

Mind-Body Interventions for Anxiety Disorders: A Review of the Evidence Base for Mental Health Practitioners

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Mind-body interventions have gained increasing popularity for use with anxiety symptoms; however, it is unclear what role they play in the treatment of anxiety disorders, such as generalized anxiety disorder, panic disorder, and social anxiety disorder. Although psychopharmacology and psychotherapy treatment interventions are available, mind-body interventions may be low-stigma options that can serve as effective alternatives. The goal of this review is to provide clinicians with an overview of high-quality studies for the most well researched mind-body interventions. This review involved a search of the primary literature, including meta-analyses, systematic reviews, and randomized controlled trials (RCTs), that evaluated mind-body interventions for the treatment of anxiety disorders. When published evidence was limited, lower-quality studies were reviewed. Overall, data were limited on the efficacy of most mind-body

modalities for anxiety disorders. The highest-quality data existed for yoga, mindfulness-based interventions, and applied relaxation for anxiety disorders. However, findings were sometimes inconsistent across studies, and some studies were limited by small sample sizes, poorly defined randomization and blinding procedures, and inadequate control groups. Although not enough data exist to recommend mind-body interventions as primary treatment options, they may be considered as part of a larger treatment plan given their relatively low levels of risk. Future steps for researchers include conducting additional RCTs with adequate control groups, comparing mind-body treatments with existing treatments, and examining long-term effects of mind-body interventions.

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Mind-body interventions, such as yoga and mindfulness meditation, are an area of exponential growth and increased interest of the general population; yet clear clinical guidelines are limited concerning which interventions are evidenced based and appropriate for general psychiatric practice. Furthermore, it is unclear what role these interventions play in the treatment of anxiety disorders. The most common anxiety disorders are panic disorder, specific phobia, generalized anxiety disorder, and social anxiety disorder. These disorders often cause significant impairment in social, interpersonal, or occupational functioning, with a lifetime prevalence of nearly 33.7% (1); economic costs of these disorders, estimated at \$42.3 billion per year (2), are attributed to treatment, lost productivity, and poor quality of life (3). Psychiatrists may be asked by their patients about whether any of these mind-body interventions are appropriate for them. The purpose of this review is to summarize the high-quality literature on effective mind-body interventions for anxiety disorders to better inform general psychiatric practice.

METHODS

This review involved a search of the primary literature, including articles from the Ovid MEDLINE, PsycArticles, and

PsycINFO databases; additional studies cited in prior literature reviews and meta-analyses were also added. Studies that included patients with a diagnosed anxiety disorder, such as social anxiety, general anxiety, panic disorder, or specific phobia, were reviewed as well as studies that utilized a validated anxiety severity questionnaire with a pre-defined cutoff score thought to represent the likely presence of an anxiety disorder. For mind-body interventions with limited data on anxiety disorders, we reviewed their effect on anxiety symptoms if a cutoff score was used to indicate likely presence of the disorder. Studies that consisted of an intervention that was not given through a formally trained teacher or developed and designed by a trained teacher or practitioner were excluded. In addition, literature that focused on mind-body interventions for a primary diagnosis of obsessive-compulsive disorder, posttraumatic stress disorder, or substance use disorder were excluded. High-quality data from meta-analyses, systematic reviews, and randomized controlled trials (RCTs) were given priority; however, for mind-body interventions with limited data, lower-quality studies were included. Studies that included comorbid depression were included if thought to be useful to the general psychiatrist, given the high comorbidity with anxiety disorders and depression.

MIND-BODY INTERVENTIONS AND EVIDENCE

Meditation and Mindfulness-Based Interventions (MBIs)

Meditation practices have received increased interest as possible interventions for psychological distress and anxiety. Mindfulness meditation is a type of meditation that has been widely researched in studies using adapted, manualized MBIs to improve emotional coping and physical well-being. The focus of MBI is on the practice of mindfulness, which involves paying attention to one's thoughts, feelings, and physical sensations and adopting a nonjudgmental stance toward them (4). We examined studies that were close approximations of the established MBI formats (i.e., mindfulness-based stress reduction [MBSR], mindfulness-based cognitive therapy [MBCT]) and included patients whose primary diagnosis was an anxiety disorder such as generalized anxiety disorder, panic disorder, and social anxiety disorder.

The more well-studied MBIs included MBSR and MBCT. These formats are both standardized, manualized, 8-week programs that include group sessions and individual home practices. Classes are 2–2.5 hours weekly and led by a trained instructor; they include a 1-day “retreat” as well as daily audio-guided individual home practice for about 45 minutes per day (5). MBSR was created by Jon Kabat-Zinn in 1979 to assist patients with chronic pain, but it has since been applied to many other physical and emotional problems (6). MBSR teaches mindfulness meditation techniques, including breath awareness, body scanning, and mindful movement, which are used to help patients be aware of internal and external stimuli, notice habitual thought processes, and recognize maladaptive responses to stressors and more easily choose their reactions with intention and awareness.

MBCT was developed in 2002 by Teasdale et al. (7) with the goal to prevent relapses of major depression. It combines concepts and elements from MBSR and adds cognitive-behavioral therapy (CBT) principles. Just as in CBT, patients are taught to recognize automatic thoughts and associated emotional states but without passing judgment. The goal is to change their relationship with those thoughts rather than necessarily change the thoughts themselves. The “3-minute breathing space” is a key MBCT technique used to help bring attention to the breath and body after becoming aware of thoughts and feelings. Both programs encourage incorporating mindfulness into daily activities as well as group-based discussions of individual experience with mindfulness (5–7).

The use of MBIs for treatment of psychiatric conditions is relatively new compared with other forms of psychotherapy (5). Although many studies have investigated the overall effect of MBIs, they vary in their methods, objectives, and targeted patient populations. Khoury et al. (8) performed a comprehensive meta-analysis of 209 studies that examined the effects of MBIs on a range of physical and psychological conditions. They found generally moderate effect sizes across a mixture of pre-post comparisons, comparison with

waitlist control groups, and comparison with active treatment. They also reported no significant differences between MBIs and CBT, behavioral therapies, or pharmacological treatments in several conditions. Despite this plethora of research, few high-quality studies have focused on MBI treatment specifically for formally diagnosed anxiety disorders.

With regard to MBSR, Kabat-Zinn et al. (6) performed an early pilot study with patients who had generalized anxiety disorder or panic disorder, which showed improvement in anxiety on the basis of the Hamilton Anxiety Rating Scale (HAM-A) and the Beck Anxiety Inventory (BAI) after treatment with the standardized MBSR program; however, no control group was used in this initial study. We found five RCTs that focused on MBSR for one or more diagnosed anxiety disorders (9–13). Notably, two of the studies included clinician-rated scales, which may be more objective (14–16). Although anxiety disorders were the primary diagnoses, most did not exclude comorbid depression. They had slight variation in exclusion criteria, but the majority excluded for psychosis, bipolar disorder, acute safety concerns, recent substance use, and participation in other forms of therapy.

Overall, these studies showed significant improvement in anxiety symptoms after the MBSR programs; however, several limitations were found, such as small sample size and reliance on self-report scales (such as the BAI and the Penn State Worry Questionnaire). Most of the studies did not examine long-term, follow-up data, with the longest time to follow-up being 6 months (10). Hoge et al. (11) had the only RCT that used an attention control group, an internally designed stress management education course that followed the same structure and time requirements of MBSR but did not contain any elements of mindfulness; this design allowed for control of nonspecific effects included in MBSR, such as instructor attention and group support. The MBSR group was found to have significantly larger reduction in anxiety symptoms in most clinical outcome measures (Severity and Improvement subscales of Clinical Global Impressions scale; BAI) but not in the primary outcome (HAM-A).

Two of the RCTs compared MBSR with active comparator groups. Arch et al. (9) found that patients in both their MBSR and CBT groups had a moderate-to-large effect sizes; however, the CBT group had significantly greater improvements in anxious arousal symptoms, whereas the MBSR group had greater improvements in worry and comorbid emotional disorders. Jazaieri et al. (12) compared MBSR with aerobic exercise of similar duration and format for patients with social anxiety disorder. They found significant improvements in both groups compared with untreated control groups, although randomization was not used for the nontreatment group. Jazaieri et al. also found significant differences between groups on symptoms of social anxiety, mood, and overall well-being, although the study was not powered to do formal equivalence testing.

Although several RCTs have demonstrated the effectiveness of MBCT on the prevention of relapse in major

depressive disorder, only two high-quality studies used MBCT for diagnosed anxiety disorders (5, 17). Zemestani and Fazeli Nikoo (18) studied pregnant women with depression or anxiety disorders. Although they reported that MBCT was associated with greater improvements in BAI scores in the MBCT group immediately after treatment, no significant differences were found at 3-month follow-up (18). Furthermore, given that patients with anxiety and depressive disorders were combined in all analyses, it is difficult to apply these findings to patients with anxiety disorders specifically or to nonpregnant patients. Kim et al. (19) included patients with generalized anxiety disorder or panic disorder; however, this study was unblinded, non-randomized, and had no long-term follow-up data. Both studies had small sample sizes ($N=33$, $N=46$, respectively). Although both studies included education control groups, they were significantly less intensive with regard to time, attention, and effort than the MBCT group; thus, they did not adequately control for nonspecific effects of treatment.

The currently available RCTs using MBSR and MBCT specifically for anxiety disorders are encouraging, along with the preliminary findings in the larger body of research for comorbid disorders and other psychological outcomes. At the same time, limited data have targeted anxiety disorders specifically, and the current evidence has several limitations. One of the most significant limitations is the lack of robust control groups; however, the few studies that did implement control groups were still positive (11, 18, 19). Long-term data contributing to the understanding of the clinical efficacy of these treatments are minimal. Future studies for both MBSR and MBCT would benefit from improved power and use of active control groups that closely match the format of these interventions, but without the mindfulness components, and follow-up with patients over time.

Interestingly, adding an MBI to CBT may enhance the effectiveness and adherence to CBT, which suggests another way that MBIs could be used in treatment planning. In the future, it may also be useful to see what attracts patients with anxiety to these alternative treatment formats, as concepts of mindfulness may make it easier for patients to engage in treatment, which alone could be a benefit to these therapies over other options. Overall, the current research points to MBIs being potentially useful tools for patients with anxiety disorders, but additional research could help clarify the best type of MBI, format, and timing to optimize treatment outcomes.

Meditation Studies (Nonmindfulness)

We also attempted to find studies that examined meditation practices, separate from mindfulness, for anxiety disorders. One meta-analytic review compared the effectiveness of meditation versus relaxation therapies in the treatment of anxiety disorders (20). Fourteen RCTs were reviewed ($N=862$), 10 of which focused on anxiety symptoms in some way (e.g., trait anxiety, high anxiety sensitivity, social anxiety); however, only three focused specifically on anxiety

disorders, such as generalized anxiety disorder. The effect size demonstrated that meditation was slightly more effective ($g=-0.23$, with the number needed to treat=7.74). Overall, RCT studies and reviews on meditation as an intervention for anxiety disorders were limited. We did not find any studies on patients diagnosed as having an anxiety disorder in which a meditation intervention (which was also separate from previously mentioned mindfulness and yoga interventions) was clearly described and patients were randomly assigned to two groups.

Yoga

Yoga originated from India thousands of years ago (21), but the modern form practiced in Western countries is an innovation of the 19th century (22). Modern yoga is heterogeneous, including many subtypes designed to link mind and body (e.g., Hatha, Iyengar, Sudarshan Kriya) (21), and may include elements of static postures (asanas), flowing movements (vinyasas), patterns of breathing (pranayama), and mindfulness (22, 23). Its benefits for mood and anxiety symptoms have been documented in the literature since the 1970s (21, 24, 25). Yoga has become popular among the general population for its purported health benefits, with more than 10% of U.S. adults having practiced yoga at least once in their lifetime (26).

A large body of research has investigated the impact of yoga on stress and anxiety symptoms among a variety of populations, including healthy adults as well as patients with obesity, arthritis, breast cancer, and migraines. In a recent meta-analysis, Zoogman et al. (27) found a large effect size ($d=0.80$) for yoga interventions on anxiety levels across these populations. However, relatively few yoga studies have investigated psychiatric clinical populations with formally diagnosed anxiety disorders.

Two recent meta-analyses focused on yoga for anxiety disorders. Cramer et al. (23) included eight RCTs studying yoga among participants with formal anxiety diagnoses or anxiety levels exceeding predefined cutoffs on questionnaires suggesting a diagnosis (e.g., BAI, HAM-A). They found a small effect size for yoga compared with no treatment (standard mean difference [SMD]= -0.43) and, interestingly, a larger effect size when compared with an active control group (SMD= -0.86). However, no significant difference was found between yoga and either no treatment or an active control group when including only studies with formally diagnosed anxiety disorders.

Vollbrecht et al. (28) included five RCTs studying Hatha yoga for anxiety disorders and found no significant effect on anxiety symptoms. However, they commented that included studies had small sample sizes and therefore limited power.

We looked for additional studies in the literature and found seven RCTs that measured the effects of yoga on anxiety disorders. One well-designed RCT (29) with a relatively large sample ($N=90$) demonstrated benefits of both Hatha yoga and mindfulness meditation on anxiety symptoms among a group of patients with anxiety and depressive

disorders compared with a nontreatment control group. No difference was identified between participants in the yoga versus the meditation groups. Given the lack of an attention control group, it is unclear whether these improvements reflect specific benefits of yoga and mindfulness independently, a shared factor of these two interventions (e.g., both include elements of meditation and mindful breathing), or nonspecific effects of any treatment (e.g., time spent with a mental health provider, attention from research staff).

In a recent study, Simon et al. (30) compared CBT, Kundalini yoga, and an educational attention control group for patients with generalized anxiety disorder. They found that the yoga group had a statistically significant greater response rate than the control group. However, when the yoga response rate was compared with CBT, yoga was less efficacious than CBT.

One small RCT with an active control group consisting of massage, steam, diaphragmatic breathing, and acupressure (31) found improvements in anxiety symptoms in both groups, with a nonsignificant trend favoring yoga over the active control group among patients with generalized anxiety disorder. Another RCT (32) comparing yoga alone with a combined yoga+CBT intervention for panic disorder demonstrated improvements in anxiety over time with a trend favoring the combined condition. However, both studies were potentially underpowered to identify group differences (both with $n \leq 20$). RCTs assessing the effect of yoga on anxiety symptoms among patients with nonspecific diagnoses of psychoneurosis (33, 34) and anxiety disorder (35) showed greater decreases in anxiety symptoms versus control groups undergoing “pseudo-yoga” and no treatment, respectively; however these studies have limited methodological information available, and so their impact is unclear.

Although the impact is limited by the study design, several nonrandomized studies concluded that yoga interventions improved anxiety disorder symptoms. In one such study, Gabriel et al. (36) used statistical techniques (e.g., propensity score matching) to reduce bias from lack of randomization; they found that patients with generalized anxiety disorder showed substantial reductions in anxiety symptoms after yoga, with moderate to large effect sizes, relative to participants in an active control condition receiving individual psychotherapy, who showed no symptom reduction. However, the meaning of these findings is unclear because patients chose their treatment group. In other nonrandomized studies, when compared with treatment as usual, patients with mixed anxiety disorders (but mostly generalized anxiety disorder) showed reduced symptoms after a 2-week yogic breathing intervention (37) but not after a single-session intervention at a partial hospitalization program (38). In the absence of randomization, these studies carry high risk of bias. Several uncontrolled studies demonstrated improvements in anxiety symptoms over time after completing yoga interventions among patients with generalized anxiety disorder in particular (39, 40) and a diverse array of anxiety diagnoses in general (6, 36, 41, 42);

but again, in the absence of a control group, whether these changes are caused by or merely correlated with participation in a yoga intervention is unclear.

In addition to the paucity of robust RCTs, the studies reviewed have two significant limitations. First, only four studies reviewed present any follow-up data (29, 39, 41, 43); thus, the largely positive results demonstrated immediately after completion of a yoga intervention may not persist in the long term. Second, the yoga interventions used are highly heterogeneous, with variation in their components (i.e., postures, breathing, and meditation), length (ranging from a single session to 12 weeks), and frequency (ranging from daily to weekly).

In summary, some promising findings suggest that yoga may be effective in reducing anxiety among clinical populations, with the strongest evidence for generalized anxiety disorder. However, with few RCTs (which themselves are limited by small sample sizes and diverse diagnostic populations), it is difficult to establish a firm causal link between yoga and improved anxiety. With limited follow-up data, it is difficult to conclude whether any benefits after yoga interventions persist in the long term. Furthermore, the heterogeneity of interventions studied makes it difficult to “prescribe” yoga with confidence in any specific form, frequency, or duration. Although yoga is unlikely to have adverse effects (23, 27) and may benefit people without psychiatric conditions, evidence is currently insufficient to recommend the routine practice of yoga as primary treatment for patients with anxiety disorders.

Applied Relaxation (AR)

AR was widely studied in anxiety disorders during the 1980s, particularly for generalized anxiety disorder, for which it is now considered an established treatment (44). In AR, patients are trained in psychotherapy sessions to use relaxation techniques to interrupt or prevent anxiety symptoms. Patients are first taught to recognize the onset of anxiety symptoms; they then apply specific skills such as progressive relaxation training, which involves slow, paced diaphragmatic breathing or imagery techniques (45).

A recent review and meta-analysis (46) examined 16 clinical trials using relaxation therapy for anxiety disorders. Although the majority of the trials were for generalized anxiety disorder ($k=6$), panic disorder ($k=4$) and social anxiety disorder ($k=2$) were also represented; in addition, four trials were for mixed anxiety disorders. The authors concluded that the overall effect size was 0.62 (Hedges' g), representing a medium-high effect; this finding indicates that good research support exists for the effectiveness of relaxation training for anxiety disorders.

Since that review, a few more recent studies have been published. For example, in a three-arm trial involving 116 patients, Milrod et al. (47) compared AR, CBT, and psychodynamic psychotherapy for the treatment of panic disorder. They reported that the three treatments were equally effective in reducing anxiety symptoms but that

patients who were more severely ill found AR less acceptable. Another study compared AR with a newly developed psychotherapy, acceptance-based behavior therapy, in a sample of 81 people with generalized anxiety disorder (48). The authors reported that both treatments were associated with clinically meaningful change.

Massage

Swedish Massage (SM) is one of the most commonly used forms of massage treatments in the community (49). It consists of rhythmic long strokes, kneading, and percussive touch (49). SM has also been found to be effective for the treatment of anxiety disorders, as demonstrated in one study by Rapaport et al. (49). This RCT consisted of 47 untreated patients, diagnosed with generalized anxiety disorder by *DSM-IV* criteria and a HAM-A score greater than 14, who were assigned to either SM twice a week or a control intervention of light touch for 6 weeks. A statistically significant reduction was found in HAM-A scores with SW compared with the control group, with an effect size of -0.69 .

In another study, Sherman et al. (50) evaluated 68 patients with generalized anxiety disorder who were randomly assigned to therapeutic massage, thermotherapy, or relaxing room therapy control groups for 10 sessions over 12 weeks. Although the massage group and both control groups showed improvements at the end of treatment and maintained improvements at 26-week follow-up, the study did not show any statistically significant differences between groups (50).

Tai Chi

Tai chi has been used as a therapeutic tool for multiple conditions for centuries in China. Although originally developed as a martial art, tai chi evolved into a form of mind-body exercise involving a series of synergistic and deliberate movements while shifting weight accompanied by deep relaxation and visual concentration (51).

Although data are limited, one RCT ($N=32$) suggests that in older patients (ages 60–75) with an anxiety disorder, the combination of tai chi with paroxetine had greater improvements in anxiety compared with paroxetine alone (as assessed by the HAM-A) after 45 days of treatment, with lower rates of recurrence after paroxetine was discontinued (9.09% vs. 42.86%) (51).

A recent assessor-blinded, randomized controlled feasibility study examined the effect of a 10-week tai chi chuan (TCC) intervention on anxiety and sleep quality in a young adult college student population; these students reported mild to severe levels of anxiety on the seven-item Generalized Anxiety Disorder Assessment (GAD-7) but were not formally diagnosed as having an anxiety disorder (51–53). Participants were randomly assigned to one of three arms: 10 weeks of TCC meetings occurring twice a week ($N=28$), 10 weeks of TCC meetings plus an out-of-class practice aid ($N=28$), and a control group receiving an anxiety

management handout ($N=19$). Anxiety was measured by the 20 state anxiety questions of the Spielberger State-Trait Anxiety Inventory (54). Results showed that levels of anxiety decreased for the TCC and combined TCC groups, whereas no reductions in anxiety were found in the control group. Although the difference in anxiety symptom reduction was not statistically significant between the control group and the TCC groups, the effect size suggests that TCC had a small but increasingly positive effect on anxiety levels over time compared with the control group, with a Hedges' g between the two groups of 0.3 at 4 weeks, 0.4 at 10 weeks, and 0.4 at 2-month follow-up.

In another study, Hoffmann-Smith et al. (55) evaluated the effects of tai chi within an ambulatory population with high levels of anxiety by clinicians utilizing the HAM-A. They used a pretest-posttest design in which all participants completed a 10-week tai chi program. After the program, an 11-point drop occurred on the HAM-A, demonstrating a meaningful drop in anxiety symptoms.

Multiple systematic reviews have evaluated the effects of tai chi on anxiety symptoms but without clearly defined anxiety disorders or cutoffs for anxiety scales (56–58). The conclusions of these studies are consistent; tai chi has been positively associated with anxiety reduction, but the quality of studies published in the literature is modest.

Taken together, although it appears through preliminary research that tai chi may be beneficial for individuals with anxiety symptoms, more RCTs with rigorous designs are necessary to establish the efficacy of tai chi in treating anxiety disorders.

Reiki

Reiki has been utilized as a treatment for a variety of ailments since being developed in Japan in the mid-19th century. It is a form of energy therapy involving laying hands “on or just above a person, with the goal of directing energy to help facilitate the person's own healing response” (59). Although several studies looked at anxiety symptoms, we did not find any that included patients diagnosed as having anxiety disorders.

A recent Cochrane review identified three RCTs that evaluated the effects of reiki on anxiety symptom reduction (but not for anxiety disorders) (60). One study assigned men with prostate cancer to one of three groups: reiki, relaxation, and waitlist control. Following the intervention, individuals with anxiety in the reiki group had reduced anxiety, but the differences between reiki and the other two groups were not statistically significant (61). Another study assigned older adults to either reiki or waitlist control; no statistically significant differences were found in anxiety change scores between groups (62). In a third study, university students were randomly assigned to reiki and relaxation-treated control groups; but again, changes with treatment were not significant between the groups (63).

A 2008 systematic review on reiki found four RCTs that included anxiety symptom reduction as an outcome (64).

One study, which evaluated the effect of reiki on pain and anxiety in patients who were chronically ill, found a significant reduction in anxiety symptoms in the reiki group compared with the sham control group (65). The other three trials did not find intergroup differences compared with the control group (66–68). A few other RCTs evaluated reiki in reducing stress and anxiety in various populations and found a significantly greater drop in anxiety in the reiki group compared with the control group (69, 70).

In sum, the existing data on reiki for anxiety are limited. Systematic reviews on reiki in anxiety symptom reduction across a variety of populations have demonstrated inconsistent findings, and vary widely in methodology, making it difficult to compare and generalize. Although two more recent RCTs mentioned here (69, 70) found evidence of anxiety symptom reduction, the studies were not conducted among patients with a diagnosed anxiety disorder. Thus, no high-quality evidence exists showing that reiki is beneficial for the treatment of anxiety disorders.

Therapeutic Touch

Therapeutic touch is a Western form of energy therapy developed in the early 1970s that has been described as the practitioner moving one's

hands around the patient's body, at a distance of two to five inches, encountering and assessing the energy field by feeling for changes in temperature, pressure, rhythm or a tingling sensation . . . and redirecting and rebalancing energy through the use of hand movements . . . to bring the two energy fields into a harmonic resonance. (71)

To date, no RCTs have been conducted to evaluate the effectiveness of therapeutic touch for anxiety disorders (71). Although uncontrolled, some studies have suggested that therapeutic touch can have a positive effect on anxiety among patients with cancer (72), individuals in nursing homes (73), patients with burns (74), and a variety of other populations (75). Furthermore, a recent systematic review concluded that this intervention might reduce anxiety levels among patients with various disease conditions, including heart disease and stroke (76). However, we do not have enough evidence to recommend therapeutic touch as treatment for patients with anxiety disorders.

Guided Imagery

Guided imagery is an ancient relaxation technique that focuses on the interaction between brain, mind, body, and behavior using the patient's own imagination and mental processing to form a pleasing mental representation of an object, place, event, or situation to replace negative or stressful feelings (77, 78). Guided imagery can be self-directed or conducted by a professional or a recording (78).

In a series of RCTs assessing the effects of guided imagery on symptoms of anxiety among nonclinical populations, we find a growing body of literature that may support this intervention. These studies assessed the effects of guided

imagery among populations of nonclinical adults seeking general stress and anxiety relief, parents of children hospitalized with malignancies, adults with work-related stress, patients receiving hemodialysis, patients with irritable bowel syndrome, adults and children with preoperative anxiety, and patients with acrophobia or fear of heights (78–85). In each of these studies, anxiety outcomes were significantly reduced following the guided imagery intervention compared with control groups.

Qigong

Qigong is a traditional Chinese mind-body exercise that could be used as a stress management intervention technique that provides skills for relaxation, reduction of stressors, and coping with stress (86). Qigong involves mind-body exercises that integrate body, breath, and mind adjustments into one, addressing both psychological and physiological aspects of health by integrating both dynamic (movement) and static (still) forms; both of these forms usually incorporate the meditative state, in which the body, breath, and mind are one (77). Several types of Qigong practice are commonly practiced, including self-healing Qigong and “Baduanjin” (77, 87).

Several RCTs assessed the effects of Qigong on symptoms of anxiety among nonclinical groups, including a distressed Korean population, first-year nursing and midwifery students, as well as adults with burnout and anxiety symptoms (86, 88–90). In three of these studies, anxiety outcomes were statistically significant following the Qigong intervention compared with the control groups (86, 88, 90). In one study comparing Qigong with cognitively oriented behavioral rehabilitation with Qigong, no significant differences were found, although both treatments significantly reduced symptoms of anxiety from pre- to posttreatment (89).

Meta-analyses examining Qigong have supported the efficacy of Qigong across various populations for reducing anxiety symptoms, although in the majority of these studies, anxiety was a secondary outcome measure (77, 91–94). Qigong has been shown to be effective in reducing anxiety and depression among older adults (93) as well as reducing stress and anxiety among healthy adults (94) and people with varying physical and mental illnesses (91).

More RCTs with rigorous research designs are needed to establish the efficacy of Qigong as an intervention for populations with clinically diagnosed anxiety. However, as evidence for Qigong continues to develop, promising results from multiple RCTs are encouraging (77, 91, 92).

Laughter Therapy

Laughter therapy is a combination of mimicking laughter and yoga-like movements and breathing styles, in which the patient is encouraged to focus on the experience of laughter and the associated bodily sensations. This practice creates a resulting focus on the present moment, which is hypothesized to provide temporary relief from negative thoughts and rumination while providing an opportunity for a release of

negative emotions (95, 96). Laughter therapy or humor training is generally done in a group setting, over several weeks, and focuses on different humor behaviors such as spontaneous and simulated laughter (97, 98). During this practice, patients are encouraged to engage in simulated laughter, which may lead to spontaneous or genuine laughter among group members and instructors, thus creating greater connections among group members (96, 97).

Laughter therapy is a relatively new field of research that has yet to reach maturity, although reviews have found a growing body of support for laughter therapy as an intervention for anxiety symptoms (97). Several RCTs assessed the effects of laughter therapy among populations of people postmastectomy, people receiving in-vitro fertilization, and adults undergoing dialysis; these RCTs found that symptoms of anxiety were significantly reduced compared with the control groups receiving treatment as usual (99–101). One study found that among adults with diagnosed depression with stress or anxiety symptoms, reductions in symptoms of anxiety did not reach significance (96). Other studies found no significant effect of laughter therapy compared with a control group, including one with people diagnosed as having anxiety disorders (98, 100).

In their meta-analysis, van der Wal and Kok (97) found that laughter-inducing therapies may improve anxiety symptoms among patients undergoing dialysis, elderly populations, healthy populations, people experiencing chronic pain, and people who are pregnant, although the overall quality of this evidence was low and the field has yet to reach maturity. Interestingly, they suggested that simulated or nonhumorous laughter may have more of a positive effect on depression and anxiety compared with spontaneous or genuine laughter.

Humor and laughter interventions are safe and convenient and can promote interpersonal relationships in both patients and clinicians. Therefore, these interventions have great feasibility and potential to be used as an aspect of psychotherapy to improve anxiety, depression, and sleep quality among adults (102).

Underlying Mechanisms

Underlying mechanisms for mind-body interventions have not been clearly worked out. However, various possibilities have been proposed for mindfulness meditation and yoga, which may also be applicable to other mind-body treatment approaches. For example, both Hölzel et al. (103) and Shapiro et al. (104) have suggested that these mind-body practices increase “reperceiving,” “decentering,” and “reappraisal,” which allows an individual to experience their thoughts differently. This practice allows them to partake in a larger perspective and not be as closely identified with the experience, creating a path to greater flexibility in reacting to experiences and improved emotion regulation. Another proposed mechanism is exposure, by which a person allows themselves to be “exposed” to previously avoided stimuli (such as memories or thoughts) while practicing nonreactivity; this practice leads to

greater acceptance and nonjudgment, which, in turn, makes the stimuli less provocative over time. Greater research into underlying mechanisms for mind-body interventions is needed.

PRACTICAL CONSIDERATIONS FOR MIND-BODY INTERVENTIONS IN ANXIETY DISORDERS

Overall, the data supporting the use of mind-body interventions for anxiety disorders are limited. RCTs are limited, and many available studies have small sample sizes that limit statistical power, include patients with mixed depression and anxiety, and do not utilize control groups that adequately control for attention and expectation effects; these limitations make it difficult to establish firm causal links between interventions and reductions in anxiety. However, stronger evidence exists for some interventions with certain anxiety disorders, such as AR for generalized anxiety disorder, increasingly promising but still limited outcomes for yoga for generalized anxiety disorder, and MBSR and MBCT for several disorders. It is worth noting that studies on the latter two treatments sometimes included comorbid depression in their populations, which could have affected anxiety outcomes given the overlap in symptoms. Although we often see both depression and anxiety in our clinical populations and a broad effect on psychiatric symptoms might be desirable, it is difficult scientifically to distinguish the effects of MBSR and MBCT on anxiety versus depression in mixed samples.

The question of researcher allegiance (RA) was raised in several of the reviewed studies and must also be considered because it can contribute to bias. RA refers to the experimenter’s “belief in the superiority of a treatment [and] . . . the superior validity of the theory of change that is associated with the treatment” (105, 106). Researchers are motivated by personal beliefs or experiences that lead them to pursue research in complementary and alternative medicine (107). Given the limitation that blinding cannot be adequately performed in mind-body intervention trials, RA can contribute to optimism bias and serve as a form of nonfinancial conflict of interest (108). A recent meta-analysis found that RA may contribute to bias in MBI studies across a variety of psychiatric conditions (109). RA should be considered when interpreting results of these mind-body studies.

Studies varied dramatically from one another in terms of frequency of intervention, duration of treatment, and length of follow-up, if included at all. For example, the longest follow-up periods reported in the studies that we evaluated for MBSR and yoga for anxiety disorders were both 6 months (13, 30). Recent findings, however, suggest that although Kundalini yoga may have short-term efficacy for generalized anxiety disorder, these improvements may not be persistent (30). The next step for researchers is to look more closely at long-term effects of mind-body interventions, in addition to further RCTs with adequate control groups and further comparisons with existing treatments.

Cost and access to these interventions are a consideration when considering options. Various types of yoga have

become more accessible across the country and can be found in most cities in health care settings, gyms, private studios, and wellness centers. MBIs, however, tend to be less common and may be more costly. Most important, mind-body treatments are often not reimbursed by health insurance companies, although there are exceptions. Especially relevant in the context of the coronavirus (SARS-CoV-2) pandemic, we also do not know whether online versions or patient-led versions of these interventions are equivalent in efficacy.

Potential risks and side effects of mind-body treatments must also be considered. According to the then director of the National Center for Complementary and Integrative Medicine at the National Institutes of Health, complementary treatments can pose harms to be patients because of “unjustified claims of benefit, possible adverse effects . . . and the possibility that vulnerable patients with serious diseases may be misled” (110). Although most class-based, mind-body interventions are safe and well-tolerated, studies have sometimes reported depersonalization, anxiety, panic, and reexperiencing of trauma-related memories; moreover, in overnight retreat settings, psychosis and mania have been reported (111). Few studies evaluating yoga for anxiety reported on adverse events; for those that did, no adverse events were found (23).

CONCLUSIONS

Weighing the limited data against the overall low risk for these mind-body interventions, we cannot recommend these methods for primary treatment of an anxiety disorder; however, these interventions, especially MBIs and yoga, may serve a role as part of an overall treatment plan. The strongest evidence for treatment efficacy exists for AR for generalized anxiety disorder, yoga for generalized anxiety disorder, and MBSR and MBCT for several disorders. We recommend that the general psychiatrist consider cost, patient preference, and potential synergy with traditional treatments when evaluating mind-body interventions for their patients. These therapies could be potentially added to either pharmacotherapy and psychotherapy as part of a larger treatment plan; they could also be used in cases in which symptoms are mild or when patients strongly desire nonpharmacologic treatments.

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