Effects of mind–body interventions on depressive symptoms among older Chinese adults: a systematic review and meta-analysis

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Objective: To determine the efficacy of mind–body interventions in depressive symptoms treatment among older Chinese adults (>60 years of age).

Methods: We searched MEDLINE, PsycINFO (Ovid), Embase (Ovid), CINAHL, Cochrane Central Register of Controlled Trials, China National Knowledge Infrastructure, Wanfang Data, Chinese Biomedical Literature Database, and Chongqing VIP for eligible studies until September 2016. We reviewed randomized controlled trials investigating the efficacy of mind–body interventions for depressive symptoms among Chinese older adults. Two authors independently conducted screening, and risk of bias assessment. Data were extracted by one author and crosschecked by the research team. Cohen’s d standardized mean differences were calculated to represent intervention effects.

Results: A comprehensive search yielded 926 records; 14 articles met inclusion criteria. Relative to the control groups, mind–body interventions had large short-term effects in reducing depressive symptoms in older Chinese adults (standardized mean differences = −1.41; 95% CI [−1.82, −0.99]). Most studies did not report the long-term effects of mind–body interventions. Subgroup analyses by type of mind–body interventions, participants’ age group, and control condition yielded different effect sizes; however, these differences did not all reach a statistically significant level. The interpretation of the subgroup analysis should be considered with caution given its observational nature and a small number of included studies.

Conclusions: This systematic review suggests that mind–body interventions had short-term effects in alleviating depressive symptoms among older Chinese adults. Further research (randomized controlled trials with active controls and follow-up tests) are needed to assess the effects of mind–body interventions on depressive symptoms among this population. Copyright © 2017 John Wiley & Sons, Ltd.

Key words: complementary and alternative interventions; depression; randomized controlled trials; meta-analysis

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Introduction

Depression is a serious mental health problem among the rapidly growing Chinese older adults and is associated with significant and negative consequences such as higher functional disability (Chi et al. 2005), chronic physical conditions (Chi et al., 2005; Wu et al., 2010), increased suicide rates (Hsu et al., 2005), and lower quality of life (Chan et al., 2006). Depressive symptoms affect between 16% and 30% of older Chinese Americans in different areas in the United States (Mui, 1996; Stokes et al., 2002); 11% to 15.3% of older Chinese adults in Hong Kong and Taiwan (Chi et al., 2005; Chong et al., 2001); and 39.86% of older Chinese adults in Mainland China (J. Yu et al., 2012). Despite its substantial consequences and high prevalence rates, depression among older Chinese...
adults is inadequately treated. Mainstream antidepressant therapy and psychotherapy have limitations in this population (Tsang et al., 2008). Chinese adults and older adults view psychiatric disorders as stigmatizing (Lee et al., 2005; Kung, 2003; Ng, 1997). They are reluctant to seek mental health treatment because of dependence on willpower and fear of losing face (e.g., depression is viewed as a personal weakness or moral failing, which can have undesirable effects on reputation and respect from others) (J.-P. Chen et al., 2002). They are also reluctant to use Western medications due to side effects and potential complications (Lam, 2001). Older Chinese adults are likely to express depressive symptoms in somatic terms (e.g., poor appetite, disturbed sleep) (Kleinman, 1977; Parker et al., 2001). They also tend to seek informal help from family members, friends, community or religious leaders, and traditional Chinese medicine practitioners (Kung, 2003; Ng, 1997).

To address these issues, culturally congruent complementary and alternative interventions for depression among Chinese adults have been investigated (e.g., Tsang et al., 2008). Mind–body interventions are compatible with Chinese holistic beliefs of harmony between human and nature (Astin, 1998; Chesney and Straus, 2004). These interventions are generally viewed as beneficial for well-being and have fewer associations with stigmas regarding psychiatric disorders (Yeung et al., 2014). In particular, mind–body interventions focus on the interactions among the brain, body, mind, and behavior. Mind–body interventions generally include different combinations of breathing exercises, meditation, and structured movements. Research has shown that these interventions are commonly used to cope with a wide range of depression severity and have positive outcomes (Bertisch et al., 2009; Cramer et al., 2013; Sharma and Haider, 2013; Tsang et al., 2008). Mind–body interventions are relatively cost effective (Sobel, 1999) and safer for older and physically frail individuals (Morone and Greco, 2007). Well-accepted mind–body interventions include relaxation-based therapies (e.g., progressive muscle relaxation, biofeedback), concentration-based therapies (e.g., meditation, guided imagery, hypnosis meditation), and movement-based therapies (e.g., Tai Chi, Qi Gong, yoga) (Morone and Greco, 2007).

Mechanisms that drive the positive effects of mind–body interventions (e.g., mindfulness) have been studied and categorized into psychological, behavioral, and neurobiological mechanisms (Creswell, 2017). Psychological mediators include self-reported mindfulness measured by questionnaires, decentered mindset (i.e., ability to more objectively observe one’s moment-to-moment experience), attention regulation, body awareness, emotion regulation (e.g., reappraisal, exposure, extinction, and reconsolidation), and change in perspective on the self (Bernstein et al., 2015; Creswell, 2017; Hölzel et al., 2011a). Behavioral mechanism of change involves formal daily home meditation practice. Neuroscience findings have shown that mindfulness practice can affect central nervous system, activate multiple brain regions (e.g., anterior cingulate cortex, insula), and change brain structure (e.g., increasing gray matter density in the hippocampus) (Hölzel et al., 2011b; Tang et al., 2015).

Most existing systematic reviews on mind–body interventions for psychosocial well-being have focused on the general population (Cramer et al., 2013; Hofmann et al., 2010; Sharma and Haider, 2013; C.-C. Wang et al., 2010; W.-C. Wang et al., 2009). Only a few studies focused on older adults (Chi et al., 2013; Klainin-Yobas et al., 2015; Rogers et al., 2009). None of them specifically focused on the effects of mind–body interventions on alleviating depressive symptoms among older Chinese adults. In addition, none of the existing systematic reviews of mind–body interventions on depression tested the potential different effects among different age groups of older adults, different types of mind–body interventions, and different types of control conditions. Because Chinese older adults are such a huge and unique population, a comprehensive systematic review of mind–body interventions that have been validated through clinical trials among older Chinese adults with depressive symptoms is needed. To our knowledge, this review is the first of its kind.

This study addressed the following research questions: What kinds of mind–body interventions targeting depressive symptoms among older Chinese adults have been studied? How efficacious are those interventions in alleviating depressive symptoms among older Chinese adults? Do the effects vary or remain consistent among different subgroups (e.g., elderly age groups, type of mind–body interventions, and control conditions)?

**Methods**

Inclusion and exclusion criteria.

**Type of studies.** A key search criterion was to identify randomized controlled trials (RCTs). We included studies published in the English or Chinese language.
Mind–body interventions and depression

Type of participants. Participants identified themselves as Chinese ethnicity; ages ranged from 60 and up; diagnosed with depression according to any established diagnostic criteria or had depression symptoms at baseline measured by any established depression rating scales. Cutoff scores for each scale that indicated mildly depressed were used (e.g., GDS-15 above a cutoff score of 6, GDS-30 above a cutoff score of 11, Yesavage and Sheikh, 1986).

Type of interventions. Experimental—used any form of mind–body intervention (e.g., Tai Chi, Qi Gong, yoga, progressive muscle relaxation, mindfulness-based cognitive therapy, etc.) as main treatment component. Control—no treatment (e.g., waitlist control), standard care (e.g., standard care for chronic physical illness), or non-therapeutic activities (e.g., health education, recreational activities).

Type of outcome measures. Studies operationalized depressive symptoms as an outcome and measured by any established depression rating scales, such as Chinese version of Center for Epidemiological Studies Depression Scale (Chinese CES-D); Geriatric Depression Scale (Short Form) (GDS-15), Geriatric Depression Scale (Long Form) (GDS-30), Zung Self-Rating Depression Scale (SDS), Hamilton Rating Scale for Depression (HRSD), and Profile of Mood States (POMS).

Exclusion criteria included: (a) articles were not RCTs; (b) participants were not Chinese, aged under 60, or were neither clinically depressed nor expressed depressive symptoms; and (c) intervention includes other treatment component besides mind–body interventions while control group did not have that treatment component (e.g., intervention group is mind–body intervention plus psycho-therapy, while control group is standard care).

Data collection

Identified records were exported into Endnote X7 for title and abstract screening. After removing duplicates, research team independently examined studies for inclusion criteria. The research team members then independently screened the full text of the articles that passed the initial screening. During the screening process, conflicts on different opinions were resolved by communication between two research team members. If a conflict was not resolved, a third team member resolved the discrepancy about whether or not to include the study. After full-text screening, the studies meeting criteria were included for data extraction and systematic review. To extract information, we used the data collection form for intervention reviews recommended by Cochrane’s guidelines for systematic reviews (Higgins and Green, 2008). The data were extracted by one author and crosschecked by the research team. Disagreements were also resolved through discussion.

Risk of bias assessment

Included studies were assessed for risk of bias using the Cochrane Collaboration’s risk of bias tool on six domains: sequence generation, allocation concealment, blinding of participants and personnel, blinding of outcome assessment, incomplete outcome data, and reporting bias (Higgins and Green, 2008). Each item was rated with high, low, or unclear with an explanation. Review Manager 5.3 (Cochrane Collaboration, 2014) was used to assess the risk of bias of included studies and to graphically present the results. The research team first independently performed this assessment and then discussed the disagreements.
Data analyses

Review Manager 5.3 (Cochrane Collaboration, 2014) was used to analyze the data. Cohen’s $d$ standardized mean difference (SMD) with a 95% confidence interval was used as a standardized parameter to represent an intervention effect across studies with a control group. The effect size can be interpreted as small ($<.2$), medium ($0.2–0.5$), and large ($>0.5$) (Cohen, 1988). A statistical significance of each Cohen’s $d$ would be supported by a corresponding $z$ test with a $p$-value less than .05. Statistical parameters $I^2$, and $\tau^2$ were examined for the heterogeneity of the effect sizes. Benchmarks of $I^2$ can be tentatively categorized as low (25%), moderate (50%), and high (75%) heterogeneity (Higgins et al., 2003). $\tau$ is the estimated standard deviation of underlying effects across studies. For SMD, an approximate 95% range of underlying effects, also known as the prediction intervals can be obtained by creating an interval from 2 times $\tau$ below the random-effects pooled estimate, to 2 times $\tau$ above it (Higgins and Green, 2008).

Due to the variation of study characteristics (e.g., mode of intervention, participant characteristics), we assumed that the true effect size may vary from study to study. Thus, comparisons were based on a random-effects model (Borenstein et al., 2010). Subgroup analyses were performed to explore the potential heterogeneity. Subgroups were defined by three categorical moderators: type of mind–body intervention, participants’ age group, and control condition. A funnel plot and Egger’s regression was used to statistically examine whether there was a publication bias via Comprehensive Meta-Analysis 2.2 (Borenstein et al., 2009).

Results

Initial searches yielded 156 English abstracts, with 29 from MEDLINE, 27 from CINAHL, 22 from PsycINFO, 31 from Embase, 47 from Cochrane Library, and 761 Chinese abstracts, with 185 from WANFANG, 344 from CNKI, 140 from CBM, and 92 from CQVIP. An additional nine articles were identified from forward and backward searching. Removing duplicates yielded 97 English abstracts and 709 Chinese abstracts. Title and abstract screening yielded 34 English articles and 77 Chinese articles for full-text review. Full-text review yielded five full-text English articles and nine Chinese articles to be included for data extraction. Figure 1 illustrates the search process.

Table 1 summarizes the characteristics of the 14 reviewed mind–body intervention trials on depression among Chinese older adults (Chou et al., 2004; Deng and J. Wang, 2013; R.-K. Li, 2016; Y.-X. Li et al., 2016; Liao, 2012; D.-Y. Liu and M.-F. Liu, 2015; Y. Liu et al., 2014; Tsang et al., 2003; Tsang et al., 2006; Tsang et al., 2013; Yang et al., 2015; H.-H. Yu et al., 2015; Zhang et al., 2014; Zhang et al., 2015).

Study characteristics

All the included trials are RCTs. Among the included studies, the main interventions used were Qi Gong (i.e., Eight Section Brocades; $n = 3$) (Tsang et al., 2003; Tsang et al., 2006; Tsang et al., 2013), Tai Chi (i.e., 18-form and 24-form Yang style; $n = 3$) (Chou et al., 2004; Deng and J. Wang, 2013; Liao, 2012), relaxation ($n = 3$) (Yang et al., 2015; H.-H. Yu et al., 2015; Zhang et al., 2014), and mindfulness (i.e., meditation, $n = 5$) (R.-K. Li, 2016; Y.-X. Li et al., 2016; D.-Y. Liu and M.-F. Liu, 2015; Y. Liu et al., 2014; Zhang et al., 2015). There was a considerable overlap of treatment components among these interventions. For example, meditation was used in combination with relaxation in three trials (R.-K. Li, 2016; Yang et al., 2015; H.-H. Yu et al., 2015). Critical components of mind–body interventions such as breathing, body scan, and structured movement were included in most of the trials. The length of intervention sessions varied from 30 to 120 min, and the duration of the intervention period varied from 1 week to 6 months. The frequency of the treatment varied from once or twice per day to once per week. All the reviewed studies had depression as one of the main outcomes and used standard measurements for depression or depressive symptoms.

Participant characteristics

The sample of the reviewed studies included Chinese older adults in mainland China ($n = 10$) (Deng and J. Wang, 2013; R.-K. Li, 2016; Y.-X. Li et al., 2016; Liao, 2012; D.-Y. Liu and M.-F. Liu, 2015; Y. Liu et al., 2014; Yang et al., 2015; H.-H. Yu et al., 2015; Zhang et al., 2014; Zhang et al., 2015) and Chinese older adults in Hong Kong ($n = 4$) (Chou et al., 2004; Tsang et al., 2003; Tsang et al., 2006; Tsang et al., 2013). The sample size of the studies varied from 14 to 120. Four studies had participants with mean age between 60 and 69 years old (Deng and J. Wang, 2013; D.-Y. Liu and M.-F. Liu, 2015; Yang et al., 2015; H.-H. Yu et al., 2015), seven studies had participants with mean age between 70 and 79 years old (Chou et al., 2004; Liao, 2012; R.-K. Li, 2016; Y.-X. Li et al., 2016; Y. Liu et al., 2014; Tsang et al., 2003; Zhang et al., 2015), and
three studies had participants aged 80 and above (Tsang et al., 2006; Tsang et al., 2013; Zhang et al., 2014). Four studies enrolled participants with a depression diagnosis (Chou et al., 2004; R.-K. Li, 2016; Tsang et al., 2006; Tsang et al., 2013). The other 10 studies had participants with depressive symptoms measured by standardized depression scales. One study used GDS-15 and had baseline scores above a cutoff score of 6 (H.-H. Yu et al., 2015), six studies used GDS-30 and had baseline scores above 11 (Y.-X. Li et al., 2016; Liao, 2012; Y. Liu et al., 2014; Tsang et al., 2003; Zhang et al., 2014; Zhang et al., 2015), two studies used SDS and had baseline scores above 50 (Deng and J. Wang, 2013; Yang et al., 2015), and one study used HRSD and had baseline scores above 8 (D.-Y. Liu and M.-F. Liu, 2015).

Risk of bias assessment

Among the included studies, 60% of them (n = 9) had low risk of bias in random sequence generation (i.e., describe the method used to generate the allocation sequence by some random procedure; Schulz et al., 2010); however, none of the included studies reported allocation concealment (i.e., describe any steps taken to conceal the allocation sequence until interventions assigned). About 90% of the included studies (n = 13) had high risk of performance bias because they did not report this item, and blinding of participants and personnel is unlikely for these sorts of interventions. About 40% of the studies (n = 6) reported blinding of outcome assessment and thus were considered as having low risk of detection bias. About 10% of the studies (n = 1) that had high drop-out rate and did not use an intention-to-treat analysis was categorized as having high risk of attrition bias. There were about 10% of the studies (n = 1) who did not report detailed information in the results section on all outcome measures used in the studies and were thus rated with high risk of bias. A detailed review authors’ judgements about each risk of bias item for each included study is shown in Figure 2.

Effects of mind–body interventions on depressive symptoms

**Immediate post-intervention effect.** Fourteen studies involving 1019 participants were synthesized in this
<table>
<thead>
<tr>
<th>Author, year (country/ region)</th>
<th>Design</th>
<th>Setting</th>
<th>Participants, condition</th>
<th>N, Age M ± SD</th>
<th>Intervention, duration, frequency (main component)</th>
<th>Comparison</th>
<th>Depression measurement, timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chou et al., 2004 (Hong Kong)</td>
<td>RCT</td>
<td>Psychogeriatric outpatient clinic</td>
<td>Community-dwelling older adults, met DSM-IV diagnostic criteria for major depression or dysthymia; 50% female</td>
<td>Intervention (n = 7); Control (n = 7); Age = 72.6 ± 4.2</td>
<td>Tai Chi, 45-min/session, 3 times/week, 3 months (18-form Yang style Tai Chi, breathing exercises, structured movement)</td>
<td>Waiting-list control</td>
<td>CES-D; Pretest, posttest</td>
</tr>
<tr>
<td>Deng and J. Wang, 2013 (China mainland)</td>
<td>RCT</td>
<td>Community</td>
<td>Community-dwelling older adults; 57% female</td>
<td>Intervention (n = 50, age = 65.2 ± 7.1); Control (n = 50, age = 63.7 ± 5.9)</td>
<td>Tai Chi, 30–60 min/session, 30 sessions/month, 3 months (Outdoor Tai Chi exercise with Chinese traditional music background)</td>
<td>Walking exercise</td>
<td>SDS; Pretest, posttest</td>
</tr>
<tr>
<td>Y.-X. Li et al., 2016 (China mainland)</td>
<td>RCT</td>
<td>Community outpatient clinic</td>
<td>Older adults with chronic physical pain; 53.7% female</td>
<td>Intervention (n = 41); Control (n = 41); Age = 72.1 ± 6.8</td>
<td>MBSR + Standard care for pain + Health education, 1.5–2 h/session, 1 session/week, 8 weeks. (Body scan, meditation)</td>
<td>Wait-list control + Standard care for pain + Health education</td>
<td>GDS-30; Pretest, posttest</td>
</tr>
<tr>
<td>R.-K. Li, 2016 (China mainland)</td>
<td>RCT</td>
<td>Community or hospital, unclear</td>
<td>Clinical depressed older adults diagnosed by CCMD-3; 41.5% female</td>
<td>Intervention (n = 47, age = 70.5 ± 4.4); Control (n = 47, age = 68.9 ± 6.2)</td>
<td>Mindfulness + Physical exercises, 30 min/session, 3 sessions/week, 3 months (Meditation, relaxation, abdominal breathing)</td>
<td>Physical exercises + Recreational activities</td>
<td>GDS-30, SDS, HRSD, POMS; Pretest, posttest</td>
</tr>
<tr>
<td>Liao, 2012 (China mainland)</td>
<td>RCT</td>
<td>Community</td>
<td>Community empty-nest older adults with depressed mood; 54.4% female</td>
<td>Intervention (n = 35); Control (n = 33); Age range: 60–69 (n = 30), 70–79 (n = 80, and up (n = 7)</td>
<td>Tai Chi (24 style), 1-h/day, 5 days/week, 6 months (Warm-up exercise, Tai chi practice, and relaxation exercise)</td>
<td>Maintained usual daily activities</td>
<td>GDS-30; Pretest, midway, posttest</td>
</tr>
<tr>
<td>D.-Y. Liu and M.-F. Liu, 2015 (China mainland)</td>
<td>RCT</td>
<td>Psychogeriatric department in a hospital</td>
<td>Hospitalized elderly patients from psychogeriatric department; 47.5% female</td>
<td>Intervention (n = 40, age = 65.1 ± 7.7); Control (n = 40, age = 66.7 ± 6.3)</td>
<td>Mindfulness + Standard care (depression medication), 1.5–2 h/session, 1 session/week, 8 weeks. (Body scan, mindful walking, mindful breathing, meditation)</td>
<td>Recreational activities (reading, painting, dancing, chess and cards, etc.) + Standard care (depression medication)</td>
<td>HRSD; Pretest, posttest</td>
</tr>
<tr>
<td>Y. Liu et al., 2014 (China mainland)</td>
<td>RCT</td>
<td>Nursing home</td>
<td>Older adults living in nursing home; 57.5% female</td>
<td>Intervention (n = 40, age = 71.0 ± 7.2); Control (n = 40, age = 71.4 ± 6.9)</td>
<td>Mind–body intervention + Health education + Psychological support + Recreational activities, 45–60 min/session, 3 sessions/week, 3 months (Meditation, abdominal breathing, guided imagery, finger massage)</td>
<td>Health education + Psychological support + Recreational activities</td>
<td>GDS-30, POMS; Pretest, posttest</td>
</tr>
<tr>
<td>Tsang et al., 2003 (Hong Kong)</td>
<td>RCT</td>
<td>Geriatric day hospital</td>
<td>Geriatric patients in sub-acute stage of chronic physical illnesses with depressed mood; subacute stage of</td>
<td>Intervention (n = 24, age = 72.9 ± 9.5); Control (n = 26, age = 76.3 ± 8.4)</td>
<td>Qi Gong + Rehabilitation activities, 60-min/session, 2 times/week, 12 weeks (Eight Section Brocades; meditation, breathing)</td>
<td>Rehabilitation activities</td>
<td>GDS-30; Pretest, midway, posttest</td>
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Table 1. (Continued)

<table>
<thead>
<tr>
<th>Author, year (country/region)</th>
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<th>Depression measurement, timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tsang et al., 2006 (Hong Kong)</td>
<td>RCT</td>
<td>Nongovernment care and attention homes</td>
<td>Older adults; chronic medical illness and diagnosis of depression or obvious features of depression; 80.5% female</td>
<td>Intervention ($n = 48$, age $= 82.1 \pm 7.2$); Control ($n = 34$, age $= 82.7 \pm 6.8$)</td>
<td>Qi Gong, 30- to 45-min/session, 3 times/week, 16 weeks (Eight Section Brocades, meditation, breathing exercises, structured movement)</td>
<td>Newspaper-reading group, same duration and frequency</td>
<td>GDS-15; Pretest, midway, posttest, 4-week follow-up, 8-week follow-up</td>
</tr>
<tr>
<td>Tsang et al., 2013 (Hong Kong)</td>
<td>RCT</td>
<td>Psychogeriatric day clinic, geriatric day care center, and care and attention homes</td>
<td>Depressed older adults; chronic medical illness and major depressive disorder diagnosis; 68.4% female</td>
<td>Intervention ($n = 21$, age $= 79.7 \pm 6.6$); Control ($n = 17$, age $= 80.7 \pm 4.4$)</td>
<td>Qi Gong, 30- to 45-min/session, once/week, 12 weeks (Eight Section Brocades, meditation, breathing exercises, structured movement)</td>
<td>Newspaper-reading program, same duration, and frequency</td>
<td>GDS-15, HRSD; Pretest, midway, posttest, 4-week follow-up, 8-week follow-up</td>
</tr>
<tr>
<td>H.-H. Yu et al., 2015 (China mainland)</td>
<td>RCT</td>
<td>Community outpatient clinic</td>
<td>Community older adults with type II diabetes; 52.1% female</td>
<td>Intervention ($n = 36$); Control ($n = 35$); Age $= 66.3 \pm 4.5$</td>
<td>Relaxation + Standard care for diabetes, 90 min/session, once/week, 5 weeks (Breathing exercises, progressive muscle relaxation, guided meditation)</td>
<td>Standard care for diabetes</td>
<td>GDS-15; Pretest, posttest, 6-month follow-up</td>
</tr>
<tr>
<td>Yang et al., 2015 (China mainland)</td>
<td>RCT</td>
<td>Hospital</td>
<td>Elderly patients with coronary heart disease; 25% female</td>
<td>Intervention ($n = 60$, age $= 67.7 \pm 5.7$); Control ($n = 60$, age $= 68.0 \pm 5.9$)</td>
<td>Relaxation + Standard care for coronary heart disease, 30 min/session, 1–2 sessions/day, 1 week (Music relaxation, breathing exercise, progressive muscle relaxation, and meditation)</td>
<td>Standard care for coronary heart disease</td>
<td>SDS; Pretest, posttest</td>
</tr>
<tr>
<td>Zhang et al., 2014 (China mainland)</td>
<td>RCT</td>
<td>Community</td>
<td>Chronic insomnia elderly patients; 52.2% female</td>
<td>Intervention ($n = 45$, age $= 79.6 \pm 4.0$); Control ($n = 45$, age $= 80.6 \pm 4.5$)</td>
<td>Relaxation, 30 min/session, 1 session/day, 8 weeks (Progressive muscle relaxation)</td>
<td>Health education</td>
<td>GDS-30; Pretest, posttest</td>
</tr>
<tr>
<td>Zhang et al., 2015 (China mainland)</td>
<td>RCT</td>
<td>Medical Psychology Division, Hospital</td>
<td>Chronic insomnia elderly patients; 41.7% female</td>
<td>Intervention ($n = 30$, age $= 78.6 \pm 2.9$); Control ($n = 30$, age $= 77.6 \pm 3.9$)</td>
<td>MBRS, 2-h classes and 0.5-day retreat, 8 weeks (Meditation techniques included the body scan, standing, sitting, and walking meditations)</td>
<td>Wait-list control group + Standard care</td>
<td>GDS-30; Pretest, posttest</td>
</tr>
</tbody>
</table>

Note: CES-D, Chinese version of Center for Epidemiological Studies Depression Scale; CCMD-3, Chinese Classification of Mental Disorders; DSM-IV, Diagnostic and Statistical Manual of Mental Disorders (fourth edition); GDS-15, Geriatric Depression Scale (Short Form); GDS-30, Geriatric Depression Scale (Long Form); SDS, Zung Self-Rating Depression Scale; HRSD, Hamilton Rating Scale for Depression; POMS, Profile of Mood States.
Compared to the control groups, mind–body interventions had large post-intervention effects in reducing depressive symptoms among older Chinese adults (SMD = 1.41; 95% CI [1.82, 0.99]). The overall I² indicated that 88% of the variability across studies was due to heterogeneity rather than chance. The τ of 0.73 is the standard deviation of underlying effects across studies. This indicated that 95% range of the underlying effects is within −2.87 to 0.05, which suggests a large amount of inconsistency among effect sizes.

Subgroup analysis. Subgroup analyses were conducted to explore the potential heterogeneity among included studies. Figure 3 shows the subgroup analysis by type of mind–body interventions. Among the four subgroups, Tai Chi (SMD = −2.63; 95% CI [−4.29, −0.98]) had the largest effect size, followed by relaxation (SMD = −1.68; 95% CI [−2.33, −1.02]), mindfulness (SMD = −1.09, 95% CI [−1.41, −0.76]), and Qi Gong (SMD = −0.68, 95% CI [−1.77, 0.41]). The differences among the four subgroups were marginally significant (p = .10). There was evidence of moderate to high heterogeneity within each subgroup.

Figure 4 shows the subgroup analysis by participants’ age groups. Effect sizes were largest for participants aged 60 to 69 years old (SMD = −1.56, 95% CI [−2.18, −0.95]), followed by participants aged 70 to 79 years old (SMD = −1.46, 95% CI [−2.26, −0.66]), and smallest for participants aged 80 and above (SMD = −1.20, 95% CI [−1.65, −0.75]). The differences of the effect sizes among these three subgroups were not statistically significant (p = .62). There was evidence of moderate to high heterogeneity within each subgroup.

Figure 5 shows the subgroup analysis by control condition. The effect size of mind–body interventions compared to non-therapeutic activities (SMD = −1.32, 95% CI [−1.70, −0.95]) was smaller than that compared to no treatment or standard care (SMD = −2.55, 95% CI [−4.37, −0.72]). The effect size for mind–body interventions plus non-therapeutic activities versus non-therapeutic activities (SMD = −0.70, 95% CI [−1.68, 0.27]) was also smaller than the effect size of mind–body interventions plus standard care versus standard care (SMD = −1.91, 95% CI [−2.69, −1.13]). The effect size for mind–body interventions plus standard care plus non-therapeutic activities compared to standard care plus non-therapeutic activities was large and statistically significant (SMD = −0.89, 95% CI [−1.23, −0.56]). The differences among these subgroups were statistically significant (p = .04).

Follow-up assessments. Only three selected studies had follow-up tests. Two studies had 1-month follow-up tests (SMD = −1.04; 95% CI [−2.09, 0.00]) and 2-month follow-up (SMD = −0.76; 95% CI [−1.42, −0.09]) (Tsang et al., 2006; Tsang et al., 2013). One study had 6-month follow-up test (SMD = −0.71; 95% CI [−1.22, −0.21]) (H.-H. Yu et al., 2014). The effect size of mind–body interventions compared to non-therapeutic activities (SMD = −0.70, 95% CI [−1.68, 0.27]) was also smaller than the effect size of mind–body interventions plus standard care versus standard care (SMD = −1.91, 95% CI [−2.69, −1.13]). The effect size for mind–body interventions plus standard care plus non-therapeutic activities compared to standard care plus non-therapeutic activities was large and statistically significant (SMD = −0.89, 95% CI [−1.23, −0.56]). The differences among these subgroups were statistically significant (p = .04).
et al., 2015). All the follow-up effect sizes were smaller than their post-intervention effect sizes.

Publication bias assessment. Funnel plot was performed to assess the publication bias. There was no evidence of asymmetry and publication bias as indicated by Egger’s regression test (Intercept = −3.68, standard error = 3.50, 95% CI [−11.32, 3.95], p > .05).

Discussion

The present study is the first systematic review examining the efficacy of mind–body interventions designed to reduce depressive symptoms among Chinese older adults. The studies included in this review varied in specific type of mind–body intervention, sample size, intervention duration, chronic physical conditions, outcome measurements, and risk of bias. Compared to control groups, mind–body interventions had large short-term effects in alleviating depressive symptoms. Due to the small numbers of reviewed studies and the high risk of bias of certain studies, the effect sizes estimated were uncertain and should be interpreted with caution. Only three included studies tested long-term effects and got smaller sustainable effect sizes than their short-term effects. A previous systematic review by Tsang et al. (2008) also found support for the short-term effects of mindful physical exercises on reducing depressive symptoms among adults and older adults with depression from Eastern and Western countries. Our results contribute to the literature by examining the short- and long-term effects of mind–body interventions targeting depression among older Chinese adults.

The reviewed studies clustered around four main types of mind–body interventions and showed efficacious results for Tai Chi, relaxation, and mindfulness. Previous systematic reviews found that Tai Chi could be an efficacious treatment to reduce depressive symptoms among a majority of White older adults from USA and Australia (Chi et al., 2013) and in general population (C.-C. Wang et al., 2010). Two

![Figure 3](image-url)
Figure 4 Forest plot for post-intervention effect sizes by participants’ age group.

Figure 5 Forest plot for post-intervention effect sizes by control condition.
other systematic reviews noted mixed efficacy of Tai Chi in reducing depression in general population (Sharma and Haider, 2013; W.-C. Wang et al., 2009). Our study contributes to the literature by evidencing support for the use of Tai Chi as an alternative treatment for Chinese older adults with depression or depressive symptoms diagnosis or depressive symptoms. Our results suggest that Tai Chi, rooted in Chinese culture and more acceptable by Chinese older adults, might be more efficacious than other type of mind–body interventions in treating depression among this population. Also, the larger effect size for Tai Chi found in our study compared to that found in previous study (e.g., in Chi et al., 2013) may suggest that Tai Chi is more efficacious among Chinese older adults with depression compared to their counterparts from other ethnicities.

Our study also found larger effect size of relaxation than previous systematic review (Klainin-Yobas et al., 2015). Their study found the sustainable effects of relaxation (i.e., 14 and 24 weeks after the interventions) in reducing depression among older adults from Eastern and Western countries. The effect size of mindfulness found in our study was comparable to previous review of a majority of participants from the Western countries (Hofmann et al., 2010).

The synthesized effect size for Qi Gong was not statistically significant. Previous systematic review by Oh et al. (2013) also found mixed findings. Our review was only able to include three trials of Qi Gong for depression. Both Tsang et al. (2006) and Tsang et al. (2013) found that Qi Gong significantly reduced depressive symptoms compared to a newspaper-reading control group. However, the Tsang et al. (2003) study did not find significant result, probably due to the small sample size and limited time of intervention. More trials are needed in order to test the efficacy of Qi Gong as an alternative treatment for depression among Chinese older adults.

None of the previous systematic reviews conducted any subgroup analysis by participants’ age group. Our review suggests that the effect sizes might be different among different older adults’ age groups, with the largest effect for the group of 60 to 69 and smallest for the group of 80 and above. However, we cannot conclude whether the effect of mind–body interventions on depressive symptoms differed due to different age groups given the observational nature of subgroup analysis. Nevertheless, this calls for a calibration of mind–body interventions specific to age ranges within the older adult population given the potential different effects by age category.

The control group design of the included studies varied considerably. The effect size of mind–body interventions versus non-therapeutic activities was smaller than that compared to standard care or no treatment. This is reasonable because of the nature of the active control design, which helps to control for the alternative explanations for the possible effects of the intervention (e.g., attention from study staff, therapeutic environment, social support, etc.) (Kinser and Robins, 2013). They also recommended that the active control design is ideal for the study of mind–body interventions related to depressive symptom mitigation. The studies that have “add-on” controls (i.e. mind–body interventions plus standard care plus non-therapeutic activities) also yielded large effect sizes (>0.5), which may indicate that mind–body interventions have specific treatment effects beyond the effect of standard care and non-therapeutic activities.

The interpretation of these sub-group analyses should be considered with caution given the small number of included studies and the observational nature of subgroup analysis (Borenstein and Higgins, 2013). Small number of included studies is underpowered to detect a statistically significant result. We cannot infer a causal relationship between type of mind–body interventions, participants’ age group, control condition, and the effect size of mind–body interventions in decreasing depressive symptoms based on subgroup analysis.

Strengths and limitations

This systematic review is the first to synthesize evidence of the efficacy of mind–body interventions in reducing depressive symptoms among Chinese older adults. We conducted comprehensive literature search from both English and Chinese electronic databases and included studies written in both languages. Our findings were based on older adults with a depression diagnosis or depressive symptoms and may suggest the robustness of mind–body interventions to impact a range of symptom expression, from the most severe (i.e., diagnosable symptom expression) to less severe or more “elevated” symptom expression.

The current review has several limitations. First, we only found eligible studies conducted in Hong Kong and mainland China. Therefore, findings may not be applicable to Chinese older adults living in other areas. Second, we did not cover unpublished studies such as trials in progress due to limited accessibility. Third, due to the limited RCTs conducted in this field, we only included 14 trials. The small number of reviewed trials makes the results suggestive only.
Future research recommendations

More high-quality research (RCTs with active controls and follow-up tests) are needed to assess the effects of mind–body interventions on depressive symptoms among older adults. Researchers may also consider multi-arm studies with varying duration/frequencies/group sizes of the intervention among the control groups to find the best approach for Chinese older adults or other populations (Kinser and Robins, 2013). Intervention designs may need to consider specific age group within the older adult population and both depression and chronic physical illness given the comorbidities that older adults may often have with depression. Intention-to-treat analysis is recommended for future studies to minimize type I error and increase the generalizability of findings (Gupta, 2011). Most existed research has been focused on the key ingredients that lead to positive change (Shapiro et al., 2006). Finally, researchers are encouraged to provide detailed reports of the research process (e.g., recruitment, randomization, data analysis) according to the CONSORT Statement to enhance transparency of the clinical trial (Boutron et al., 2008; Schulz et al., 2010).

Key points

- Mind–body interventions had large short-term effects in reducing depressive symptoms in older Chinese adults with depression diagnosis or depressive symptoms (SMD = −1.41; 95% CI [−1.82, −0.99]). Long-term sustainable effects of mind–body interventions were not clear.
- Different types of mind–body interventions (e.g. mindfulness, relaxation, Tai Chi, Qi Gong) may have different effects in this population.
- Mind–body interventions may have specific treatment effects besides the effects of standard care and other non-therapeutic activities.

References


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Mind–body interventions and depression


