression. *Complementary Therapies in Medicine, 34*, 149-155. http://doi.org/10.1016/j.ctim.2017.06.008	Excluded	Studied student's perceptions of yoga, not outcomes the intervention or self management
Uebelacker, L. A., Tremont, G., Gillette, L. T., Epstein-Lubow, G., Strong, D. R., Abrantes, A. M., Turka, A.R., Tran, T., Guadiano, B.A., & Miller, I. W. (2017). Adjunctive yoga v. health education for persistent major depression: A randomized controlled trial. *Psychological Medicine, 47*(12), 2130-2142. http://doi.org/10.1017/S0033291717000575	Included	RCT
Uebelacker, L. A., Weinstock, L. M., Battle, C. L., Abrantes, A. M., & Miller, I. W. (2018). Treatment credibility, expectancy, and preference: Prediction of treatment engagement and outcome in a randomized clinical trial of Hatha yoga vs. health education as adjunct treatments for depression. *Journal of Affective Disorders, 238,* 111-117. http://doi.org/10.1016/j.jad.2018.05.009	Excluded	Studied treatment program preference, credibility, or expectancy to predict engagement in depression interventions; did not meet inclusion criteria
Velásquez, A. M., López, M. A., Quiñonez, N., & Paba, D. P. (2015). Yoga for the prevention of depression, anxiety, and aggression and the promotion of socio-emotional competencies in school-aged children. *Educational Research and Evaluation, 21*(5-6), 407-421. http://doi.org/10.1080/13803611.2015.1111804	Excluded	Studied children; did not meet inclusion criteria
Weinstock, L. M., Broughton, M. K., Tezanos, K. M., Tremont, G., Gillette, T., & Uebelacker, L. A. (2016). Adjunctive yoga versus bibliotherapy for bipolar depression: A pilot randomized controlled trial. *Mental Health and Physical Activity, 11*, 67-73. http://doi.org/10.1016/j.mhpa.2016.11.001	Excluded	Studied patients with bipolar depression only; did not meet inclusion criteria

Table 4

Included studies and descriptive factors

Reference	Study Purpose	Pop (N)/Sample size (n)/Setting	Sample Detail	Design/Level of Evidence	Instruments	Intervention and Control Group	Findings	Implications for research and/or practice	Limitations
Bridges, L., & Sharma, M. (2017). The efficacy of yoga as a form of treatment for depression. *Journal of Evidence-Based Complementary & Alternative Medicine, 22*(4), 1017-1028. http://doi.org/10.1177/2156587217715927	Impact of various schools of yoga on depressive symptoms.	Total number of participants across all 23 studies reviewed not indicated. n=14 to 136 participants per study. Outpatient setting.	Age 18+ with depression diagnosis. Varying co morbidities: cancer, addiction, post stroke hemiparesis, low back pain, college students, pregnancy, postpartum, a. fib, caregivers, low income.	Systematic review of 23 RCTs, quasi-experimental, and pretest/posttest (mostly RCTs) from 2011- May 2016. Level I-III	11 clinician assisted depression scales- ex: Beck Depression Inventory (BDI), Hamilton Rating Scale for Depression (HAM-D), Edinburgh Postnatal Depression Scale (EPDS)	Interventions: at least one hour of yoga (mostly Hatha but various types with focus on asana [movement] and pranayama [breathing]) per week; duration 1-32 weeks. Controls: exercise, physical therapy, non-yogic breathing, counseling, education, tai chi, assessment only, relaxation CD, antidepressant medication.	Yoga interventions effective in reducing depression in pregnant women, low back pain, a. fib, post-stroke hemiparesis, and addiction groups. Studies looking at breast cancer patients showed mixed results. Postpartum showed mixed results.	Many variables- geographic location, socioeconomic status, co morbidities, time and duration of intervention, style of intervention (type of yoga), etc need to be controlled for and explored in future studies. Authors suggest using behavioral theories/techniques when designing and evaluating future interventions since psychotherapy techniques are used to manage depressive symptoms.	Only 4 studies used power analysis, which limits the study of effectiveness of intervention on depression. Small sample sizes limit power for statistical analysis. Most studies were on short-term effects (less than 3 months).
Cramer, H., Anheyer, D., Lauche, R., & Dobos, G. (2017). A systematic review of yoga for major depressive disorder. *Journal of Affective Disorders, 213*, 70-77.	Efficacy and safety of yoga in patients with major depressive disorder. Primary outcomes: remission rates and severity. Secondary	n= 240 participants across 7 studies; inpatient or outpatient setting; 20 to 53 participants per study, average n=30 per study	Age 18+ with DSM-IV or DSM-V diagnosis of major depressive disorder.	Systematic review of 7 RCTs from three major search engines from inception to 2016. Level I	Clinician assisted depression scales such as HAM-D and BDI.	Interventions: pranayama or asana- usually both. Some also incorporated focus on meditation or relaxation. Control: standard care, no intervention, ECT, antidepressants, walking, phone counseling, therapist facilitated attention.	Yoga is as efficacious as other interventions. Methodological problems and unclear risk-benefit ratio preclude definite recommendations.	Yoga may be useful in managing depression. Further studies needed due to small number of RCTs in this review and low sample sizes. High bias risk in current studies. Safety largely unclear although previous RCTs report no serious adverse events.	Larger, adequately powered RCTs needed.

http://doi.org/10.1016/j.jad.2017.02.006	outcomes: anxiety level and adverse events.								
Duan-Porter, W., Coeytaux, R. R., McDuffie, J. R., Goode, A. P., Sharma, P., Mennella, H., Nagi, A., & Williams, J. W. (2016). Evidence map of yoga for depression, anxiety, and posttraumatic stress disorder. *Journal of Physical Activity & Health, 13(*3), 281-288. http://doi.org/10.1123/jpah.2015-0027	Yoga's effectiveness for reducing symptomology in patients with depressive disorders (as well as GAD, PD, and PTSD). Each diagnosis was examined separately, so this study will be included.	n=706 participants across 18 studies; inpatient or outpatient setting	Age 18+ with depression diagnosis. Some with other mental health co morbidities. Exclusion criteria: excluding bipolar, schizophrenia, personality disorders.	Systematic review including: 1 systematic review, 14 RCTs, 3 completed but unpublished trials. Level I	Various clinician assisted depression scales.	Intervention: various types of yoga (all include asana and pranayama) of various duration or intensity. Control groups: antidepressants, no intervention, relaxation, exercise, ECT.	Yoga improves short-term depressive symptoms but trials were heterogeneous and high risk of bias. Yoga more efficacious than relaxation or aerobic exercise. Higher quality of life outcomes with yoga versus relaxation. Outcomes assessed at median time of 10 weeks.	Need RCTs focusing on comparison to specific groups of antidepressants, remission rates, health related quality of life, and long-term outcomes such as functional status. Most studies do not provide sufficient data on "dosing" details- instructor background/training, level of guidance from instructor, amount of time subjects practiced, amount of time spent on yoga when used with another intervention- i.e. MBSR.	Larger RCTs needed. Heterogeneous studies. High risk of bias.
Gong, H., Ni, C., Shen, X., Wu, T., & Jiang, C. (2015). Yoga for prenatal depression: A systematic review and meta-analysis. *BMC Psychiatry, 15*(14), 1-8. http://doi.org/10.1186/s12888-015-0393-1	Effectiveness of yoga in management of prenatal depression.	n=375 across 6 RCTs; outpatient setting	Prenatal adults (most between ages of 20-40) women with depression.	Systematic review and meta-analysis of 6 RCTs found using four search engines from inception through July, 2014. Level I	Structured Clinical Interview for DSM-IV and Center for Epidemiological Studies Depression Scale.	Intervention: asana or asana + pranayama, meditation, or deep relaxation (integrated yoga) of unspecified duration. Average duration of intervention= 12 weeks. Control groups: standard prenatal care, standard antenatal exercises, social support.	Prenatal yoga may be effective in partially reducing depressive symptoms. Asana + pranayama, meditation, or deep relaxation more effective than asana alone (significant $p<0.00001$ vs. non significant). Integrated yoga beneficial for both depressed and non-	More RCTs with larger sample sizes and standardized yoga interventions needed.	Significant heterogeneity of controls. Effect of yoga may be underestimated due to lack of homogenous controls. Authors note that scales used may overestimate depression because they include physical symptoms that may be inherent to pregnancy (tiredness, lack of energy).

							depressed prenatal women. Yoga setting yields greater reduction in depressive symptoms than exercise in non-yoga setting.		
Kinser, P. A., Elswick, R. K., & Kornstein, S. (2014). Potential long-term effects of a mind–body intervention for women with major depressive disorder: Sustained mental health improvements with a pilot yoga intervention. *Archives of Psychiatric Nursing, 28(*6), 377-383. http://doi.org/10.1016/j.apnu.2014.08.014	Effectiveness of yoga for women with MDD using standardized outcome measures and a long follow up (1 year post intervention) to fill current research gaps.	n=27 randomized; outpatient setting	Women ages 18+ with confirmed diagnosis of MDD or dysthymia.	RCT pilot with long-term prospective cohort follow up. Level IV	Face to face visit (qualitative information) and PHQ-9. Secondary outcome instruments: Perceived Stress Scale 10 (PSS-10), State Trait Anxiety Inventory (STAI), Ruminative Responses Scale (RRS).	Intervention: 75-minute weekly Hatha yoga class plus daily home practice with DVD or handout made by instructor for 8 weeks. Control: health education (75 min session conducted by RN) for 8 weeks. All participants encouraged to continue current lifestyle, medications, etc.	Significant decrease in long-term depressive symptoms in yoga participants ($p = 0.0017$. Decreases in rumination and stress levels ($p = 0.0172$). Qualitative data: Participants reported long term benefits from having practiced yoga, regardless of if currently practicing or not. Report yoga as a tool in toolbox to manage stress and depressive symptoms. Acknowledgement that long term yoga practice may be challenging due to time, finances, or anhedonia. Report having a yoga buddy may be helpful for long-term adherence.	Several participants noted that they would be more motivated if recommendation to practice yoga came from healthcare providers. Healthcare providers should consider how to integrate recommendations for mind-body modalities into practice. More long-term studies needed. Research needed to improve rigor of interventions protocols and improve reporting.	Very small sample size- generalizability limited. Volunteer bias (those who volunteered to participate in long term follow up may have better mental health status).

Lee, K.C., Tang, W.K., & Bressington, D. (2019). The experience of mindful yoga for older adults with depression. *Journal of Psychiatric and Mental Health Nursing, 26,* 87-100. http://doi.org/10.111/jpm.12517	Exploring the experience of mindful yoga (yoga combined with a MBSR approach) on older adults with depression.	n=9 randomized; outpatient setting	Age 65+ with ICD-10 diagnosis of depression	Descriptive, qualitative study. Level V	Face to face interviews following the program (no more than 2 weeks post) and at 4 weeks post intervention.	Intervention: Eight weekly (3 hour per week) sessions combining yoga postures with MBSR techniques. Home practice with printed guidebook for 30-45 min per day during intervention. No control.	Mindful yoga may be safe/effective at improving mental and physical health of older adults. Six themes emerged: improved physical status, actively involved in community, positive psychological effects, perceived therapeutic ingredients, facilitators of practicing mindful yoga, and barriers to practicing mindful yoga.	May be useful to study single sex intervention groups in future. High quality studies with control groups needed.	Small sample. No randomization/control.
Nyer, M., Gerbarg, P. L., Silveri, M. M., Johnston, J., Scott, T. M., Nauphal, M., Owen, L., Nielsen, G.H., Mischoulon, D., Brown, R.P., Fara, M., & Streeter, C. C. (2018). A randomized controlled dosing study of iyengar yoga and coherent breathing for the treatment of major depressive disorder: Impact on suicidal ideation and safety findings.	Safety of yoga for individuals with MDD, as well as effect on suicidal ideation without intent.	n=32 randomized; outpatient setting	Age 18-55, current SCID diagnosis of MDD, and at least mild to moderate depression based on BDI-II scores (14-28). Co morbid anxiety disorders allowed. Patients treated with antidepressants, receiving psychotherapy within the previous 3 months, doing more than 6 one hour mind-body practices in the past 6 months, patients with a regular prayer or meditation practice (>2h/wk), bipolar or psychosis diagnosis, lifetime	Randomized controlled dose-finding study. Level II	Structured clinical interview including both BDI-II and Columbia-Suicide Severity Rating Scale (C-SSRS) at start and completion. Weekly Safety Form. Clinical evaluation by psychiatrist at baseline and psychiatrist or clinical psychologist at weeks 4,8, and 12-review of the	Interventions: Two arms: Low dose group (two 90 min yoga classes plus three 30 min homework sessions weekly), high dose group (three 90 min classes plus four 30 min hw sessions weekly. 12 week intervention duration for both arms. No control group.	Decrease in depressive symptoms and SI in both dosing groups (greater reduction in depressive sx but not SI in higher dose group). Good adherence and tolerability of intervention. Combined report of SI on BDI-II: 9 at screening, 1 at week 12. Combined report of SI on C-SSRS: 10 at screening, 1 at week 12. Adverse effects: musculoskeletal soreness or pain, one report of headache, one nosebleed not requiring medical attention (likely	Yoga with emphasis on asana and pranayama may be a promising intervention for individuals with MDD and SI without plan.	Majority of participants were Caucasian females. More research needed in other cultural groups. Larger RCTs with longer durations needed to validate/extend preliminary findings.

Complementary Therapies in Medicine, 37, 136-142. http://dx.doi.org/10.1016/j.ctim.2018.02.006			history of suicide attempt, current alcohol/substance abuse/dependence were excluded.		three forms.		related to pre-existing condition), one report of dizziness. No serious AEs.		
Prathikanti, S., Rivera, R., Cochran, A., Tungol, J. G., Fayazmanesh, N., & Weinmann, E. (2017). Treating major depression with yoga: A prospective, randomized, controlled pilot trial. *PLoS ONE, 12*(3), 36. https://doi.org/10.1371/journal.pone.0173869	Efficacy of yoga on symptoms of MDD in adults. Strict exclusion criteria in attempt to look at yoga as monotherapy.	n=38 randomized; outpatient setting	Age 18+ (mean age 43), exclusions: antidepressants or herbals/nutraceutical mood-remedies within past 2 months, current or plan to initiate psychotherapy or mind-body practices during the duration of study.	Randomized, controlled, single-blind, prospective trial. Level IV	Evaluation with Mini International Neuropsychiatric Interview and BDI-II. GSES (self-efficacy measure) and RSES (self-esteem measure). Qualitative feedback questionnaire at the end of study.	Intervention: 90 minute in person Hatha yoga twice weekly. Control: 90 minute attention control education group twice weekly. Duration of intervention = 8 weeks.	Statistically (p=0.034) and clinically significant reduction in symptom severity and remission rates in adults with mild to moderate MDD (p = 0.034). Yoga participants more likely to achieve remission defined as BDI score less than or equal to 9 (p = 0.018). Large effect size of yoga reducing BDI scores (Cohen's d = -0.96, 95% CI, -1.81 to -0.12). Retention rates 75% in yoga, 56% in control- statistically comparable. Self-efficacy improved in both yoga and control groups. Self-esteem only improved in yoga group. No serious AEs; 2 msk injuries (occurred outside of study setting). Qualitative questionnaire findings: participants did not feel that depressive sx interfered with participation; most	Yoga with emphasis on asana and pranayama maybe a promising intervention for individuals with MDD and SI without plan. More studies needed to clarify impact of yoga elements (asana vs. pranayama) on mood and to study optimal combination. Suggest several populations that could benefit from this non-pharm intervention/research: perinatal, adolescents, medically frail seniors, those with medication sensitivities.	Conclusions can not be drawn from such a small sample size. Post-intervention interviews done immediately after yoga- responses may reflect acute effect of treatment. Difficult to identify the optimal "dose" of yoga.

							made positive comments about their learning experience; most suggested increasing the sessions to three times weekly if repeated.		
Rao, R.M., Raghuram, N., Nagendra, H.R., Usharani, M.R., Gopinath, K.S., Diwakar, R.B., Patil, S., Bilimagga, R.S., & Rao, N. (2015). Effects of integrated yoga program on self-reported depression scores in breast cancer patients undergoing conventional treatment: A randomized controlled trial. *Indian Journal of Palliative Care, 21*(2), 174-181. http://doi.org/10.4103/0973-1075.156486	Impact of yoga versus supportive therapy on self-reported symptoms of depression in breast cancer patients.	n=98 randomized; inpatient and outpatient setting- depending on participant treatment regimen	Women w/ newly diagnosed breast CA, age 30-70, Zubrod performance status of 0-2 (ambulatory >50% of time), high school education, treatment with surgery followed by either RT or CT. Exclusions: concurrent medical condition likely to interfere w/ treatment, major psychiatric, neurological, or autoimmune diseases, or secondary malignancy.	Randomized, controlled trial. Level II	BDI at baseline, after surgery, before/during /after radiotherapy or chemotherapy.	Intervention: Integrative yoga 60 min daily goal, but minimum of 60 min three times per week (asana, pranayama, meditation, yogic relaxation with imagery). Sessions occurred with instructors during hospitalizations. Instructors monitored home practice when participants not hospitalized. Duration of intervention = 24 weeks. Control: supportive expressive therapy with education (unstructured) given during hospital visits and during adjuvant RT and CT cycles. Participants encouraged to talk to their counselor any time during the study. Participants excluded if become too sick to complete 60% of sessions.	Overall decrease in self-reported depression in both groups. Significant decrease in depression in yoga group compared to controls before ($p=0.01$) and during ($p=0.01$)radiation, and before ($p=0.05$) and during ($p=0.001$) chemo. Positive correlation between depression scores, symptom severity, and distress during surgery, RT, or CT ($p<0.001$). Results suggest possible antidepressant effect of yoga in breast cancer patients undergoing conventional treatment.	Integrative yoga is beneficial in reducing self-reported symptoms of depression in this population. More studies needed.	Yoga and control groups did not receive the same amount of intervention time. BDI symptoms may mimic symptoms of cancer disease (lack of energy, fatigue, anorexia, weight loss)- which could have contributed to increased BDI scores (however, all members underwent conventional therapy, so could have had floor effect across entire study).

Schuver, K. J., & Lewis, B. A. (2016). Mindfulness-based yoga intervention for women with depression. *Complementary Therapies in Medicine, 26,* 85-91. http://doi.org/10.1016/j.ctim.2016.03.003	Efficacy of mindfulness-based yoga on depression and rumination symptoms in depressed women.	n=40 randomized; outpatient setting	Women 18+ (age range 20-64) with personal history of depression (ever being told by a healthcare provider they had depression or had been given an antidepressant for depression), read/write English, commit to two sessions of yoga or walking per week for 12 weeks, yoga naive (not more than four yoga classes in past two years or more than one class in past month).	Randomized controlled prospective pilot trial. Level IV	BDI and RRS at baseline, post-intervention (12 week mark), and 1 month follow up.	Intervention: Mindfulness-based yoga for 12 weeks (home based DVD including asana, pranayama, and meditation along with telephone based mindfulness education). Control: home based walking plus health education sessions delivered via phone. Exercise logs kept in both groups.	Significant decreases in depressive symptoms in both groups ($p<0.001$ yoga group, $p<0.01$ home walking group) from baseline to post-intervention and from baseline to one-month follow up. No significant difference between groups after controlling for baseline. Decrease in rumination in yoga group but not control at post-intervention ($p<0.01$), but not 1 month. High adherence rates >80% in both groups (higher in yoga group).	Mindfulness-based yoga may provide tools to manage ruminative thoughts in women with depressive symptoms. Yoga may provide opportunity to focus on alternative thoughts/sensations versus rumination. Decrease in symptoms with both yoga and walking is promising since physical activity has physical and mental benefits. Recommend measuring biomarkers such as cortisol, and objective measures of physical activity in future studies. Recommend further study due to increasing interest in CAM.	Majority of participants were Caucasian, educated, employed, and of mid-high socioeconomic status, which may have lowered statistical power to find differences between groups. Measures (home practice or walking) were self-reported.

Streeter, C. C., Gerbarg, P. L., Whitfield, T. H., Owen, L., Johnston, J., Silveri, M. M., Gensler, M., Faulkner, C.L., Mann, C., Qixted, M., Hernon, A.M., Nyer, M.B., Brown, E., Richard, P., Jensen, & Jensen, J. E. (2017). Treatment of major depressive disorder with iyengar yoga and coherent breathing: A randomized controlled dosing study. *The Journal of Alternative and Complementary Medicine, 23*(3), 201-207. http://doi.org/10.1089/acm.2016.0140	Determine effects of Iyengar yoga and coherent breathing at five breaths per minute on depressive symptoms, and determine optimal interventions for yoga dosing for future studies.	n=30 randomized; outpatient setting	Ages 18-55 years old, current diagnosis of MDD (BDI-II); co morbid anxiety disorders allowed if would not interfere with participation. Exclusions: antidepressants/benzos/mood stabilizers, psychotherapy during 3 months prior to screening, more than six 1 hour mind-body practices in past 6 months, current prayer practice >2h/week, bipolar/psychosis/substance abuse/dependence.	Randomized controlled dose-finding study. Level II	BDI-II	Intervention: high dose group (3 90 min classes per week), low dose group (2 90 min classes per week). 12 week program.	Significant decreases in BDI-II scores in both high and low dose groups from screening to week 12 ($p < 0.001$) in both dosing groups; 95% CI -22.3 to -14.9 in HDG and -22.8 to -12.5 in LDG). No significant differences between groups after the 12 week mark, although a greater number of HDG participants had BDI-II scores less than or equal to 10. No serious AEs. 13 reports of transient muscle soreness. Study supports the use of Iyengar/breathing to alleviate depressive symptoms in people with MDD.	Yoga-base intervention may be useful for avoiding drug side effects and drug-drug interactions. May be good adjunct therapy.	Small sample size, no active control group. Two subjects started psychotherapy during the study, which may have impacted results.

Uebelacker, L.A., Battle, C.L., Sutton, K.A., Magee, S.R. & Miller, I.W. (2016). A pilot randomized controlled trial comparing prenatal yoga to perinatal health education for antenatal depression. *Archives of Women's Mental Health, 19*(3), 543-547. http://doi.org/10.1007/s00737-015-0571-7	Determine feasibility, safety, adherence, and change in depression severity after prenatal yoga intervention.	n=20; outpatient setting	Age 18+, 12-26 weeks pregnant, diagnosis of major or minor depression in current pregnancy, present moderate depressive symptoms (Quick Inventory of Depressive Symptomatology [QIDS]), not currently practicing yoga, medical clearance, English speaking. Exclusion: bipolar, schizophrenia, current or chronic psychosis; Severe PTSD/OCD/panic disorder; drug/alcohol use, acute suicidality.	Randomized controlled trial pilot. Level II	QIDS for screening for inclusion, DSM-IV Structured Clinical Interview and QIDS and EPDS for assessment and follow up screening.	Intervention: prenatal yoga (75 minute class weekly) followed by home practice which was measured every three weeks. Control: mom-baby wellness workshop (75 minutes). Duration of study- 9 weeks.	Results found good feasibility, acceptability, and safety of yoga in prenatal subjects. No injury or AEs. Depression severity decreased in both groups, but decreased more in yoga control. Decreased depression severity suggests prenatal yoga may be a useful intervention.	Further investigation needed. Pregnant women need more treatment options for depression. Prenatal yoga is an exciting alternative because of wide accessibility, potential positive impact on mental and physical health, and acceptability to pregnant women.	Small sample size/study not powered for detection of effect; results must be interpreted with caution. No blinding to intervention (impossible when studying behavioral interventions).
Uebelacker, L. A., Tremont, G., Gillette, L. T., Epstein-Lubow, G., Strong, D. R., Abrantes, A. M., Turka, A.R., Tran, T., Guadiano, B.A., & Miller, I. W. (2017). Adjunctive yoga v. health education for persistent major depression: A randomized controlled trial.	Determine effectiveness of Hatha yoga as an adjunctive treatment (in addition to antidepressants) in individuals with depression. Secondary outcomes: depression symptoms over the	n=122 randomized; outpatient setting	Age 18+ Inclusion criteria: met criteria for MDD in past two years (per structured clinical interview for DSM-IV), QIDS score of mild or moderate depression, medical clearance, English speaking. Exclusion criteria: bipolar, schizophrenia, psychotic sx; drug/alcohol abuse; suicidal ideation	RCT. Level II	Primary outcome measure= QIDS at 10 weeks.	Intervention: Invited to attend 1 to 2 80 minute Hatha classes per week for 10 weeks. Control: healthy living workshop (HLW)- invited to attend 1 to 2 60 min session weekly for 10 weeks (topics varied- alcohol, nicotine, caffeine, being a smart patient, nutrition, brain disease, cancer prevention, germs/cold/flu, sleep, physical pain, depression, heart protection, diabetes).	No significant difference between groups (as assessed by QIDS score) at 10 weeks point. Significantly higher odds of treatment response for yoga vs. HLW group, and lower depression severity in yoga group at 3 and 6 month follow up($p = 0.03$, 95% CI 1.12-5.37). Yoga group also had better social/work/role function and health perceptions at follow	Yoga may teach individuals skills for coping with depressed mood/cognition that may be practiced off the mat (in real life scenarios). Also points towards likelihood that medication plus CBT (which also affects mood/cognition) would be more useful than medication alone. Areas for further research: how much yoga each week and over what period of time needed for clinically significant	Sample predominantly female and Caucasian. Small to medium effect size.

Psychological Medicine, 47(12), 2130-2142. http://doi.org/10.1017/S0033291717000575	entire intervention and follow up periods, social and role functioning, general health perceptions, pain, and physical functioning.		requiring intervention, taking antidepressant at a dose demonstrating effectiveness for at least 8 weeks (can be taking but must not have full effectiveness per American Psychiatric Association practice guidelines), antidepressants changed in past 4 weeks or plans to change them in next 10 weeks, psychotherapy frequency change in past 6 or next 10 weeks, pregnancy, no more than 4 mind-body/yoga sessions in previous year or 8 in two years.			Assessments occurred at 10 weeks (completion of intervention), 3 and 6 months post.	up points. No statistically significant difference in yoga vs. HLW achieving full remission. No differences between yoga and HLW in pain or physical functioning. No serious adverse events in either arm.	difference in depression symptoms?	