

Exercise, Yoga, and Meditation for Depressive and Anxiety Disorders

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Anxiety and depression are among the most common conditions cited by those seeking treatment with complementary and alternative therapies, such as exercise, meditation, tai chi, qigong, and yoga. The use of these therapies is increasing. Several studies of exercise and yoga have demonstrated therapeutic effectiveness superior to no-activity controls and comparable with established depression and anxiety treatments (e.g., cognitive behavior therapy, sertraline, imipramine). High-energy exercise (i.e., weekly expenditure of at least 17.5 kcal per kg) and frequent aerobic exercise (i.e., at least three to five times per week) reduce symptoms of depression more than less frequent or lower-energy exercise. Mindful meditation and exercise have positive effects as adjunctive treatments for depressive disorders, although some studies show multiple methodological weaknesses. For anxiety disorders, exercise and yoga have also shown positive effects, but there are far less data on the effects of exercise on anxiety than for exercise on depression. Tai chi, qigong, and meditation have not shown effectiveness as alternative treatments for depression and anxiety. (*Am Fam Physician*. 2010;81(8):981-986, 987. Copyright © 2010 American Academy of Family Physicians.)

► **Patient information:** A handout on exercise, yoga, and meditation for anxiety and depression, written by the authors of this article, is provided on page 987.

Many persons with clinical anxiety or depression turn to nonpharmacologic and non-conventional interventions, including exercise, meditation, tai chi, qigong, and yoga. There is increasing scientific interest in the potential effectiveness of these interventions for the treatment of anxiety and depression, especially for mild to moderate levels of disorder severity. These interventions have appeal because their use seems unlikely to have severe adverse effects and they are easily available. This article summarizes the available evidence on the effectiveness of these approaches for treating clinical anxiety and depression.

Depression Treatment EXERCISE

There is extensive literature on a wide range of exercise interventions for depression. Several systematic reviews¹⁻³ and a synthesis of systematic reviews⁴ focused on exercise interventions for persons with clinically diagnosed depression. Another systematic review focused on exercise in older persons with depression.⁵ All reviews reported that exercise produces meaningful reductions in depression symptoms that are comparable with cognitive behavior therapy (CBT),¹⁻⁵ and two studies^{6,7} found it was at least comparable with

sertraline (Zoloft). A Cochrane meta-analysis is the largest review of this type, analyzing 25 randomized controlled trials (RCTs).² It found that exercise produced marked clinically positive effects. It also noted important methodologic weaknesses in the majority of studies. Analysis of the only three methodologically rigorous trials in the review found smaller, nonsignificant positive effects. However, even this analysis was flawed because it mixed trials with differing levels of exercise and duration.

Two RCTs demonstrated that high-energy (i.e., weekly expenditure of at least 17.5 kcal per kg) aerobic exercise or resistance training produces greater reductions of depression symptoms than low-energy (i.e., weekly expenditure of 7 kcal per kg or less) exercise.^{8,9} Two small RCTs showed that the positive effects of exercise were the same in group and individual settings,⁹ and that supervised exercise in the clinic produced the same positive effect as unsupervised exercise in the home.¹⁰ Although exercise reduces depression in adults, it has not been tested in homogenous diagnostic groups of adolescents. The few studies on clinically treated patients 11 to 19 years of age have not shown statistically significant positive effects.¹¹ *Table 1* outlines the overall effectiveness evidence of exercise for depression treatment.^{1-5,8-11}

SORT: KEY RECOMMENDATIONS FOR PRACTICE

<i>Clinical recommendation</i>	<i>Evidence rating</i>	<i>Comments</i>
Exercise is an effective treatment option for depression in adults, but there is only minimal evidence to support its use in anxiety treatment.	B	<p>A large number of small, flawed studies found exercise superior to placebo, and aerobic and high-energy resistance exercise more superior to placebo and equal to treatment with selective serotonin reuptake inhibitors for mild to moderate depression.^{1-5,8,9}</p> <p>A single, but positive, trial showed exercise to be better than placebo, but not as good as clomipramine (Anafranil) in short-term reduction of panic disorder symptoms.³¹ No follow-up data were gathered; therefore, duration of effects is not clear. Little additional information is available.</p>
Yoga is a therapeutic option for depression, and it also has positive effects on anxiety disorders.	B	<p>Yoga is superior to placebo for depression with no adverse events reported, although there are no clear necessary or sufficient styles, postures, or practice durations.^{12,13}</p> <p>A systematic review and subsequent randomized controlled trials show consistent positive effects of yoga on anxiety disorders compared with placebo in flawed, small studies.^{32,37,38}</p>
Tai chi, qigong, and meditation have not shown effectiveness as alternative treatments for depression or anxiety.	B	<p>Meditation had no clear treatment effects on depression or anxiety disorders,^{23,39} although it is effective for preventing relapse in patients with three or more episodes of depression.^{25,26}</p> <p>A single study on older adults with comorbid depression and chronic medical problems showed qigong reduced depression symptoms, although symptom reduction vanished when practice was discontinued.²⁰</p> <p>Tai chi and qigong have not been specifically studied for anxiety treatment.</p>

A = consistent, good-quality patient-oriented evidence; B = inconsistent or limited-quality patient-oriented evidence; C = consensus, disease-oriented evidence, usual practice, expert opinion, or case series. For information about the SORT evidence rating system, go to <http://www.aafp.org/afpsort.xml>.

YOGA

Yoga has been used to address a variety of health problems, including mental health. A systematic evidence review¹² and two subsequent studies^{13,14} showed that yoga is an effective intervention for depression treatment. Findings were based on a small number of trials with significant methodologic weaknesses, including short duration of treatment, small numbers of participants, and variability in interventions and severity of depression. Most participants were young and relatively fit, raising questions about generalizability. Adverse effect reporting was limited, but no safety issues or adverse effects were identified. *Table 2* outlines the overall effectiveness evidence of yoga for depression treatment.¹³⁻¹⁹

TAI CHI AND QIGONG

Tai chi and qigong originated in China and are internal martial arts consisting of slow, deliberate movements, relaxed breathing, and deep mental focus. The limited amount of literature suggests that tai chi and qigong are effective in reducing depression symptoms, at least in the short term.^{20,21} The positive effects may be partially related to the social support of practicing in a group

format. One study focused on qigong for anxiety and depression treatment in a clinical population of older adults with chronic medical illnesses.²⁰ Ratings on the Geriatric Depression Scale showed significant improvement in the qigong group during the active practice period, but improvements faded within a month of completion. Another trial compared older patients who had depression with wait-list control participants, and concluded that the positive effects of tai chi were mediated by the social support in the group lessons and practices.²¹

MEDITATION

Mindfulness-based stress reduction (MBSR) is a standardized intervention that aims to increase mindfulness through meditation by systematically focusing attention on each part of the body in sequence, practicing gentle Hatha yoga, and participating in group discussion. MBSR has been studied in participants with a variety of medical problems, and has been shown to reduce stress, depression, fatigue, pain, and binge eating.²² However, a recent review of 15 studies on the effects of MBSR found no clear positive effects on depression symptoms in patients with

Table 1. Evidence on the Effectiveness of Exercise for Treatment of Depression

<i>Sources of evidence</i>	<i>Findings</i>
Meta-analysis of 14 RCTs on exercise compared with no treatment or cognitive therapy ¹	Exercise produced large, clinically significant reductions in depression symptoms, comparable with cognitive therapy effects; methodologic weaknesses in RCTs limited recommendations
Cochrane meta-analysis of 25 RCTs ² (updates earlier study ¹)	Exercise produced large, clinically significant reductions in depression symptoms, but only moderate improvement shown when analysis limited to three highly rigorous trials; exercise effects comparable with those of cognitive therapy
Meta-analysis of 11 RCTs from peer-reviewed journals ³	Quantitative analysis of exercise monotherapeutic effects showed large effect size; qualitative review of four RCTs on exercise as adjunct treatment also positive; methodologic weaknesses in RCTs are common
Nonsystematic review of multiple meta-analyses ⁴	The consistent tendency for meaningful exercise-induced reductions of depression symptoms were noted, as well as common methodologic problems (e.g., no intention-to-treat analysis, poor allocation concealment, non-blinded assessment); recommendation to use exercise
Systematic review of five RCTs comparing exercise with non-active control for older patients with depression ⁵	Each RCT on older adults (i.e., 50 to 84 years of age) with depression showed greater symptom reduction from exercise than from non-active control conditions (e.g., student visits); methodologic weaknesses noted
RCT (n = 80) comparing aerobic with anaerobic exercise in adults with depression ⁸	Adults with mild to moderate depression were assigned to high-energy aerobic exercises, low-energy aerobic exercises, or a low-energy stretching control condition; higher energy expenditure produced greater reductions in depression symptoms; low-energy aerobic exercise had same effect as control
Small RCT comparing effects of exercise frequency and group versus individual effects ⁹ ; another RCT comparing supervised exercise with home exercise ¹⁰	High-frequency (i.e., three to five times weekly) aerobic activity produced greater symptom reduction compared with low-frequency (i.e., once weekly) aerobic activity; no differences in symptom reduction between exercises performed in groups versus individually, or between supervised exercise versus home exercise
Cochrane meta-analysis of 16 RCTs with participants younger than 20 years ¹¹	Most studies were conducted in the general population and not clinically diagnosed groups; in the few studies on children in clinical treatment, no statistically significant differences were seen among treatment with exercise, low-intensity relaxation, psychosocial intervention, or no intervention

RCTs = randomized controlled trials.

Information from references 1 through 5 and 8 through 11.

comorbid medical disorders or in patients with mood disorders alone.²³

Mindful meditation is also combined with CBT to treat depression and prevent relapse.²⁴ Although there is little evidence for the effectiveness of MBSR or meditation as an alternative treatment of depression, there are some indications that mindfulness may complement CBT in changing thinking patterns associated with depression.^{25,26} Adding mindfulness training as a means of preventing relapse is effective in patients whose depression has recurred three or more times.^{25,26}

Anxiety Treatment EXERCISE

Little research has been conducted on the effects of exercise on anxiety disorders.²⁷ However, the effects of short- and long-term

physical activity on anxiety symptoms in healthy participants or those with medical problems have been studied.²⁸ Two studies have examined the effect of exercise on anxiety sensitivity, which is thought to trigger panic attacks in susceptible persons.^{29,30}

A study of 46 outpatient participants with panic disorder compared the effectiveness of a 10-week duration of treatment with aerobic exercise, clomipramine (Anafranil), or placebo.³¹ The exercise and clomipramine groups had statistically significant reductions in panic symptoms compared with the placebo group, although clomipramine treatment was most effective and faster acting overall.

YOGA

A systematic review of the effects of yoga on anxiety treatment identified five trials

Table 2. Evidence on the Effectiveness of Yoga for Treatment of Depression

Sources of evidence	Findings
Yoga and PMR compared with control ¹⁵	Yoga and PMR were superior to control, with yoga more effective than PMR
Shavasana yoga compared with no intervention ¹⁶	College students with severe depression improved with yoga mid- and post-treatment
SKY yoga compared with electroconvulsive therapy and with imipramine (Tofranil) ¹⁷	Reductions on Beck Depression Inventory for all three groups with electroconvulsive therapy better than SKY or imipramine, but SKY as effective as imipramine
Full SKY yoga compared with partial SKY yoga ¹⁸	30 participants with major depressive disorder improved with either therapy, but results were not statistically significant
Iyengar yoga compared with wait list ¹⁹	28 participants with mild depression benefited from yoga, measured by Beck Depression Inventory at mid-treatment and throughout
Yoga plus psychoeducation treatment compared with group therapy plus psychoeducation treatment ¹³	46 participants with chronic depression randomized to meditation and yoga group, group therapy and hypnosis group, or control group; significantly more meditation and yoga group participants experienced remission than control participants at nine-month follow-up
Mindful exercise compared with non-mindful exercise ¹⁴	Systematic review of 12 randomized controlled trials showed short-term reduction in depression symptoms with mindful and non-mindful exercise

NOTE: Inclusion criteria were randomized controlled trials, participants with depression or depressive disorders, use of yoga or yoga-based exercises alone, and depression rating scales used as outcome measures.

PMR = progressive muscle relaxation; SKY = Sudarshan Kriya yoga.

Information from references 13 through 19.

of persons with clinically diagnosed anxiety disorders.³² However, these were small, methodologically flawed controlled trials with variability in conditions treated and interventions used (*Table 3*³³⁻³⁷). The limited results were consistently positive, including substantial improvement in one trial³⁷ of participants with obsessive-compulsive disorder and another trial³⁸ of patients with mixed anxiety and depression. Safety and contraindications were not addressed and high attrition rates may reflect the effect of motivation on patient compliance.

TAI CHI AND QIGONG

There is essentially no evidence for the effectiveness of tai chi or qigong in treating anxiety disorders. The limited data supporting tai chi and qigong in the treatment of depression suggest that there is no basis for recommending these approaches for anxiety disorders.^{20,21}

MEDITATION

A 2006 Cochrane review of meditation approaches for treating anxiety disorders found only two RCTS.³⁹ One compared transcendental meditation with electromyographic biofeedback and with relaxation therapy. The other compared mindful meditation with a form of yoga. Drop-out rates were high in both studies, and neither was of high quality. Studies of meditation have not allowed any conclusions to be drawn about its effectiveness in the treatment of anxiety disorders.

Contraindications

Exercise programs must be tailored to individual needs, taking into consideration each patient's age and health status. If a patient has a known cardiovascular problem or is at an increased risk, exercise testing should be selectively performed at the discretion of the physician. Physical practices of yoga can range from gentle to vigorous. Physicians should be clear about what types of yogic practices would be appropriate with regard to each patient's physical limitations, and patients should seek out appropriately trained instructors. When an appropriate method, intensity, and duration of activity are chosen, yoga and exercise can be made accessible to almost anyone. The National Center for Complementary and Alternative Medicine can serve as a resource for physicians and patients with information on yoga (<http://nccam.nih.gov/health/yoga/introduction.htm>), meditation (<http://nccam.nih.gov/health/meditation/overview.htm>), and tai chi (<http://nccam.nih.gov/health/taichi/>).

Bottom Line

Meditation, tai chi, and qigong do not have clear indications of effectiveness in the treatment of depression or anxiety. Exercise and yoga, on the other hand, have multiple studies demonstrating their effectiveness, which is sometimes comparable with mainstream treatments and consistently superior to placebo. Exercise and yoga are tested as alternatives to standard pharmacologic and psychotherapeutic treatment approaches,

Table 3. Evidence on the Effectiveness of Yoga for Treatment of Anxiety Disorders

Sources of evidence	Findings
Yoga (n = 15) compared with control treatments of relaxation, postures, breathing, and writing (n = 12) for persons with a diagnosis of psychoneurosis ³³	Yoga showed a statistically significant difference (5-percent level) in TAS scores (mean difference = 7.16) after treatment
Yoga (n = 21) compared with medication treatment on a variable dosage schedule (amitriptyline and clordiazepoxide [Librium], n = 18) ³⁴	Yoga showed statistically significant greater reductions in TAS in this nonrandomized sample
Yoga practiced daily for 40 minutes (n = 38) versus control treatment with diazepam (Valium) at unspecified frequency or doses (n = 53) for three months' duration in patients with a diagnosis of anxiety neurosis ³⁵	Mean reduction in Institute for Personality and Ability Testing anxiety scale with yoga group (3.39; $P < .05$) versus control group (0.36; $P > .05$); attrition rate of 21.1 percent in yoga group and 66 percent in control group
One week of yoga training followed by twice daily practice (n = 41) compared with control (n = 30; placebo capsule) in participants with a diagnosis of anxiety neurosis ³⁶	Hamilton Anxiety Scale measured every three weeks for 12 weeks; yoga showed significant improvement between three and six weeks ($P < .01$), but control did not
Kundalini yoga (n = 11) versus relaxation and mindfulness meditation (n = 10) in 21 participants with obsessive-compulsive disorder; multiple outcome measures, with Y-BOCS as primary ³⁷	Seven participants in each group completed three months of treatment, with yoga demonstrating greater improvements on the Y-BOCS (but statistically significant in one group only); groups were merged for an additional year of yoga (n = 11) and had a 71 percent improvement on the Y-BOCS

NOTE: Inclusion criteria were randomized controlled trials, participants with anxiety or anxiety disorders, use of yoga or yoga-based exercises alone, and anxiety rating scales used as outcome measures.

TAS = Taylor Anxiety Scale; Y-BOCS = Yale-Brown Obsessive Compulsive Scale.

Information from references 33 through 37.

and show limited but positive data as complementary treatments in combination with these standard treatment approaches.

Members of various family medicine departments develop articles for "Complementary and Alternative Medicine." This is one in a series coordinated by Sumi Sexton, MD, and Benjamin Kligler, MD, MPH.

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