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## Review Articles

# Critical Analysis of the Efficacy of Meditation Therapies for Acute and Subacute Phase Treatment of Depressive Disorders: A Systematic Review

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**Background:** Recently, the application of meditative practices to the treatment of depressive disorders has met with increasing clinical and scientific interest, owing to a lower side-effect burden, potential reduction of polypharmacy, and theoretical considerations that such interventions may target some of the cognitive roots of depression. **Objective:** We aimed to determine the state of the evidence supporting this application. **Methods:** Randomized controlled trials of techniques meeting the Agency for Healthcare Research and Quality definition of meditation, for participants having clinically diagnosed depressive disorders, not currently in remission, were selected. Meditation therapies were separated into praxis (i.e., how they were applied) components, and trial outcomes were reviewed. **Results:** 18 studies meeting the inclusion criteria were identified, encompassing 7 distinct techniques and 1173 patients. Mindfulness-Based Cognitive Therapy comprised the

largest proportion of studies. Studies including patients having acute major depressive episodes ( $n = 10$  studies), and those with residual subacute clinical symptoms despite initial treatment ( $n = 8$ ), demonstrated moderate to large reductions in depression symptoms within the group, and relative to control groups. There was significant heterogeneity of techniques and trial designs. **Conclusions:** A substantial body of evidence indicates that meditation therapies may have salutary effects on patients having clinical depressive disorders during the acute and subacute phases of treatment. Owing to methodologic deficiencies and trial heterogeneity, large-scale, randomized controlled trials with well-described comparator interventions and measures of expectation are needed to clarify the role of meditation in the depression treatment armamentarium.

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## INTRODUCTION

Depressive disorders, including major depressive disorder (MDD) and dysthymia, have a 12-month prevalence of approximately 7%<sup>1</sup> in the general population, and the prevalence is higher in hospitalized patients with medical illness<sup>2</sup> and ambulatory medical patients.<sup>3,4</sup> However, initial trials of currently available pharmacologic and psychotherapeutic treatments result in depression remission less than 50% of the time with multiple trials<sup>5,6</sup> and overall have

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moderate effect sizes.<sup>7</sup> Furthermore, in patients with comorbid medical illness, pharmacotherapeutics for depression carry the risk for polypharmacy, drug-drug interactions, and increased side effects. There is a need for new depression treatments with a more favorable risk/benefit profile and different mechanisms of action from existing treatments. Interest in the use of mind-body therapies for MDD and other psychiatric disorders is high among patients<sup>8</sup> and increasing among practitioners: for example, “mindfulness” is highest among the therapeutic orientations rated most likely to increase in use over the coming decade by psychotherapy experts.<sup>9</sup>

### Definition of Meditation

The term meditation refers to a broad set of psychosomatic practices that involve training and regulating attention toward interoceptive or exteroceptive foci, or intentionally created mental images, while observing or redirecting attention from distracting thoughts.<sup>10–15</sup> Examples of interoceptive foci are sensations associated with the breath or other parts of the body, or “awareness itself”; exteroceptive foci may include such things as a statue or flame; and mentally generated imaginal representations may include verbal mantras (repetitive words or sets of syllables) or visual images.<sup>16,17</sup> Those meditation techniques involving sustained attention to a specific focus or limited range of inner or outer experience have often been referred to as concentrative or focused attention practices, whereas those incorporating a broader attentional spotlight to an array of changing stimuli have been called mindfulness, open-awareness, or open monitoring practices.<sup>18–20</sup> Open monitoring practices de-emphasize delineation of an explicit focus in favor of nonreactive but clear and vivid observation of moment-to-moment experiences.<sup>19</sup>

There is disagreement about which therapies are based on meditation and are comparable in mechanism of action. In attempting to address this controversy, the Agency for Healthcare Research and Quality proposed a consensus definition of meditation using a modified Delphi process.<sup>21</sup> This definition suggested that there are 3 principles essential to meditation: a defined technique, logic relaxation, and a self-induced state or mode. “Defined technique” denotes a describable set of instructions; “logic relaxation” refers to a lack of “intent” to analyze, judge, or

create expectations regarding the practice; and “self-induced state” distinguishes meditation from hypnosis or guided imagery practices. A few examples of practices identified as meditation-based included mindfulness, many types of yoga, Tai Chi, Transcendental Meditation, and qigong. However, this definition met with some criticism owing to its relative nonspecificity.<sup>22</sup> A more recent iteration from the Agency for Healthcare Research and Quality was to dissociate “purely meditative” techniques, done while maintaining a stationary posture, from those that used a meditative awareness during movement; however, a detailed rationale for excluding the movement practices while retaining stationary meditation groupings was not provided.<sup>23</sup>

### Meditation and Acute Psychologic Symptoms

When performing meta-analysis of the clinical literature on meditation techniques used as therapeutics for psychologic symptoms, many authors have collapsed across different meditation therapies using the same type of meditation (e.g., Mindfulness-Based Stress Reduction and Mindfulness-Based Cognitive Therapy [MBCT]), or broad categories of meditation or mindfulness techniques, such as focused attention and open monitoring, or with and without movement, and tried to draw conclusions about the effect size of meditation or mindfulness techniques as a group.<sup>24–29</sup> These meta-analyses have generally concluded that meditation techniques provide small to moderate salutary benefits for symptoms of depression or anxiety, and for patients with comorbid medical illnesses such as cancer, rheumatoid arthritis, fibromyalgia, and heart disease. Of these meta-analyses, 2 also analyzed meditation therapies by technique, but when doing so collated subjects with divergent symptom types (anxiety and mood) and severity, potentially confounding the results.<sup>28,29</sup>

There are difficulties in identifying the efficacious components across meditation therapies for several reasons. First, a rigorous comparison of the praxis elements of individual meditative therapies has not been undertaken, and thus the extent of commonality is not known. Because there is evidence to suggest that different meditative practices involve different neuronal substrates, it is likely that meditation therapies that incorporate different practices affect the biologic substrates of target psychologic symptoms differently.<sup>20,30</sup>

## Meditation Therapies for Depression

It is also unclear that all meditation therapies based on a particular form of meditation, such as “mindfulness-based therapies,” share a common neural mechanism of action. For example, it may be that the cognitive component to MBCT engages neural mechanisms not present within the less cognitively-oriented Mindfulness-Based Stress Reduction Intervention.<sup>20,30</sup> By grouping different forms of meditation, authors may be obscuring individual differences among meditation therapies that might result in different effect sizes. Therefore, we have not attempted to collapse across meditation practices to compute an effect size in the current review.

### Meditation as a Treatment Across the Depression “Life Cycle”

Treatments for clinical depressive disorders occur during distinct phases of the illness: acute, continuation, and maintenance phases, and relapse prevention in the acute or continuation phase.<sup>31</sup> Because initial treatments for depression result in remission only about one-third of the time,<sup>5</sup> there is often also a subacute phase in which those who have experienced partial benefit from an initial treatment receive augmentation with either medications or psychotherapy.

Several authors who have reviewed the efficacy of meditation techniques for reduction of depressive symptoms have grouped together patients with depressive disorders across the depression life cycle, and not differentiated among patients at different phases of their depressive illnesses.<sup>26,27,32</sup> However, this approach might underestimate or overestimate the effect size for meditation depending on the depressive phase. For example, patients amid an acute severe major depressive episode (MDE) might lack the concentration needed to meditate as effectively as during partial remission, and thus the effects of meditation might be larger during partial remission. Alternatively, effects of meditation might be weaker for patients with subacute depressive illness in partial remission owing to a ceiling effect for improvement. It is therefore important that reviews of meditation for depressive symptoms take phase of depressive illness into consideration.

Accounting for phase of depressive illness has been systematically accomplished only with MBCT. Several trials have aimed to determine whether MBCT may reduce the relapse rate for patients with MDD

who are currently in remission,<sup>33–39</sup> and most of these have demonstrated a reduction in relapse rate relative to treatment as usual or placebo.<sup>33,35–38</sup> Systematic meta-analysis indicated that MBCT is an effective treatment for depressive relapse in patients with MDD who have had 3 or more (but not 2 or less) previous MDEs.<sup>40</sup> However, the specific role of meditation practice in these results remains unclear because a dismantling study failed to differentiate MBCT effects on relapse prevention from a cognitive therapy designed to mimic MBCT but without experiential mindfulness elements, except in a secondary analysis that indicated increased efficacy of MBCT in subjects with high levels of childhood trauma.<sup>39</sup>

Systematic review has never been undertaken to elucidate the evidence base for the treatment of clinically diagnosed depressive disorders across the spectrum of meditative therapies. Our objective was to determine the evidence base for meditation therapies as depression therapeutics during these phases by answering the following 3 questions:

- (1) What are the similarities and differences among the *praxis* elements of the therapies (and thus the extent to which generalizations can be made across techniques)?
- (2) What does the empirical evidence from randomized controlled trials (RCTs) demonstrate?
- (3) How can future research be designed to advance our knowledge of the role of meditation therapies in treating depression?

## MATERIAL AND METHODS

### Literature Search

MEDLINE, the Cochrane Collaboration, and PsycINFO were searched according to the PRISMA guidelines through January 2014 for RCTs, including articles with the terms “meditation,” “yog\*,” “mindfulness\*,” “Tai Chi,” “T'ai Chi,” “Qigong,” “Vipassana,” “prayer,” combined with “depressi\*,” or “dysthymi\*,” combined with “random\*,” or “RCT.” Articles were selected that (1) identified the subject population as suffering from a depressive disorder, i.e., MDD, dysthymia, or both and (2) had as a primary outcome reduction of current depressive symptoms. Thus, the many articles that studied depressive symptoms as an outcome but in clinically nondiagnosed

populations were excluded. Reference lists were reviewed from these articles to identify additional publications, and other review articles were also used.

### Meditation Therapy Component Evaluation

The descriptions of the meditation therapies within the articles were studied, and cited references obtained. In cases of lack of clarity regarding components of a specific intervention, corresponding authors were contacted and asked to provide further details. Components of meditation practices, focusing on praxis, were derived using descriptive principles drawn from Patañjali's Yoga Sutras,<sup>16</sup> the Satipatthana Sutta,<sup>17</sup> and mental imagery theory.<sup>41</sup> Resultant categories included the role of movement, spirituality, mental imagery (internal representations of somatic, visual, or verbal/auditory domains), object of attention (soma-tosensory, emotional, cognitive, and external), the provision of a holistic philosophical viewpoint, and any other associated therapeutic elements.

### Statistical Analysis

Effect sizes (Hedges  $g$ ) were calculated using the following formula:  $(\bar{u}_1 - \bar{u}_2)/S_p$ , where  $\bar{u}_1$  is the mean of the treatment group (for between-group comparisons) or baseline (for within-group comparisons),  $\bar{u}_2$  is the mean of the control group (for between-group comparisons) or end point (for within-group comparisons), and  $S_p$  is the pooled variance. Effect sizes were corrected for small sample sizes.<sup>42</sup>

## RESULTS

### Search Results

Of 1673 trials of meditation identified, 926 duplicates were removed. The remaining 747 abstracts were screened, and publications excluded that were non-English language, review articles, and nonclinical populations, and also those not using techniques that were considered to be meditation were excluded. 119 articles were selected for full-text review, of which 105 articles for relapse prevention, theses, adolescent populations, secondary articles from RCTs, and non-clinically diagnosed populations were removed. 14 articles were found to be RCTs focused on treatment of active depression symptoms in clinically diagnosed populations (not in remission), and an additional 4

articles were identified from other systematic reviews. These 18 depression trials included 1173 subjects and used 7 different meditation techniques (Table 1).

### Meditation Techniques

The most frequently studied techniques included MBCT, 8 studies<sup>43–50</sup>; Tai Chi, 3 studies<sup>51–53</sup>; Sudarshan Kriya Yoga (SKY), 2 studies<sup>54,55</sup>; and Patañjali Yoga, 2 studies.<sup>56,57</sup>

None of the interventions used an exclusively one-pointed focus of attention throughout the intervention, but generally consisted of multiple different attentional foci and techniques. With the exception of Sahaj Yoga, therapies contained a significant amount of meditative awareness during nonaerobic movement exercises, in addition to stationary postures, whereas only one (Tai Chi) focused exclusively on meditative engagement during movement. At least 4 of the 7 therapies used imagery to modulate feeling state during some practices (inner resources meditation, MBCT during body scan practice, Patañjali Yoga, and Sahaj Yoga), and 4 of the 7 explicitly included a holistic philosophical overview for the practice (MBCT, Patañjali Yoga, qigong, and Sahaj Yoga). Of the 7 techniques, 2 (MBCT and inner resources meditation) provided additional therapeutic elements drawn from cognitive-behavioral therapy (CBT), whereas all of them (with the possible exception of Sahaj Yoga, for which this was indeterminate) included an element of group support.

### Efficacy of Meditation Therapies in the Acute Phase of Major Depression Treatment

Eleven trials included participants with a current MDE (or a mix of patients with MDEs, dysthymia, and residual subacute symptoms Table 2). Of these, 5 included patients only with MDEs and found large within-group effect sizes ranging from 0.93–3.33, whereas the rest of the studies included mixed populations and demonstrated effect sizes ranging from 0.33–1.47.<sup>58</sup> Of the 5 studies including only subjects with MDEs, 3 included a mix of patients who were receiving meditation as a primary treatment or augmentation therapy,<sup>45,53,60</sup> whereas 2 of the studies were carried out in an inpatient setting with unmedicated patients.<sup>54,55</sup> The largest of the 11 studies to include subjects with a MDE (219 subjects) found

**TABLE 1. Elements of Meditation Therapies**

Technique	Overview	Mental imagery	Attention	Holistic philosophical overview	Additional therapeutic elements
Inner resources meditation	Mantra meditation (attention to a word or phrase with passive disregard for passing thoughts), mindfulness, yoga asanas (low impact and nonaerobic), and a subject-dependent spiritual component	<i>Somatic:</i> breathing imagery (e.g., imagine lungs as balloons filling with air). <i>Visual:</i> guided imagery to help “let go” of thoughts and feelings. <i>Verbal:</i> mantra repetition	<i>Somatosensory:</i> “surrender” to body during yoga and breathing meditation. <i>Emotional:</i> “surrender” to emotion during meditation exercises. <i>Cognitive:</i> “surrender” to thought during meditation exercise	Unclear	Bibliotherapy ( <i>Feeling Good Handbook</i> ) provided to all participants, conducted in a group setting 1 d/wk for 12 wk; homework 6 d/wk
Mindfulness-based cognitive therapy	Mindfulness meditation with focus on bringing an equanimous, observing awareness to present-moment experience of breath, body, sound, thought, and “awareness itself,” yoga asanas (low impact and nonaerobic), and cognitive therapy. Emphasis on developing mindfulness during formal practice and also implementing this mindful awareness during day-to-day activities, especially emotionally challenging times	<i>Somatic:</i> during body scan (“feel or imagine the breath” moving into body parts to aid in bringing attention to each area of the body)	<i>Somatosensory:</i> to sensations of eating, breathing, breath and body as a whole, walking. <i>Emotional:</i> awareness of feelings. <i>Cognitive:</i> awareness of thoughts as events in the field of awareness as if “projected on a screen,” <i>External:</i> bringing full awareness to senses generally and awareness of “pleasant events”	Becoming more aware of what is happening “in the moment” provides a greater choice in relationship to life experience. Developing a stance of an equanimous observing awareness toward the contents of awareness and the craving/aversion tendencies of mind provides access to decreased rumination and identification with thought, deeper wisdom, and self-compassion	<i>Attitudinal:</i> Relate to symptoms of depression not as personal failings but as parts of an impersonal syndrome. During body scan, bringing an “interested and friendly awareness,” having “lightness of touch” in awareness. As a way of accepting into awareness difficult sensations/feelings/thoughts, may silently repeat “It’s ok. Whatever it is, it’s ok. Let me feel it.” Other CBT components include creating pleasant and unpleasant events calendars, making an action plan for activities to help respond to negative moods, raising awareness of depleting vs nourishing activities, raising awareness of personal warning signs for onset of depression. Conducted in group setting 1 d/wk for 8 wk and an optional 6-h retreat day; homework 6 d/wk
Patañjali Yoga	5 <i>Components: Yoga asanas</i> (nonaerobic, gradual and sustained tonic stretch), <i>Pranayama</i> (breath control with slow alternate nostril breathing), <i>Pratyahara</i> (withdrawal of attention from sense objects), <i>Dharana</i> (focused concentration), and <i>Dhyana</i> (steadfast meditation)	<i>Visual:</i> during dharana stage, focusing attention on an “object or symbol—mostly a visual image”	<i>Somatosensory:</i> to body during yoga, pranayama. <i>Cognitive:</i> to “3 types” of thoughts—about “random” experiences, disturbing thoughts, and desiring to change	Ethical behavior and withdrawal from sensory preoccupation leads to feelings of well being	Conducted in a group setting 6 d/wk for 8 wk

Qigong	Series of physical postures (low impact and nonaerobic), while focusing on breathing and present-moment physical sensations and “clearing the mind”	Unclear		<i>Somatosensory</i> : to body during movement. <i>External</i> : to sight during movement	Balancing and training the flow of “qi” promotes health	Conducted in a group setting 2 d/wk; daily homework practice “under trained family supervision”
Sahaj Yoga	Meditation practice beginning with a standardized set of spiritual “questions and assertions” by the subject, repeated several times, with hands placed in different gestures, followed by a period of direct witnessing of thoughts until a “thought-free” state emerges	<i>Verbal</i> : internally generating “questions and assertions”		<i>Cognitive</i> : witnessing thoughts until a “thought-free state” emerges	Prayer asking God for “divine knowledge” and “self-realization”	Participants encouraged to practice 3 times a week for 30 min and also to repeat the practice at night with their feet resting in salt water before bed
Sudarshan Kriya Yoga	Pranayama consisting of “focused hyperventilation” with attention directed toward the breath, followed by yoga nidra (lying down, deeply restful meditation)	None		<i>Somatosensory</i> : to sensations of breathing	Not in these studies	<i>Attitudinal</i> : during yoga nidra, participants instructed to “relax and let go”; conducted in a group setting 6 d/wk
T'ai Chi	Series of repetitive, slow, nonstrenuous, nonaerobic, physical movements with a mindful, present-oriented attentional focus on the movements	Unclear		<i>Somatosensory</i> : to body during movement. <i>External</i> : to visual surroundings during movement	Not in these studies	Conducted in a group setting 1 d/wk

\_\_\_\_\_ CBT = cognitive-behavioral therapy.

**TABLE 2. Meditation Therapy Trials for Acute Depression**

Study/country	Design	Homework	Subjects	Duration	Results	Effect size	Relative deficiencies
<i>Inner resources meditation (IRM)</i>							
Butler et al., <sup>61</sup> USA	IRM vs hypnosis vs bibliotherapy; all groups + TAU	6 d/wk	N = 52, age ≥ 18 y, chronic unipolar DSM-IV depressive disorder lasting ≥ 2 y	12 wk	Greater remission in IRM vs bibliotherapy at 9 mo ( $p <$ 0.05 with $\chi^2$ test); no difference between IRM and hypnosis; rate of change of HAM-D nondifferent	Not calculated due to lack of short-term postinterven- tion data	Lack of blinding, short-term outcome posttherapy not reported, mix of patients with different depressive illnesses, not rigorously designed to assess nonequivalence, inappropriate statistical test for sample size
<i>Mindfulness-based cognitive therapy (MBCT)</i>							
Barnhofer et al., <sup>44</sup> UK	MBCT + TAU vs TAU	6 d/wk	N = 31, age 18–65 y, ≥ 3 MDEs or current MDE ≥ 2 y, and current MDE or residual symptoms	8 wk	Greater reduction in BDI-II in MBCT + TAU group ( $p =$ 0.001). Fewer MBCT + TAU still in MDE (SCID, $p = 0.03$ )	WS: 1.07 BS: 0.88	Mix of acute and subacute depressive phases, therapist and patient expectations not assessed
Chiesa et al., <sup>43</sup> Italy	Augmentation of ADM with MBCT or PED	6 d/wk	N = 18, age ≥ 18 y, unipolar MDD, HAM-D > 7 following ADM treatment	8 wk	Greater reduction in HAM-D in MBCT group at week 8 ( $p =$ 0.04)	WS: 1.02 BS: 0.75	Lack of blinding, therapist and patient expectations not assessed
Geschwind et al., <sup>46</sup> Netherlands	MBCT + TAU vs TAU	6 d/wk	N = 130, age ≥ 18 y, history of MDD, residual symptoms with HAM-D ≥ 7	8 wk	Greater reduction in HAM-D in MBCT group ( $p < 0.001$ )	WS: 0.73 BS: 0.57	TAU not well defined, therapist and patient expectations not assessed
Hamidian et al., <sup>47</sup> Iran	MBCT + ADM vs ADM	6 d/wk	N = 50, age ≥ 18 y, dysthymia or double depression	8 wk	Greater reduction in BDI-II in MBCT group than ADM group ( $p < 0.0001$ )	WS: 1.23 BS: 0.66	Patients poorly defined, mix of patients with different depressive illnesses, ADM not described, expectations not assessed
Manicavasgar et al., <sup>45</sup> Australia	MBCT vs CBT; augmentation of current treatment if any	6 d/wk	N = 69, age ≥ 18 y, unipolar MDE, not melancholic	8 wk	Nondifferent reductions in BDI- II	WS: 0.93 BS: 0.15	Lack of blinding to study hypotheses, some groups not randomized, not rigorously designed to assess equivalence between therapies
Omidi et al., <sup>48</sup> Iran	MBCT modified with “behavioral enhancement” + TAU vs CBT + TAU vs TAU	6 d/wk	N = 90, age 18–45 y, MDD on ADM, phase of illness not established	8 wk	General severity index of brief symptom inventory (BSI) showed nondifferent reductions between MBCT and CBT, greater than TAU ( $p <$ 0.01)	Not calculated due to nonstandard depression outcome measure	Lack of blinding to study hypotheses, not rigorously designed to assess equivalence between therapies, TAU not well defined; phase of illness poorly defined
Shahar et al., <sup>49</sup> USA	MBCT vs wait list, subjects could continue on stable ADM (12 wk without change before study)	6 d/wk	N = 52, age 24–64 y, ≥ 3 MDEs, residual symptoms or current episode (if symptoms “fluctuated toward remission”)	8 wk	Greater reduction in BDI in MBCT group. Effects of MBCT mediated by reduction in brooding and increase in mindfulness (both $p < 0.05$ )	WS: 0.87 BS: 1.09	Mix of patients with different phases of depression, lack of active control group



van Aalderen et al., <sup>50</sup> Netherlands	MBCT + TAU vs TAU; subjects could continue on stable ADM (6 wk without change before study)	6 d/wk	N = 219, age 47.3 ± 11.5 y, ≥ 3 MDEs, current MDE or residual symptoms	8 wk	Greater reduction in HAM-D in MBCT group ( $p < 0.001$ ). No difference between those with acute and subacute phase depression reductions	WS: 0.33 BS: 0.47	TAU not well defined (participants needing to stay on ADM without change suggests <i>not a true TAU control</i> ); expectations not assessed
<i>Patañjali Yoga (PY)</i>							
Vahia et al., <sup>56</sup> India	PY vs pseudo-Patañjali Yoga (PPY)	None, but treatment sessions 6 d/wk	N = 95, age 15–50 y, “psychoneurosis” (including depression subpopulation)	6 wk	74% improvement in PY vs 43% in PPY on target symptom relief ( $p = 0.04$ )	Not calculated owing to missing information	Subjects poorly characterized, expectations of patients and therapists not assessed
Vahia et al., <sup>57</sup> India	PY vs medication (amitriptyline and chlorthalidopoxide)	None, but treatment sessions 6 d/wk	N = 39, age 15–50 y, psychoneurotic and psychosomatic disorders (25% depression)	6 wk	HAM-D nondifferent between both groups	Not calculated owing to missing information	Subjects poorly characterized, expectations not assessed, not rigorously designed to assess nonequivalence between therapies
<i>Qigong and Tai Chi (TC)</i>							
Chou et al., <sup>52</sup> Hong Kong, China	TC vs wait list	None, TC sessions 3 d/wk	N = 14, age ≥ 60 y, unipolar MDE or dysthymia, CES-D ≥ 16	12 wk	TC showed greater reduction in CES-D ( $p < 0.01$ )	WS: 1.47 BS: 2.12	No active control, mix of patients with different depressive illnesses
Lavretsky et al., <sup>51</sup> USA	TC vs PED	Not mentioned, TC sessions 1 d/wk	N = 73, age ≥ 60 y, unipolar MDD, no remission on escitalopram	8 wk	TC showed greater reductions in HAM-D ( $p < 0.05$ ).	WS: 0.65 BS: 0.39	Lack of blinding, therapist and patient expectations not assessed
Tsang et al., <sup>59</sup> Hong Kong, China	Qigong vs newspaper reading group (NRG)	Daily	N = 97, age ≥ 65 y, history of diagnosed depressive disorder or elevated GDS	16 wk	GDS showed greater reductions in Qigong than in NRG ( $p < 0.05$ )	WS: 0.79 BS: 1.54	Mix of patients with different depressive illnesses, therapist and patient expectations not assessed, not rigorously designed to assess nonequivalence between therapies
Yeung et al., <sup>53</sup> USA	TC vs wait list (WL), all subjects continued current treatment (if any)	TC sessions 2 d/wk	N = 39, age 50 ± 10 y, current MDE with HAM-D ≥ 18, all Chinese American	12 wk	No difference in HAM-D or response (24% in TC vs 0% in WL, $p = 0.15$ ) or remission rates (20% in TC vs 0% in WL, $p = 0.30$ ) between groups	WS: 1.67 BS: -0.10	No active control, underpowered
<i>Sahaj Yoga (SY)</i>							
Sharma et al., <sup>60</sup> India	Augmentation of ADM with SY or Pseudo-Sahaj Yoga (PSY)	None, but SY sessions 3 d/wk	N = 30, age 18–45 y, current MDE	8 wk	HAM-D reduction in SY group greater than PSY ( $p = 0.003$ ). Greater remission in SY group (47%) than PSY group (13%) at 8 wk ( $p = 0.02$ )	WS: 2.80 BS: 0.71	Expectations of patients and therapists not assessed, medication protocol and dosages not described

TABLE 2. Continued

Study/country	Design	Homework	Subjects	Duration	Results	Effect size	Relative deficiencies
Sudarshan Kriya Yoga (SKY) Janakiramaiah et al., <sup>54</sup> India	Sudarshan Kriya Yoga (SKY) vs ADM (imipramine) vs ECT	None, SKY sessions 6 d/wk	N = 45, age 36.0 ± 7.8 y, current MDE, HAM-D ≥ 17, hospitalized	4 wk	SKY and ADM showed nondifferent reductions in HAM-D; ECT superior to both ( <i>p</i> = 0.04)	WS: 2.07 BS (IMN): -0.23 BS (ECT): -0.85	Lack of blinding to study hypotheses, therapist and patient expectations not assessed, not rigorously designed to assess equivalence between therapies
Rohini et al., <sup>55</sup> India	Full SKY (F-SKY) vs Partial SKY (P-SKY)	None, but treatment sessions daily	N = 30, age 18-60 y, current MDE, not on ADM HAM-D ≥ 18, hospitalized	4 wk	F-SKY and P-SKY showed nondifferent reductions in BDI. F-SKY tended to have a higher response rate (80%) than P-SKY (47%) ( <i>p</i> < 0.06)	WS: 3.34 BS: 0.64	Patient and therapist expectations not assessed, not rigorously designed to assess nonequivalence between therapies

ADM = antidepressant medication; BDI-II = Beck Depression Inventory II; BS = between subjects; CBT = cognitive-behavioral therapy; CES-D = Center for Epidemiologic Studies Depression Scale; DSM-IV = Diagnostic and Statistical Manual of Mental Disorders IV; ECT = electroconvulsive therapy; GDS = Geriatric Depression Scale; HAM-D = 17-item Hamilton Depression Rating Scale; IMN = imipramine; MDD = major depressive disorder; MDE = major depressive episode; PED = psychoeducation group; SCID = Structured Clinical Interview for DSM Disorders; TAU = treatment as usual; WS = within subjects.

that the efficacy of MBCT did not differ whether patients had an MDE or had subacute residual symptoms.<sup>50</sup>

Efficacy of Meditation Therapies in the Subacute Phase of Treatment

Three studies included only patients with residual depression symptoms after acute phase treatment, and these demonstrated effect sizes ranging from 0.65–1.02.<sup>43,46,51</sup>

Efficacy of Meditation Therapies Relative to Control Groups

Relative to wait list or treatment-as-usual controls, studies demonstrated moderate to large effect sizes (0.47–2.12),<sup>44,46,47,49,50,52</sup> with the exception of Yeung et al. (2012).<sup>53</sup> In the latter study, the wait list control group exhibited an abnormally large reduction in depressive symptoms (within-group effect size 1.54) relative to the control groups of other studies (within-group effect sizes: -0.60 to 0.35).

Among studies that used psychoeducation or pseudotherapy control group arms, between-group sizes favored meditation and were moderate to large (0.39–1.54).<sup>43,51,55,59,60</sup> The within-subject effects in psychoeducation groups ranged from 0.02–0.59.

Three studies for MDD, and one for a depressed subpopulation diagnosed with psychoneurosis, also used as controls validated, first-line depression treatments: MBCT vs CBT,<sup>45,48</sup> SKY vs imipramine,<sup>54</sup> and Patañjali Yoga vs amitriptyline.<sup>57</sup> These showed no significant differences in reduction of depressive symptoms between the meditation and the control groups. The study of SKY also used a second-line treatment for depression, electroconvulsive therapy, as a further control condition, and this demonstrated inferiority of the SKY intervention (effect size of SKY -0.94 relative to electroconvulsive therapy).

DISCUSSION

The data from RCTs suggest that meditative interventions may have substantial effects on depressive symptoms in patients with clinically diagnosed depressive disorders, including those currently having an acute MDE and those in partial remission. Across

trials, the upper limit of effect sizes was larger for subjects having an acute MDE than those with residual symptoms, possibly owing to a ceiling effect of improvement for subjects with residual symptoms. However, variations among the subcomponents of the different meditation therapies resulted in our concluding that the therapies were not similar enough to allow for derivation of a common effect size.

There were several factors across the trials that, while increasing the generalizability of the findings across depressive condition type and illness stage, limited their commonality. Patient populations contained a mixture of patients with different depressive illnesses in several of the trials, including MDD and dysthymia,<sup>47,61</sup> and multiple “psychoneurotic disorders.”<sup>56,57</sup> In several trials, exclusion of bipolar depressed subjects was not specifically mentioned.<sup>44,46,59</sup> Even those studies that focused on the same stage of depressive illness used meditation in different ways, i.e., as treatment augmentation, or as primary treatment.

Within trials, there were several common issues precluding definitive conclusion that the efficacy of assayed meditative practices was due to specific elements of the therapies, as opposed to nonspecific factors. Subject numbers were small within most of the trials, and none of the trials were conducted at more than 1 site. Follow-up data were often not obtained, and 4 of the studies lasted 6 weeks or less.<sup>54–57</sup> Uniformly, the expectations of therapists leading sham or partial treatment control groups relative to those leading full meditation protocols were not assessed or accounted for. As has previously been noted, therapist expectations may account for a significant portion of the effect size of psychotherapy interventions.<sup>62</sup> Similarly, the expectations of subjects were often not addressed. Several trials did not specify which medications subjects were taking, or other forms of psychotherapy they might have been engaged in. Treatment-as-usual groups were not fully described in any of the trials, nor were prior or concurrent psychotherapies that patients might have received. In several trials, dropout rates were not explicitly stated. Additionally, possible adverse reactions to the meditation practices were generally not described.

Although we used the Agency for Healthcare Research and Quality definition for meditation to include relevant studies, our component evaluation of the meditation therapies themselves suggested major

heterogeneity in praxis. These variations included elements of movement, spirituality, attention directed toward different foci, mental imagery, and whether the practices took place within the provision of a larger philosophical framework. Because almost all therapies included substantial movement components in addition to sitting meditation practices, we could not rigorously differentiate therapies on this basis. Our categorization accorded in part with the framework provided by Shear, which included the types of mental faculties used (e.g., attention and visual imagery), how the faculties were used (e.g., active and passive), the foci for these faculties (e.g., thoughts, bodily sensations, and spirit/God).<sup>14</sup> However, groupings based on elements other than praxis are possible, such as a focus on the stated goal of the meditation practice, the contextual and historical background of the practice, or the meditative state experienced as a result of the practice.<sup>63</sup> The heterogeneity in praxis, and thus likelihood of different neural mechanism, precluded attributing the effects of the meditation therapies to a common mechanism of action.

To advance the field, several kinds of experimental refinements will be necessary. First, because negative studies are less likely to be published, clinical trial registration is essential. Selection of a control group is also critical. Our results suggested a large heterogeneity in within-group effect sizes for wait-list and treatment-as-usual controls, ranging from moderate negative effects (–0.60) to large positive effects (1.54). This indicates that such controls are not always inert and may have nocebo effects (possibly because of subjects being told they will need to wait for a treatment that they believe will be beneficial), placebo effects (possible resulting from increased clinical attention), or possibly even active effects depending on the extent of treatment within “treatment-as-usual” groups. To understand why these control groups evince such a range of effects, future studies using these groups may benefit from measuring expectations regarding clinical symptom outcome after subjects have been assigned to the control group or the experimental treatment, as well as monitoring and reporting medication and psychotherapy changes, along with their timing. Psychoeducation control groups provided a more consistent range of effect size (0.02–0.54), and their use may thus facilitate comparisons among different meditation trials, while not providing so much active effect as to obscure positive

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effects of meditation. However, it would still be important to measure and adjust for expectations of benefit in such trials. Recently, active control groups such as health education control groups that incorporate the same amount of group contact, focus on healthy behaviors and homework time, but without the inclusion of meditative practices, have been advocated.<sup>64,65</sup> Although we believe that such groups may minimize nocebo effects and help to account for nonspecific effects, they also may provide active treatment with features of behavioral activation, such as exercise that may reduce symptoms of depression and confound results. Studies that aim to determine the relative efficacy of meditation to known efficacious treatments, such as antidepressant therapy or CBT, need to be adequately powered and delineate in advance meaningful clinical criteria by which differences (or noninferiority) will be determined. All in all we suggest that an ideal study to confirm the efficacy of meditation for depression would be adequately powered and have 3 arms: meditation, a credible active comparator (such as CBT), and a modest psychoeducation group that allows for a comparison of the effects of meditation to minimal treatment.

Another important research question concerns elucidating the nature of the interaction between meditation and other depression treatments, including psychotherapy, antidepressant medications, and other lifestyle changes. This is critically important for determining how meditative techniques best fit into the established therapeutic armamentarium for depression. Such interactions may be partially or fully additive, synergistic, or inhibitory. Just as combining psychotherapy and antidepressant medication can result in improved outcomes, the same may be true of combining meditation with antidepressant medication.<sup>66</sup> Indeed, interviews with meditators taking antidepressants provide preliminary suggestions that this may be the case.<sup>67</sup> Studies comparing different kinds of

meditations, in which the same psychometric and neurophysiologic measures are used, may indicate the extent to which the benefits of different meditation therapies are mediated by common mechanisms of action.

In summation, although meditative therapies are commonly used and increasingly advocated, this critical review clearly suggests that the role of meditation techniques in the clinical armamentarium for depression has not been firmly established. Existing RCTs are uniformly positive in demonstrating reductions in depressive symptoms, and although the variability both within the clinical populations and the techniques studied suggests wide generalizability across depressive condition type and illness stage, the absence of well-matched control groups and the lack of large replication trials also limit the reliability and specificity of the results and conclusions that may be drawn. Using meditation in the clinical setting on a first-line basis or as an adjunctive treatment for depression appears promising—especially given their favorable risk/benefit profile—but carefully designed studies that account for the various shortcomings of the studies reviewed are necessary. Further studies should be conducted of these promising techniques, particularly in patients with medical comorbidities who may be more vulnerable to polypharmacy and side effects of antidepressant medications.

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