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

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Abstract

Background—Recently, the application of meditative practices to the treatment of depressive disorders has met with increasing clinical and scientific interest, due to a lower side-effect burden, potential reduction of polypharmacy, as well as theoretical considerations that such interventions may target some of the cognitive roots of depression. 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 (AHRQ) definition of meditation, for participants suffering from 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—Eighteen studies meeting inclusionary criteria were identified, encompassing seven distinct techniques and 1173 patients, with Mindfulness-Based Cognitive Therapy comprising the largest proportion. Studies including patients suffering from acute major depressive episodes (N = 10 studies), and those with residual subacute clinical symptoms despite initial treatment (N = 8),

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demonstrated moderate to large reductions in depression symptoms within 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 suffering from clinical depressive disorders during the acute and subacute phases of treatment. Due to methodological deficiences 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.

Keywords

meditation; mindfulness; yoga; t'ai chi; depression; dysthymia

Introduction

Depressive disorders, including major depressive disorder (MDD) and dysthymia, have a total 12-month prevalence of approximately 7%[1] in the general population, and the prevalence is higher in hospitalized patients with medical illness[2] and ambulatory medical patients.[3, 4] However, initial trials of currently available pharmacological and psychotherapeutic treatments result in depression remission less than 50% of the time with multiple trials[5, 6] and overall have moderate effect sizes.[7] 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 utilization of mind-body therapies for MDD and other psychiatric disorders is high among patients[8] and increasing among practitioners: for example, "mindfulness" is highest among the therapeutic orientations rated most likely to increase in utilization over the coming decade by psychotherapy experts.[9]

Definition of meditation

The term meditation refers to a broad set of psychosomatic practices that involve training and regulating attention towards interoceptive or exteroceptive foci, or intentionally created mental images, while observing or redirecting attention from distracting thoughts.[10–15] 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.[16, 17] 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; while those incorporating a broader attentional spotlight to an array of changing stimuli have been called mindfulness, open-awareness, or open monitoring practices.[18–20] Open monitoring practices deemphasize delineation of an explicit focus in favor of non-reactive but clear and vivid observation of moment to moment experiences.[19]

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 (AHRQ) proposed a consensus definition of meditation utilizing a modified Delphi process.[21] This definition suggested that there are three 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 due its relative non-specificity.[22] A more recent iteration from the AHRQ was to dissociate "purely meditative" techniques, done while maintaining a stationary posture, from those that utilized a meditative awareness during movement; however, neither a detailed rationale for excluding the movement practices nor for retaining stationary meditation groupings was provided.[23]

Meditation and acute psychological symptoms

When performing meta-analysis of the clinical literature on meditation techniques utilized as therapeutics for psychological symptoms, many authors have collapsed across different meditation therapies employing the same type of meditation (e.g. Mindfulness Based Stress Reduction (MBSR) 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.[24–29] These meta-analyses have generally concluded that meditation techniques provide small to moderate salutary benefits for symptoms of depression or anxiety, including in patients with comorbid medical illnesses such as cancer, rheumatoid arthritis, fibromyalgia and heart disease. Two of these meta-analyses also analyzed meditation therapies by technique,[28, 29] but when doing so collated subjects with divergent symptom types (anxiety and mood) and severity, potentially confounding the results.

There are difficulties in identifying the efficacious components of 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,[20, 30] it is likely that meditation therapies that incorporate different practices affect the biological substrates of target psychological symptoms differently. 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 MBSR intervention.[20, 30] 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.[31] Because initial treatments for depression result in remission only about one-third of the time,[5] 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.[26, 27, 32] 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 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 due 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 Mindfulness-Based Cognitive Therapy (MBCT). Several trials have aimed to determine whether MBCT may reduce the relapse rate for patients with major depressive disorder who are currently in remission,[33–39] and the majority of these have demonstrated a reduction in relapse rate relative to treatment as usual or placebo.[33, 35–38] Systematic meta-analysis indicated that MBCT is an effective treatment for depressive relapse in patients with MDD who have had three or more (but not two or less) previous major depressive episodes.[40] 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.[39] 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 three 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 technique)?

2. What does the empirical evidence from randomized, controlled trials 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 PRISMA guidelines through January 2014 for randomized, controlled trials (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 non-diagnosed populations were excluded. Reference lists were reviewed from these articles to identify additional publications, and other review articles were also utilized.

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 the praxis itself, were derived utilizing descriptive principles drawn from Patañjali's Yoga Sutras,[16] the Satipatthana Sutta,[17] and mental imagery theory.[41] Resultant categories included the role of movement, spirituality, mental imagery (internal representations of somatic, visual, or verbal/auditory domains), object of attention (somatosensory, emotional, cognitive, external), the number of practices comprising the intervention, the provision of a holistic philosophical viewpoint, and any other associated therapeutic elements.

Statistical Analysis

Effect sizes (Hedge's g) were calculated using the following formula: $(\bar{x}_1 - \bar{x}_2)/S_p$, where $\bar{x}_1$ is the mean of the treatment group (for between group comparisons) or baseline (for within group comparisons), $\bar{x}_2$ is the mean of the control group (for between group comparisons) or endpoint (for within group comparisons), and S_p is the pooled variance. Effect sizes were corrected for small sample sizes.[42]

Results

Search Results

Out 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, non-clinical populations, and not utilizing techniques considered to be meditation. 119 articles were selected for full text review, of which 105 articles for relapse prevention, theses, adolescent populations, secondary articles from randomized controlled trials, and non-clinically diagnosed populations, were removed. Fourteen articles were found to be randomized clinical trials focused on treatment of active depression symptoms in clinically diagnosed populations (not in remission), and an additional four articles were identified

from other systematic reviews. These eighteen depression trials included a total of 1173 subjects and employed seven different meditation techniques (Table 1).

Meditation Techniques

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

None of the interventions utilized 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 non-aerobic movement exercises, in addition to stationary postures, while only one (Tai Chi) focused exclusively on meditative engagement during movement. At least four of the seven therapies utilized mental imagery to modulate feeling state during some practices (Inner Resources Meditation, MBCT during body scan practice, Patañjali Yoga, Sahaj Yoga), and four of the seven explicitly included a holistic philosophical overview for the practice (MBCT, Patañjali Yoga, qigong, Sahaj Yoga). Two of the seven techniques (MBCT and Inner Resources Meditation) provided additional therapeutic elements drawn from cognitive behavioral therapy, while 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 major depressive episodes, dysthymia, and those with residual symptoms only, Table 2). Of these, five included patients only with major depressive episodes and found large within group effect sizes ranging from 0.93 to 3.33;[58] whereas the rest of the studies included mixed populations and demonstrated effect sizes ranging from 0.33 to 1.47. Of the 5 studies for MDD, three included a mix of patients who were receiving meditation as a primary treatment or augmentation therapy, while two of the studies were carried out in an inpatient setting with unmedicated patients.[54, 55] The largest of the eleven studies to include subjects with an MDE (219 subjects) found that the efficacy of MBCT did not differ whether patients were suffering from an MDE or had subacute residual symptoms.[50]

Efficacy of meditation therapies in the subacute phase of treatment

Three studies included only patients with residual depression symptoms after acute phase treatment,[43, 46, 51] and these demonstrated effect sizes ranging from 0.65 to 1.02.

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 to 2.12),[44, 46, 47, 49, 50, 52] with the exception of Yeung et al. (2012). 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 employed psychoeducation or pseudotherapy control group arms,[43, 51, 55, 59, 60] between group sizes favored meditation

and were moderate to large (0.39 to 1.54). The within subject effects in psychoeducation groups ranged from 0.02 to 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,[45, 48] SKY vs. imipramine,[54] and Patañjali Yoga vs. amitryptiline.[57] These showed no significant differences in reduction of depressive symptoms between the meditation and control groups. The study of SKY also utilized a second-line treatment for depression, electroconvulsive therapy (ECT), as a further control condition, and this demonstrated inferiority of the SKY intervention (effect size of SKY −0.94 relative to ECT).

Discussion

The data from RCTs suggests that meditative interventions may have substantial effects on depressive symptoms in patients with clinically diagnosed depressive disorders, including those currently suffering from an acute major depressive episode and those in partial remission. Across trials, the upper limit of effect sizes was larger for subjects suffering from an acute major depressive episode than those with residual symptoms, possibly due 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 major depressive disorder and dysthymia,[47, 61] and multiple "psychoneurotic disorders".[56, 57] In several trials, exclusion of bipolar depressed subjects was not specifically mentioned.[44, 46, 59] Even those studies that focused on the same stage of depressive illness utilized 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 non-specific factors. Subject numbers were small within most of the trials, and none of the trials were conducted at more than one site. Follow-up data were often not obtained, and four of the studies lasted 6 weeks or less.[54–57] 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.[62] 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 AHRQ 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 towards different foci, mental imagery, and whether or not the practices took place within the provision of a larger philosophical framework. Our categorization accorded in part with the framework provided by Shear, which included the types of mental faculties utilized (e.g. attention, visual imagery), how the faculties were used (e.g. active, passive), the foci for these faculties (e.g. thoughts, bodily sensations, spirit/God).[14] 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.[63] 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 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 due to subjects being told they will need to wait for a treatment 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. In order to understand why these control groups evince such a range of effects, future studies utilizing 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 to 0.54), and their use may thus facilitate comparisons among different meditation trials, while not providing so much active effect as to obscure positive 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.[64, 65] Although we believe that such groups may minimize nocebo effects and help to account for non-specific 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 cognitive behavioral therapy, need to be adequately powered and delineate in advance meaningful clinical criteria by which differences (or non-inferiority) 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 three arms: meditation, a credible active comparator (such as cognitive behavioral therapy), 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,[66] the same may be true of combining meditation with antidepressant medication. Indeed, interviews with meditators taking antidepressants provide preliminary suggestions that this may be the case.[67] Studies comparing different kinds of meditations, in which the same psychometric and neurophysiological measures are utilized, may indicate the extent to which the benefits of different meditation therapies are mediated by common mechanisms of action.

In sum, 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 while 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 lack of large replication trials also limits the reliability and specificity of the results and conclusions that may be drawn. Utilizing 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.

Acknowledgments

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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, non-aerobic), spiritual component subject dependent	*Somatic:* breathing imagery (e.g. imagine lungs as balloons filling with air). *Visual:* guided imagery to help "let go" of thoughts and feelings, *Verbal:* mantra repetition	*Somatosensory:* to body during yoga, breathing meditation, *Emotional:* "surrender" to emotion during meditation exercises, *Cognitive:* "surrender" to thought during meditation exercise	Unclear	Bibliotherapy (*Feeling Good Handbook*) provided to all participants, conducted in group setting 1 day per week for 12 weeks; homework 6 days per week
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, non-aerobic), cognitive therapy. Emphasis on developing mindfulness during formal practice and also implementing this mindful awareness during day-to-day activities, especially emotionally challenging times.	Somatic: during body scan ("feel or imagine the breath" moving into body parts to aid in bringing attention to each area of the body)	*Somatosensory:* to sensations of eating, breathing, breath and body as a whole, walking, *Emotional:* awareness of feelings, *Cognitive:* awareness of thoughts as events in the field of awareness as if "projected on a screen", *External:* bringing full awareness to senses generally, awareness of "pleasant events"	Becoming more aware of what's happening "in the moment" provides greater choice in relationship to life experience. Developing a stance of an equanimous observing awareness towards 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	Relate to symptoms of depression not as personal failings but as parts of an impersonal syndrome. Attitudinal: 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 day per week for 8 weeks and an optional 6 hour retreat day; homework 6 days per week.
Patañjali Yoga	5 components: *Yoga asanas* (non-aerobic, gradual and sustained tonic stretch), *Pranayama* (breath control with slow alternate nostril breathing), *Pratyahara* (withdrawal of attention from sense objects), *Dharana* (focused concentration), *Dhyana* (steadfast meditation)	*Visual:* during dharana stage, focusing attention on an "object or symbol -- mostly a visual image"	*Somatosensory:* to body during yoga, pranayama, *Cognitive:* to "three 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 group setting 6 days per week for 8 weeks
Qigong	Series of physical postures (low impact, non-aerobic) while focusing on the breathing and present moment physical sensations while "clearing the mind"	Unclear	*Somatosensory:* to body during movement, *External:* to sight during movement	Balancing and training the flow of "qi" promotes health	Conducted in group setting 2 days per week; daily homework practice "under trained family supervision"

Technique	Overview	Mental Imagery	Attention	Holistic Philosophical Overview	Additional Therapeutic Elements
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	*Verbal:* internally generating "questions and assertions"	*Cognitive:* 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 minutes 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 towards the breath, followed by yoga nidra (lying down, meditative, allowing the mind to quiet)	None	*Somatosensory:* to sensations of breathing	Not in these studies	Attitudinal: during yoga nidra, participants instructed to "relax and let go"; conducted in group setting 6 days per week
T'ai Chi	Series of repetitive, slow, non-strenuous, non-aerobic, physical movements with a mindful, present-oriented attentional focus on the movements.	Unclear	*Somatosensory:* to body during movement, *External:* to visual surroundings during movement	Not in these studies	Conducted in group setting 1 day per week

Table 2

Meditation Therapy Trials for Acute Depression

Study / Country	Design	Homework	Subjects	Duration	Results	Effect Size	Relative Deficiencies
Inner Resources Meditation (IRM)							
Butler et al. (2008) USA	IRM vs. hypnosis vs. bibliotherapy; all groups + TAU	6 days per week	N = 52; age 18 yrs; chronic unipolar DSM- IV depressive disorder lasting 2 years	12 weeks	Greater remission in IRM vs. bibliotherapy at 9 months (p < 0.05 with χ^2-test); no difference between IRM and hypnosis; rate of change of HAM-D non-different.	not calculated due to lack of short-term post intervention data	Lack of blinding, short-term outcome post therapy not reported, mix of patients with different depressive illnesses, not rigorously designed to assess non- equivalence, inappropriate statistical test for sample size
Mindfulness Based Cognitive Therapy (MBCT)							
Barnhofer et al. (2009) United Kingdom	MBCT + TAU vs. TAU	6 days per week	N = 31; age 18 – 65 yrs; 3 MDEs or current MDE 2 years; current MDE or residual symptoms	8 weeks	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. (2012) Italy	Augmentation of ADM with MBCT or PED	6 days per week	N = 18; age 18 yrs; unipolar MDD, HAM-D > 7 following ADM treatment	8 weeks	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. (2012) Netherlands	MBCT + TAU vs. TAU	6 days per week	N = 130; age 18 yrs; History of MDD, residual symptoms with HAM-D 7	8 weeks	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. (2013) Iran	MBCT + ADM vs. ADM	6 days per week	N = 50; age 18 yrs; Dysthymia or double depression	8 weeks	Greater reduction in BDI-II in MBCT group than ADM group (p <. 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. (2011) Australia	MBCT vs. CBT; augmentation of current treatment if any	6 days per week	N = 69; age 18 yrs; unipolar MDE, not melancholic	8 weeks	Non-different reductions in BDI- II	WS: 0.93 BS: 0.15	Lack of blinding, some groups not randomized, not rigorously designed to assess equivalence between therapies, expectations not assessed
Omidi et al. (2013) Iran	MBCT modified with "behavioral enhancement" + TAU vs. CBT + TAU vs. TAU	7 days per week	N = 90; age 18 – 45 yrs; MDD on ADM, phase of illness not established	8 weeks	General severity index of brief symptom inventory (BSI) showed non- different reductions between MBCT and CBT, greater than TAU (p <.01)	not calculated due to non-standard depression outcome measure	Lack of blinding, not rigorously designed to assess equivalence between therapies, TAU not well defined; phase of illness poorly defined
Shahar et al. (2010) USA	MBCT vs. wait- list; subjects could continue	6 days per week	N = 52; age 24 – 64 yrs; 3 MDEs; residual	8 weeks	Greater reduction in HAM-D in MBCT	WS: 0.87 BS: 1.09	Mix of patients with different phases of depression, lack of

Study / Country	Design	Homework	Subjects	Duration	Results	Effect Size	Relative Deficiencies
	on stable ADM (12 weeks without change prior to study) or current prior to study if prior to study toward remission")				group. Effects of MBCT mediated by reduction in brooding and increase in mindfulness (both p < .05)		active control group; between group reductions in depressive symptoms not assessed
van Aalderen et al. (2012) Netherlands	MBCT + TAU vs. TAU; subjects could continue on stable ADM (6 weeks without change prior to study)	6 days per week	N = 219; age 47.3 ± 11.5 yrs; ≥ 3 MDEs; current MDE or residual symptoms	8 weeks	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 *not a true TAU control*); expectations not assessed
Patañjali Yoga (PY)							
Vahia et al. (1973) India	PY vs. pseudo-Patañjali Yoga (PPY)	none, but treatment sessions 6 days per week	N = 95; age 15 – 50 yrs; "psychoneurosis" (including depression subpopulation)	6 weeks	74% improvement in PY vs. 43% in PPY on target symptom relief (p = 0.04)	not calculated due to missing information	Subjects poorly characterized, expectations of patients and therapists not assessed
Vahia (1973) India	PY vs. Medication (amitryptyline and chlordiazepoxide)	none, but treatment sessions 6 days per week	N = 39; age 15 – 50 yrs; psychoneurotic and psychosomatic disorders (25% depression)	6 weeks	HAM-D non-different between both groups	not calculated due to missing information	Subjects poorly characterized, expectations of therapists not assessed, not rigorously designed to assess non-equivalence between therapies
Qigong and Tai Chi (TC)							
Chou (2004) Hong Kong, China	TC vs. wait list	none, TC sessions 3 days per week	N = 14; age ≥ 60 yrs; unipolar MDE or dysthymia; CES-D ≥ 16	12 weeks	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 (2011) USA	TC vs. PED	not mentioned, TC sessions 1 day per week	N = 73; age ≥ 60 yrs; unipolar MDD; no remission on escitalopram	8 weeks	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 (2006) Hong Kong, China	Qigong vs. newspaper reading group (NRG)	daily	N = 97; age ≥ 65 yrs; history of diagnosed depressive disorder or elevated GDS; age ≥ 65	16 weeks	GDS showed greater reductions in Qigong than 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 non-equivalence between therapies
Yeung (2012) USA	TC vs. wait list (WL), all subjects continued current treatment (if any)	TC sessions 2 days per week	N = 39; age 50 ± 10 yrs; current MDE with HAM-D ≥ 18; all Chinese American	12 weeks	No difference in HAM-D or response (24% in TC vs. 0% in WL, p = .15) or remission rates (20% in TC vs. 0% in WL, p = .30) between groups.	WS: 1.67 BS: –0.10	No active control, underpowered
Sahaj Yoga (SY)							
Sharma (2005) India	Augmentation of ADM with SY or Pseudo-Sahaj Yoga (PSY)	none, but SY sessions 3 days per week	N = 30; age 18 – 45 yrs; current MDE	8 weeks	HAM-D Reduction in SY group greater than PSY (p = 0.003). Greater	WS: 2.80 BS: 0.71	Expectations of patients and therapists not assessed

Study / Country	Design	Homework	Subjects	Duration	Results	Effect Size	Relative Deficiencies
					remission in SY group (47%) than PSY group (13%) at 8 weeks (p = 0.02) remission in SY group (47%) than PSY group (13%) at 8 weeks (p = 0.02) remission in SY group (47%) than PSY group (13%) at 8 weeks (p = 0.02) remission in SY group (47%) than PSY group (13%) at 8 weeks (p = 0.02)		
Sudarshan Kriya Yoga (SKY)							
Janakiramaiah (2000) India	Sudarshan Kriya Yoga (SKY) vs. ADM (imipramine) vs. ECT	none, SKY sessions 6 days per week	N =45; age 36.0 ± 7.8 yrs; current MDE, HAM-D 17, hospitalized	4 weeks	SKY and ADM showed non- different reductions in HAM-D; ECT superior to both (p = 0.04)	WS: 2.07 BS (IMN): −0.23 BS (ECT): −0.85	Lack of blinding, therapist and patient expectations not assessed, not rigorously designed to assess equivalence between therapies
Rohini (2000) India	Full SKY (F- SKY) vs. Partial SKY (P-SKY)	none, but treatment sessions daily	N = 30; age 18 – 60 yrs; current MDE, not on ADM HAM-D 18, hospitalized	4 weeks	F-SKY and P-SKY showed non- different reductions in BDI. F-SKY tended to have a higher response rate (80%) than P-SKY (47%) (p < 0.06)	WS: 3.34 BS: 0.64	Patient and therapist expectations not assessed, not rigorously designed to assess non- equivalence between therapies

ADM = antidepressant medication, BDI-II = Beck Depression Inventory II, BS = between subjects, CBT = Cognitive Behavioral Therapy, d = Cohen's d, 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, IRM = Inner Resources Meditation, MBCT = Mindfulness-Based Cognitive Therapy, MDD = major depressive disorder, MDE = major depressive episode, n/a = not applicable, PED = psychoeducation group, SCID = Structured Clinical Interview for DSM Disorders, TAU = treatment as usual, WS = within subjects