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Effects of relaxation interventions on depression and anxiety among older adults: a systematic review

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Objectives: This systematic review examined empirical evidence of the effects of relaxation interventions on anxiety and depression among older adults.

Method: A comprehensive literature search identified studies that satisfied the pre-set inclusion and exclusion criteria. We focused on 15 published and non-published studies − 12 randomised controlled trials and three non-randomised controlled trials − undertaken in the past 20 years (1994−2014). Three reviewers selected studies, extracted data, and appraised the methodological quality. We then computed Hedges' effect sizes and used these to represent the effects of intervention.

Results: Our findings suggested that older adults who received relaxation interventions experienced greater reductions in depression and anxiety than controls in most studies. Progressive muscle relaxation training, music intervention, and yoga had the strongest intervention effects on depression. Music intervention, yoga, and combined relaxation training most effectively reduced anxiety symptoms among older adults. Furthermore, the impact of some relaxation interventions remained in effect for between 14 and 24 weeks after the interventions.

Conclusion: This systematic review supported the positive effects of relaxation interventions on depression and anxiety among older adults. Health care providers may integrate relaxation interventions into standard care for older adults in community and hospital settings, taking into consideration the participant's preference and health care policy.

Keywords: anxiety; depression; relaxation intervention; systematic review

Introduction

Population ageing is a current global phenomenon; the world population spread has shifted toward older adult/ elderly (United Nations, 2002). Older adults include those older than 60 years (World Health Organization, 2014). They experience a natural ageing process and encounter various changes in biological health (such as decreased physical strength and function), cognitive health (such as decline in intelligence and memory), psychological health (such as reduced ability to withstand stress), and social health (Aldwin, Park, & Spiro, 2007). As a result, older adults have a higher risk of experiencing physical and psychological problems (Aldwin et al., 2007).

Depression and anxiety are psychological problems found in older adults (Polyakova et al., 2013; Wetherell, Lenze, & Stanley, 2005). It is noted that 15%−20% of elderly people have depression (American Psychiatric Association (APA), 2013) and 15%−40% of older adults experience anxiety (Mehta et al., 2003; Wittchen et al., 2002). Anxiety is associated with physical disability, decreased functional status, decreased life satisfaction, lower quality of life, increased loneliness, and increased mortality (van Hout et al., 2005; Wetherell et al., 2004; Wetherell et al., 2005). Proper and timely management of depression and anxiety is essential to prevent further debilitating effects among older adults.

Medication is the traditional treatment for depression and anxiety in older adults. Selective serotonin reuptake inhibitors are effective in treating late-life depression (Kok, Heeren, & Nolen, 2012; Taylor & Doraiswamy, 2004) and benzodiazepines (such as alprazolam) help reduce anxiety symptoms (Wetherell et al., 2005). Nevertheless, medications come with side effects, especially for physically vulnerable individuals like the elderly (Kok, 2013; Wetherell et al., 2005). There is a need to use non-pharmacological interventions, and to shift the focus from curing to preventing. Relaxation therapy is worthy of further exploration as a prevention intervention, given that it is simple, easy to practise, inexpensive, and more socially acceptable than psychotherapy.

Relaxation refers to the feeling of peace and comfort with the absence of tension in the body and mind (Smith, 2007). A state of relaxation is often accompanied by reduced neurological arousal (a sense of being physically rested and relaxed) and positive emotions like feeling mentally relaxed, peaceful, joyful, optimistic, energised, thankful, loving, and refreshed (Lehrer, Woolfolk, & Sime, 2007). Relaxation interventions include abdominal breathing (slow, deep inhalations and exhalations), yoga (breath control during body movements), progressive muscle relaxation (alternate tensing and relaxing different muscle groups), massage therapy (the manipulation of

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skin and muscles to release tension), and music intervention (sing, listen, or play music to promote relaxation) (Seaword, 2012).

The benefits of relaxation interventions on depression and anxiety have been reported in the literature. A systematic review of 15 trials reported that relaxation training was effective in mitigating depressive symptoms among adult patients with mood disorders (Jorm, Morgan, & Hetrick, 2008). Another systematic review of five randomised controlled trials (RCTs) concluded that music intervention helped improve the mood of adults with clinical depression (Maratos, Gold, Wang, & Crawford, 2008). Furthermore, another systematic review involving 124 trials found that yoga ameliorated symptoms of depression among people with various mental disorders (Balasubramaniam, Telles, & Doraiswamy, 2012).

The current systematic review

The existing systematic reviews reported findings for mixed participants including adults and adolescents but not specifically for older adults. This indicates knowledge gaps in the literature and it may be difficult to determine effective relaxation interventions for older adults. This systematic review primarily aimed to review the magnitude of the effect of relaxation interventions among older adults. The secondary aim was to compare the intervention effects of different relaxation interventions such as yoga and progressive muscle relaxation training (PMRT).

Methods

This systematic review was guided by two frameworks: the meta-analysis approach (Glass, McGaw, & Smith, 1981) and Cochrane's systematic review (Higgins & Green, 2011).

Search strategies and screening procedures

We conducted a comprehensive literature search to ensure representation of existing studies. This began with an electronic search for published studies, unpublished dissertations and theses, unpublished research reports and conference proceedings using the Scopus, CINAHL, EMBASE, ERIC, Sociological abstract, PubMed, ScienceDirect, PsyInfo, Dissertation Abstract International, MEDNAR, Web of Science Index, controlled-trail. com and clinicaltrials.gov databases. We then examined reference lists of original articles, meta-analyses, and systematic reviews to identify additional articles.

The literature search used several keywords, individually or in combination: depression, depressive symptoms, depressed mood, depress, anxiety, anxiety trait, anxiety state, anxiety responses, relaxation, relaxation therapy, relaxation intervention, stress management, abdominal breathing, muscle relaxation, autogenic training, yoga, meditation, imagery, and music intervention. Two reviewers [Pey Ying Suzanne Yew (PYSY) and Win Nuang Oo (WNO)] independently examined studies for inclusion in the research. An initial review involved screening titles and abstracts of potential studies identified

in the original search. The reviewers then retrieved and examined full-text of studies deemed to be possible relevance, and compared the list of studies believed to fulfil the pre-set inclusion and exclusion criteria. Disagreements were resolved through discussion and with the involvement of the third reviewer (PKY).

Inclusion criteria

Studies were eligible for this systematic review if they were published and unpublished research using randomised and non-randomised controlled trials; were conducted within a the past 20-year period (1994−2014) and reported in English; involved people of any gender who were aged over 60; examined the efficacy of relaxation interventions in hospital or community-based settings; included depression and anxiety as outcome variables; and used the control conditions of standard care, waitlisted control, medications, and other psychosocial interventions. We used the 20-year period to increase the number of included studies given that there is limited research in this area.

Exclusion criteria

Studies were excluded if they recruited samples with mixed age groups (such as adults, adolescents, and the elderly) without separated findings for the elderly sample and conducted online relaxation interventions (or used other internet interfaces) without any procedure to ensure or confirm whether the participants attended the interventions.

Data extraction and quality rating

We used a systematic approach to extract research data. Two reviewers, PYSY and WNO, independently examined the included studies and extracted data using the Data Collection Form guided by Cochrane's systematic review (Higgins & Green, 2011). The third reviewer, PKY, subsequently examined the included studies and then checked the accuracy of the extracted data. These data included participants, interventions, comparison, outcomes, methods, and findings.

We developed an 11-item Quality Rating Index of the Randomised Controlled Trial (QRI) to assess the methodological quality of the included studies (Klainin-Yobas, Cho, & Creedy, 2012) based on the recommendation of Jadad et al. (1996). The QRI assesses the study objective, randomisation, sample size calculation, description of interventions, double-blind procedure, data analyses, description of withdrawal participants, and assessment of adverse effects, among other factors. The response categories in the QRI are yes (1), no (0) and unclear/not stated (0). Possible scores are in the range of 0−11, with higher scores signifying higher methodological quality. Two reviewers (PYSY and WNO) independently assessed the methodological quality and the third reviewer (PKY) checked the accuracy of the assessment. Any discrepancy in data extraction and quality rating were resolved through group discussions.

Data analyses

We used the Comprehensive Meta-Analysis software version 2.0 to analyse the data. Hedges'g effect size (Hedges, 1981) was used as a standardised parameter to represent an intervention effect across studies. Hedges'g can be calculated by subtracting the mean score of the intervention group by that of the control group, and then dividing by the pools of weighted standard deviation (Hedges, 1981). Note that each standard deviation was weighted by its corresponding sample size (Hedges, 1981). The effect size can be interpreted as small (<0.2), medium ($0.2-0.5$) and large (>0.5) for each comparison (Cohen, 1988). A statistical significance of each Cohen's d would be supported by corresponding z-test with a p-value less than 0.05. We calculated two additional statistical parameters (Q and I^2 statistics) to test the heterogeneity of the effect sizes. The heterogeneity would be indicated by significant Q statistics, whereas I^2 can be categorised as having low (25 per cent), medium (50 per cent) and high (75 per cent) heterogeneity (Higgins, Thompson, Deeks, & Altman, 2003). Comparisons resulting in heterogeneous effect sizes were based on a random-effect model; those with homogeneous effect sizes used a fixed-effect model. For studies that did not provide sufficient statistical parameters, we summarised the findings in a narrative report.

Results

Summary of literature search

We identified a total of 11,565 abstracts. After the initial screening of titles and abstracts, we excluded 11,356 records (4447 were duplicates and 3464 did not meet inclusion criteria). Subsequently, we retrieved and examined 209 potentially relevant full-text articles. After this full-text review, we excluded another 194 studies. Articles were excluded because they involved no elderly participants ($n = 66$), were not intervention studies ($n = 39$), used no depression or anxiety measures ($n = 38$), involved no relaxation interventions ($n = 41$), were not experimental studies ($n = 5$) or were not published in English ($n = 5$). In the end, we included a total of 15 studies in this review.

Description of included studies

Of 15 studies, 12 used RCTs and three were non-randomised studies. Eleven studies were published journals, and the other four were unpublished thesis or dissertations. These studies were conducted in USA ($n = 7$), Hong Kong ($n = 4$), Singapore ($n = 1$), France ($n = 1$), India ($n = 1$), and Iceland ($n = 1$). All studies utilised convenience sampling. Sample sizes ranged between 18 and 208; most studies ($n = 13$) had less than 50 participants.

Relaxation interventions can be categorised into six groups: yoga, music intervention, combined relaxation training, PMRT, massage therapy, and stress management training (Table 1). The number of sessions ranged from 4 to 24 sessions. Anxiety was measured by standardised scales such as the State Trait Anxiety Inventory (STAI;

Spielberger, 1983) and the Beck Anxiety Inventory (Beck, Epstein, Brown, & Steer, 1988). Depression was measured by various scales such as the Geriatric Depression Scale (GDS; Yesavage et al., 1983) and the Center for Epidemiological Depression Scale (Radloff, 1977). Note that these are standardised instruments with established validity and reliability.

Among the 15 included studies, some had multiple comparisons and assessed outcomes at multiple time points. As such, a total of 36 comparisons ($n_{com} = 36$) with corresponding effect sizes are reported in Table 1.

Effects of relaxation interventions on anxiety

Regular sessions

Nine studies examined the efficacy of five relaxation interventions on anxiety in older adults (Table 1). Findings from seven studies (with 10 comparisons) are reported in Table 2. Among the relaxation interventions, the corresponding Q-values and I^2 statistics indicated the homogeneity of effect sizes for each intervention, so we used information from the fixed-effect model. Given that two studies (Sharpe, Williams, Granner, & Hussey, 2007; Svansdottir & Snaedal, 2006) did not report mean and standard deviation, we reported their findings in a narrative summary.

Table 2 illustrated that music interventions had the largest average effect size ($g = 2.36$) and was statistically significant ($z = 5.05$, $p < 0.01$). Furthermore, three programmes yielded medium effect sizes: yoga ($g = 0.45$, $z = 3.15$, $p < 0.01$), combined relaxation training ($g = 0.30$, $z = 0.61$, $p = 0.54$), and PMRT ($g = 0.20$, $z = 1.57$, $p = 0.12$). Additionally, an RCT tested the positive effect of the eight-session massage therapy (Sharpe et al., 2007) and we calculated an effect size using the reported F-test. Results showed that participants in the massage group had significantly lower anxiety than controls (who received guided relaxation) ($g = 0.64$). Finally, another RCT reported that older adults receiving 18 sessions of group-based music therapy did not have a significant improvement in anxiety compared to the control group (Svansdottir & Snaedal, 2006) (Table 1).

Follow-up assessments

Three out of nine studies reported data on follow-up assessments. In Guetin et al.'s (2009) study, the effect of music intervention was sustained at the 24-week post-treatment assessment ($g = 1.64$, $z = 3.97$, $p < 0.01$). The positive effects of yoga ($g = 0.87$, $z = 3.28$, $p < 0.01$) and PMRT ($g = 0.38$, $z = 2.10$, $p = 0.04$) maintained at one-month and 14-week follow-up sessions, respectively.

Effects of relaxation intervention on depression

Regular sessions

Thirteen studies examined the effects of relaxation interventions on depression (Table 1). However, only 12 studies (with 16 comparisons) provided sufficient statistics for the effect size calculation. Another study (Sharpe et al.,

Table 1.　Summary of included studies.

Author and country	Research design	Participants	Sample size	Interventions	Comparison	Outcome measure	Findings Hedges' effect size (g)
Bethany (2005)	Randomised controlled trial (RCT)	Older adults living in a community	$n_{yoga} = 11$	- Chair yoga class (group-based)	No control group	STAI BDI-II	Over the course of the interventions:
USA	Random method not mentioned	Convenience sampling	$n_{exer} = 11$	- Chair aerobics class (group-based)		Pre-test Post-test	● The yoga group had significantly the lowest scores of anxiety compared to those who engaged in aerobic exercise ($g = 0.37$), walking ($g = 0.74$), and social game groups ($g = 0.99$).
			$n_{wlk} = 10$	- Walking program (individual)			● The yoga group had significantly the lowest scores of depression compared to those who engaged in aerobic exercise ($g = 0.67$), walking ($g = 0.79$), and social game groups ($g = 1.22$).
			$n_{gam} = 10$	- Social game play (such as dominoes, Chinese checkers, scrabble, and Rummy Cube) Each intervention had 18 30-minute sessions, three times a week for six weeks			
Bonura (2007)	RCT	Older adults living in two community facilities	$n_{yoga} = 33$	- Chair yoga group (1-hour session of Hatha yoga and meditation)	Wait-listed control	STAI GDS	Post-test:
USA	Random method not mentioned	Convenience sampling	$n_{exer} = 33$	- Chair exercise group (1-hour strength balance exercise, stretching and cool down)		Pre-test	● The yoga group had significantly lower anxiety scores than the control group ($g = 0.58$).

Table 1. (*Continued*)

Author and country	Research design	Participants	Sample size	Interventions	Comparison	Outcome measure	Findings Hedges' effect size (g)
			$n_{con} = 32$			Post-test One-month follow-up	• The yoga group had significantly lower levels of depression than the control group ($g = 0.22$). At the one-month follow-up assessment: • The yoga group had significantly the lowest anxiety scores compared to control groups ($g = 0.87$). • The yoga group had significantly lower levels of depression than the control group ($g = 0.25$).
Chan et al. (2009)	RCT	Older adults at a community day care	$n_{exp} = 25$	-Music intervention (at night, listening to music of their choice, 30 minutes a week for four weeks)	30 minutes of rest period, once a week for four weeks	GDSPre-test Post-test at weeks 1, 2, 3, and 4	At week four after the intervention, the intervention group had significantly lower levels of depression than the control group ($g = 2.07$).
Hong Kong	Online research randomiser software	Convenience sampling	$n_{con} = 25$	Choices of music: Chinese classical, Western classical, Western jazz and Asian classical			
Chan et al. (2010)	RCT	Older adults at a community service centre	$n_{exp} = 21$	Music intervention (listening to music of their choice, 30 minutes a week for four weeks)	30 minutes of rest period (once a week for four weeks)	GDS Pre-test Post-test at weeks 1, 2, 3, and 4	For all time points, there were no significant differences in depression between the control and intervention groups ($g = 0.05$).
Hong Kong	Random number generator	Convenience sampling	$n_{con} = 21$	Choices of music: Chinese classical, Western classical and Western modern jazz.			

Table 1.   (*Continued*)

Author and country	Research design	Participants	Sample size	Interventions	Comparison	Outcome measure	Findings Hedges' effect size (g)
Chan et al. (2011)	RCT	Older people living in a community	$n_{con} = 26$	Music intervention (listening to music of their choice, 30 minutes a week for eight weeks)	30 minutes of rest period (once a week for eight weeks)	GDS Pre-test Post-test at weeks 1–8	The intervention group had significantly lower depression than the control group at week eight ($g = 0.96$).
Singapore	Random number generator	Convenience sampling	$n_{exp} = 24$	Choices of music: slow Chinese, Malays, Indian, and Western music.			
Chamberlin (2008)	Non-randomised study	Older adults with dementia living in communities	$n_{con} = 16$	Combined relaxation group (breathing exercises, stretching and guided imagery over an eight-week period)	Attention control (video viewing sessions held over eight weeks)	BAI GDS Pre-test Post-test	There was no significant difference in anxiety between the two groups ($g = 0.09$).
USA		Convenience sampling	$n_{exp} = 17$				There was no significant difference in depression between the two groups ($g = -0.14$).
Galvin, Benson, Deckro, Fricchione, and Dusek (2006)	RCT	Older adults living in a local senior community centre in Boston	$n_{con} = 7$	Combined relaxation group (relaxation response training, meditation and guided imagery)	No intervention	STAI BDI-II Pre-test Post-test	The intervention group had lower anxiety ($g = 0.30$) and depression ($g = 0.38$) than the control group.
USA	Random method not mentioned	Convenience sampling	$n_{exp} = 8$	Five 1.5-hour weekly sessions for five weeks, and a 20-minute home practice each day.			
Guetin et al. (2009)	RCT	Older adults with mild to moderate Alzheimer's disease living in a nursing home	$n_{con} = 15$	Music therapy using the U-Sequence (varied tempo and number of instrument)	Rest period (20-minute weekly session for 16 weeks.)	HAS	16 weeks after the intervention:

(*continued*)

Table 1.　(*Continued*)

Author and country	Research design	Participants	Sample size	Interventions	Comparison	Outcome measure	Findings Hedges' effect size (g)
France	Random method not mentioned	Convenience sampling	$n_{exp} = 15$	20-minute weekly session for 16 weeks.		GDS	The intervention group had lower anxiety ($g = 2.46$) and depression ($g = 0.47$) than the control group.
				Music styles were based on patients' choice/ preference.		Pre-test	24 weeks after the intervention:
						Post-test at wk 4, 8,16, 24	The intervention group had lower levels of anxiety ($g = 1.64$) than the control group. However, no difference in depression ($g = 0.06$) was observed between the two groups.
Krishnamurthy and Telles (2007)	Stratified RCT	Elderly people living in a residential home	$n_{yoga} = 18$	Yoga group (75 minutes of daily practice, six days a week for 24 weeks)	Wait-listed control	GDS	There are significant time by group interactions ($F = 8.625$, $p < 0.001$).
India	Lottery method	Convenience sampling	$n_{ayu} = 12$	Ayurveda group (herbal tonic twice daily for 24 weeks)		Pre-test	When compared to the control group, the yoga group had lower levels of depression at three months ($g = 0.98$) and six months ($g = 1.23$) after the intervention.
			$n_{con} = 20$			Post-test (3 and 6 months)	When compared to the Ayurveda group, the yoga group had lower levels of depression at three months ($g = 0.67$) and six months ($g = 1.50$) after the intervention.
Luskin, Reitz, Newell, Quinn, and Haskell (2002)	Non-randomised study	Elderly patients with congestive heart failure	$n_{con} = 15$	Stress management training, 75-minute weekly sessions over 10 weeks	Wait-listed control	STAI GDS Pre-test Post-test	Following the intervention, experimental group had lower depression than control group ($g = 0.09$).

Table 1. (*Continued*)

Author and country	Research design	Participants	Sample size	Interventions	Comparison	Outcome measure	Findings Hedges' effect size (g)
USA		Cardiac rehab centre Convenience sampling	$n_{exp} = 14$	[Content: Freeze-Frame, Heart Lock-in, Appreciation, Care/Overcare]			No significant difference in anxiety scores between the two groups (g = 0.07).
Sharpe et al. (2007)	RCT	Elderly people living in a community urban senior centre	$n_{con} = 24$	Massage therapy (eight 50-minute sessions over four weeks)	Guided relaxation (eight 50-minute sessions over four weeks)	GWB_Anx GWB_Dep Pre-test Post-test	Participants receiving massage therapy had significantly lower anxiety (g = 0.64) and depression (g = 0.89) than the guided relaxation group. Effect sizes were calculated using the *F*-test as the mean and standard deviations were not provided.
USA	Random number generator	Convenience sampling	$n_{exp} = 25$				
Svansdottir and Snaedal (2006)	RCT	Elderly with Alzheimer's disease from two nursing homes and two psychiatric wards	$n_{con} = 18$	Group-based music therapy with singing, playing musical instruments and dancing (18 30-minute sessions, three times a week for six weeks)	No intervention	BEHAVE-AD Pre-test	There were no significant differences in anxiety symptoms between the music therapy and control groups.
Iceland	Random method not mentioned		$n_{exp} = 20$			Post-test at 6 weeks and 10 weeks	The standard deviations were not provided so the effect size cannot be calculated.
Yu, Lee and Woo (2007)	RCT	Elderly inpatients with heart failure	$n_{con} = 63$	Progressive muscle relaxation training (PMRT) (Two one-hour sessions, two home visits, twice weekly home practice and biweekly phone calls.)	Usual care (medication and follow-ups)	HADS_Anx HADS_Dep Pre-test Post-test at 8 weeks and 14 weeks	At post-test there was no significant difference in anxiety between the two groups (g = 0.02).

(*continued*)

Table 1. (*Continued*)

Author and country	Research design	Participants	Sample size	Interventions	Comparison	Outcome measure	Findings Hedges' effect size (g)
Hong Kong	A slip draw by participants	Convenience sampling	$n_{exp} = 59$				The intervention group has significantly lower levels of depression ($g = 1.18$). At the follow-up assessment, participants receiving PMRT had significantly lower levels of anxiety ($g = 0.38$) and depression ($g = 1.24$) compared to the control group.
Yu, Lee, Woo and Hui (2007)	Non-randomised study	Older adults living in a community with a history of hospital admission in the past month	$n_{rlax} = 59$	Progressive muscle relaxation training (PMRT) (two sessions, one revisional workshop, twice-daily home practice for 12 weeks and biweekly phone calls)	Control group (eight weekly greeting phone calls)	HADS_Anx HADS_Dep Pre-test	In comparison with the control group, relaxation therapy significantly lowered both anxiety ($g = 0.38$) and depression ($g = 1.25$).
Hong Kong		Convenience sampling	$n_{exe} = 32$ $n_{con} = 62$	Exercise group: 12 weekly exercise sessions (strengthening, resistance training, and aerobic dance)		Post-test	
Wang (2009)	RCT	Older adults living in a community	$N_{exp} = 8$	Yoga group (eight 1-hour sessions, twice a week for four weeks)	Socialisation group (eight 1-hour sessions, twice a week for four weeks)	CES-D	Mean differences (MF) in depression between the pre-test and post-test were calculated for both groups.
USA	Random method not mentioned.		$N_{con} = 10$			Pre-test Post-test	There was more reduction in depression scores (MF) in the intervention and the control groups ($g = 0.52$).

Note: (1) Anxiety measures: STAI = State Trait Anxiety Inventory, BAI = Beck Anxiety Inventory, BEHAVE-AD = The Behavioural Pathology in Alzheimer's Disease Rating Scale, HAS = The Hamilton Anxiety Scale, HADS_ANX = Hospital Anxiety Depression Scale_Anxiety Subscale.
(2) Depression Measures: GDS = The Geriatric Depression Scale, HRSD = The Hamilton Rating Scale, HADS_Dep = Hospital Anxiety Depression Scale_Depression Subscale, CES-D = The Centre for Epidemiological Depression Scale.

Table 2. Effects of stress management interventions on anxiety.

Interventions	No. of studies (n)	No. of comparisons (n_{com})	Average effect size (Hedges's g)	Standard error	95% confidence interval	Z-value	P-value	Q-value	I^2
Music intervention	1	1	2.36	0.47	1.45, 3.28	5.05	<0.01	0.00	0.00
Yoga	2	5	0.45	0.14	0.17, 0.73	3.15	<0.01	4.29	6.76
Combined relaxation training	1	1	0.30	0.49	−0.66, 1.26	0.61	0.54	0.13	0.00
Progressive muscle relaxation training (PMRT)	2	2	0.20	0.13	−0.05, 0.45	1.57	0.12	1.97	48.38
Stress management training	1	1	0.07	0.36	−0.62, 0.77	0.21	0.84	0.00	0.00
Overall	**7**	**10**	**0.43**	**0.10**	**0.22**	**0.63**	**4.08**	**19.78**[*]	**64.15**

Note: [*]significance level at 0.01.

2007) was reported in a narrative summary. According to Table 3, the PMRT had the largest effect size ($g = 1.21$, $z = 8.73$, $p < 0.01$) followed by music intervention ($g = 0.84$, $z = 5.21$, $p < 0.01$). Two interventions produced medium effect sizes: yoga ($g = 0.49$, $z = 4.08$, $p < 0.01$) and combined relaxation training programmes ($g = 0.38$, $z = 0.77$, $p = 0.44$). In addition, Sharpe et al. (2007) reported that the eight-session massage therapy was more effective than guided imagery in mitigating depression among the elderly living in a community ($g = 0.89$) (Table 1).

Follow-up assessments

Four studies had follow-up assessments on the relaxation interventions but only two studies showed positive effects. The PMRT was beneficial at the 14-week follow-up assessment ($g = 1.24$, $z = 6.31$, $p < 0.001$). Similarly, the yoga programme remained efficacious at six month post-intervention ($g = 1.23$, $z = 3.53$, $p < 0.01$) (Krishnamurthy & Telles, 2007).

Methodological quality of included studies

Included studies had QRI scores ranging from 6 to 10 with an average of 7.84 (SD = 1.20) and five studies had the highest score (9 out of 11) (Chan, Chan, & Mok, 2010; Chan, Chan, Mok, & Tse, 2009; Chan, Wong, Onishi, & Thayala, 2011; Guetin et al., 2009; Sharpe et al., 2007). Most studies provided a clear description of study objectives, participants, measurements, intervention protocols, and statistical analyses. However, some issues might bias the research findings. First, all of the included studies used a convenience sampling, which may lead to selection bias. Second, only seven studies provided a method of sample size calculation and the remaining eight studies did not. As such, it is unknown if these studies had sufficient power to detect significant findings. Third, three studies did not use randomisation to allocate participants to groups, so it is unclear if participants had an equal chance in being assigned to the groups. Fourth, none of the studies assessed the undesirable effects of the relaxation interventions, so it is inconclusive whether the

interventions would work well for all older adults. Fifth, most studies did not record or control extraneous factors like concomitant treatments participants received during the course of study. These factors might bias the findings. Finally, most studies did not use an intent-to-treat method to analyse the research data, which might increase the risk for type-II errors.

Discussion

This systematic review aimed to summarise the current empirical evidence concerning the beneficial effects of relaxation interventions on anxiety and depression among older adults. Fifteen studies were included in the review. Our findings indicated that older adults who received relaxation interventions experienced greater improvements in depression and anxiety than controls in most studies. In particular, the PMRT, music intervention, and yoga had the strongest intervention effects on depression. Music intervention and yoga were best at reducing anxiety symptoms. Furthermore, the impacts of music intervention, yoga, and PMRT were sustained from 14 to 24 weeks after the interventions.

Two out of four studies supported the positive effect of music intervention, making mixed results. Among those with significant findings, participants were allowed to listen to their preferred music in comfortable environments or conditions for 4 to 16 weeks. Music is postulated to have various neurophysiological effects on older adults. Particularly, music has an impact on sensory, cognitive, behavioural, and affective components (mitigating psychological tension and modifying the feeling of anxiety and depression) (Guetin et al., 2009). Music intervention was found to increase alpha brain wave and; therefore, enhancing the state of relaxation and calmness (Kwon, Gang, & Oh, 2013). This mechanism may help explain a long-term effect of the music interventions. Results from previous literature reviews and meta-analyses confirmed the efficacy of music interventions on elderly individuals with dementia (Koger, Chapin, & Brotons, 1999; Sherratt, Thornton, & Hatton, 2004).

Our findings showed that the PMRT was effective in mitigating depression among older individuals with heart

Table 3. Effects of stress management interventions on depression.

Interventions	No. of studies (*n*)	No. of comparisons (*n*com)	Average effect size (Hedges's g)	Standard error	95% confidence interval	*Z*-value	*P*-value	*Q*-value	*I*²
Progressive muscle relaxation training (PMRT)	2	2	1.21	0.14	0.94, 1.49	8.73	<0.01	0.04	0.00
Music intervention	4	4	0.84	0.16	0.53, 1.58	5.21	<0.01	20.59*	85.43
Yoga	4	8	0.49	0.12	0.26, 0.73	4.08	<0.01	9.66	27.52
Combined relaxation training	1	1	0.38	0.49	−0.58, 1.35	0.77	0.44	0.00	0.00
Stress management programme	1	1	0.09	0.36	−0.60, 0.79	0.26	0.79	0.00	0.00
Overall	**12**	**16**	**0.82**	**0.09**	**0.65, 1.01**	**8.85**	**0.00**	**16.54***	**70.13**

Note: *significance level at 0.01.

failure and post-hospitalisation. It is believed that the PMRT has a tranquilising effect, triggers a sense of peacefulness, helps participants retreat mentally from their problem and curtails negative thoughts, reducing depressive symptoms (Yu, Lee & Woo, 2007). Notably, another systematic review also reported the beneficial effects of PMRT on people with schizophrenia, mood disorders, and other medical conditions (Carlson & Hoyle, 1993; Jorm et al., 2008; Vancampfort et al., 2013).

Older adults living in communities benefited from practising yoga as they reported less depression and anxiety following the intervention. Yoga involved various activities such as breathing exercises, stretching exercises, physical activity, meditation, and yoga-based guided relaxation. Yoga is perceived to be a holistic approach, incorporating mind, body, and spirit. It could help counterbalance the negative effects of ageing, improve physical functioning, postpone disability, decrease morbidity and mortality, stimulate the mind, and increase hope, reducing the risk of anxiety and depression (Wang, 2009). Another systematic review supported the effectiveness of yoga for people with various mental disorders, including depression, schizophrenia, sleep disorders, eating disorders, and cognitive impairment (Balasubramaniam et al., 2012).

Strengths and limitations of this systematic review

This systematic review was strengthened by the comprehensive literature search and our efforts to locate published and non-published research, minimising publication bias. We also used the Comprehensive Meta-analysis Software to produce accurate statistical parameters. Furthermore, we conducted overall data analyses (including all studies) and subgroup analyses based on relaxation interventions and outcome variables. The latter analyses aimed to ensure that effect sizes were generated from comparable or similar studies. However, there are limitations that might affect the accuracy of findings. First, we included only studies reported in English, potentially overlooking important evidence published in other languages. Second, most of these studies were undertaken in the United States, so that the findings might not be applicable to other countries or cultures. Finally, the positive effects of interventions might not be due to the

interventions per se. Participants might benefit from other aspects such as the continuing therapist−client relationships and positive interaction between the two during the interaction sessions.

Implications for clinical practice

Our findings indicated that relaxation interventions were beneficial for elderly people. As such, the relaxation interventions could be used as primary prevention and/or adjunctive therapy for depression and anxiety. As an example, yoga could be taught to older adults living in community facilities or residential homes. Music intervention could be used to assist elderly adults with mild or moderate Alzheimer's disease as well as for healthy individuals. The progressive muscle relaxation training could be delivered to older adults with heart failure. Given that adverse effects of the interventions are unknown, qualified therapists (such as certified yoga trainers) should deliver the programme. As with all relaxation interventions, participants' preference, organisational contexts, and health care policy should be taken into consideration.

Implications for future research

More RCTs are required to test the efficacy of relaxation interventions across different cultures, ethnic groups, and countries (especially in European and Asian countries). Multi-centred recruitments and larger sample sizes are essential to enhance the ability to generalise findings. Power analyses can be used to determine the adequate sample size. A procedure to ensure treatment adherence should be implemented. Potential extraneous factors should be controlled to increase the accuracy of findings. Perceptions of the study's participants and undesirable effects of relaxation interventions should also be assessed to establish a full understanding of the interventions; both qualitative and quantitative research could be undertaken in this regard. Additionally, intent-to-treat analyses should be used to lower the risk of type-II errors.

Conclusion

This systematic review provided empirical evidence to support the proposition that relaxation interventions can

reduce anxiety and depression among older adults. The relaxation interventions could be used in community or hospital settings.

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References

Note: References marked with an asterisk indicate the studies included in this review.

Aldwin, C.M., Park, C.L., & Spiro, A. (2007). *Handbook of health psychology and aging*. New York, NY: The Guilford Press.

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Arlington, VA: American Psychiatric Association.

Balasubramaniam, M., Telles, S., & Doraiswamy, P.M. (2012). Yoga on our minds: A systematic review of yoga for neuropsychiatric disorders front psychiatry. *Frontier in Psychiatry, 3*(117), 1−16.

Beck, A.T., Epstein, N., Brown, G., & Steer, R.A. (1988). An inventory for measuring clinical anxiety: Psychometric properties. *Journal of Consulting and Clinical Psychology, 56*, 893−897.

* Bethany, K.H. (2005). *The effects of selected exercise modalities on stress, anxiety, and depression responses in the elderly* (Unpublished master thesis). Department of Educational Psychology and Learning Systems, Collage of Education, Florida State University, USA.

* Bonura, K.B. (2007). *The impact of yoga on psychological health in older adults* (Unpublished master thesis). Department of Educational Psychology and Learning Systems, Collage of Education, Florida State University, USA.

Carlson, C.R., & Hoyle, R.H. (1993). Efficacy of abbreviated progressive muscle relaxation training: A quantitative review of behavioral medicine research. *Journal of Consulting and Clinical Psychology, 61*(6), 1059−1067.

* Chamberlin, B. (2008). *The effects of relaxation technique on the quality of experience in people with dementia* (Unpublished PhD dissertation). University of Connecticut, USA.

* Chan, M.F., Chan, E.A., & Mok, E. (2010). Effects of music on depression and sleep quality in elderly people: A randomised controlled trial. *Complementary Therapies in Medicine, 18*, 150−159.

* Chan, M.F., Chan, E.A., Mok, E., & Tse, F.Y.K. (2009). Effect of music on depression levels and physiological response in community-based older adults. *International Journal of Mental Health Nursing, 18*, 285−294.

* Chan, M.F., Wong, Z.Y., Onishi, H., & Thayala, N.V. (2011). Effects of music on depression in older people: A randomised controlled trial. *Journal of Clinical Nursing, 21*, 776−783.

Cohen, J. (1988), *Statistical power analysis for the behavioral sciences* (2nd ed.). New Jersey, NY: Lawrence Erlbaum Associates.

* Galvin, J.A., Benson, H., Deckro, G.R., Fricchione, G.L., & Dusek, J.A. (2006). The relaxation response: Reducing stress and improving cognition in healthy aging adults. *Complementary Therapies in Clinical Practice, 12*, 186−191.

Glass, G.V., McGaw, B., & Smith, M.L. (1981). *Meta-analysis in social research*. Beverly Hills, CA: SAGE.

* Guetin, S., Portet, F., Picot, M.C., Pommie, C., Messaoudi, M., Djabelkir, L., . . . Touchon, J. (2009). Effects of music therapy on anxiety and depression in patients with Alzheimer's type dementia: Randomised controlled study. *Dementia and Geriatric Cognitive Disorder, 28*, 36−46.

Hedges, L.V. (1981). Distribution theory for Glass' estimator of effect size and related estimators. *Journal of Educational Statistics, 6*(2), 107−128.

Higgins, J.P.T., Thompson, S.G., Deeks, J.J., & Altman, D.G., (2003). Measuring inconsistency in meta-analyses. *British Medical Journal, 327*, 557−560.

Higgins, J.P.T., & Green, S. (2011). Cochrane handbook for systematic reviews for interventions (version 5.1.0). Retrieved January 15, 2013, from http://handbook.cochrane.org./.

Jadad, A.R., Moore, R.A., Carroll, D., Jenkinson, C., Reynolds, D.J.M., Gavaghan, D.J., & McQuay, H.J. (1996). Assessing the quality of reports randomized clinical trials: Is blinding necessary? *Controlled Clinical Trial, 17*, 1−12.

Jorm A.F., Morgan, A.J., & Hetrick, S.E. (2008). Relaxation for depression. *Cochrane Database of Systematic Reviews, 4*, doi:10.1002/14651858.CD007142.pub2.

Klainin-Yobas, P., Cho, M.M.A., & Creedy, D. (2012). Effects of mindfulness-based interventions on depression among people with mental disorder: A Meta Analyses. *International Journal of Nursing Studies, 49*, 109−121.

Koger, S.M., Chapin, K., & Brotons, M. (1999). Is music therapy an effective intervention for dementia? A meta-analytic review of literature. *Journal of Music Therapy, 36*, 2−15.

Kok, R.M. (2013). What is the role of medications in late life depression? *Psychiatric Clinics of North America, 36*, 597−605.

Kok, R.M., Heeren, T.J., & Nolen, W.A. (2012). Efficacy of treatment in older depressed patients: A systematic review and meta-analysis of double-blind randomized controlled trials with antidepressants. *Journal of Affective Disorder, 141*, 103−115.

* Krishnamurthy, M.N., & Telles, S. (2007). Assessing depression following two ancient Indian intervention: Effects of yoga and Ayurveda on older adults in a residential home. *Journal of Gerontological Nursing, 33*(2), 17−23.

Kwon, M., Gang, M., & Oh, K. (2013). Effects of group music therapy on brain wave, behaviour, and cognitive function among patients with chronic schizophrenia. *Asian Nursing Research, 7*(4), 168−174.

Lehrer, P.M., Woolfolk, R.L., & Sime, W.E. (2007). *Principles and practice of stress management*. New York, NY: Guilford.

* Luskin, F., Reitz, M., Newell, K., Quinn, T.G., & Haskell, W. (2002). A controlled pilot study of stress management training of elderly patients with congestive heart failure. *Preventive Cardiology, 5*(4) 168−176.

Maratos, A., Gold, C., Wang, X., & Crawford, M. (2008). Music therapy for depression. *Cochrane Database of Systematic Reviews, 1*. doi:10.1002/14651858.CD004517.pub2.

Mehta, K.M., Simonsick, E.M., Penninx, B. W, Schulz, R., Rubin, S.M., Satterfield, S., & Yaffe, K. (2003). Prevalence and correlates of anxiety symptoms in well-functioning older adults: Findings from the health aging and body composition study. *Journal of American Geriatric Society, 51*(4), 499−504.

Polyakova, M., Sonnabend, N., Sander, C., Mergl, R., Schroeter, M.L., Schroeder, J., & Schönknecht, P. (2013). Prevalence of minor depression in elderly persons with and without mild cognitive impairment: A systematic review. *Journal of Affective Disorders, 152−154*, 28−38.

Radloff, L.S. (1977). The CES-D scale: A self-report depression scale for research in the general population. *Applied Psychological Measurements, 1*, 385−401.

Seaword, B.L. (2012). *Managing stress: Principles and strategies for health and well-being* (7th ed.). Burlington, MA: Jones & Bartlett Learning.

* Sharpe, P.A., Williams, H.G., Granner, M.L., & Hussey, J.R. (2007). A randomised study of the effects of massage therapy compared to guided relaxation on well-being and stress perception among older adults. *Complementary Therapies in Medicine, 15*, 157−163.

Sherratt, K., Thornton, A., & Hatton, C. (2004). Music interventions for people with dementia: A review of the literature. *Aging & Mental Health, 8*, 3−12.

Smith, J.C. (2007). The psychology of relaxation. In P.M. Lehrer, R.L. Woolfolk, & W.E. Sime (Eds.), *Principles and practice of stress management* (3rd ed.) (pp. 38−52). New York, NY: The Guilford Press.

Spielberger, C.D. (1983). *State-trait anxiety inventory*. Palo Alto, CA: Consulting Psychologists Press.

* Svansdottir, H.B., & Snaedal, J. (2006). Music therapy in moderate and severe dementia of Alzheimer's type: A case-control study. *International Psychogeriatrics, 18*(4), 613−621.

Taylor, W.D., & Doraiswamy, P.M. (2004). A systematic review of antidepressant placebo controlled trials for geriatric depression: Limitations of current data and directions for the future. *Neuropsychopharmacology, 29*, 2285−2299.

United Nations (2002). *World population aging 1950-2050*. Retrieved January 20, 2013, from http://www.un.org/esa/population/publications/worldageing19502050/pdf/preface_web.pdf

Vancampfort, D., Correll, C.U., Scheewe, T.W., Probst, M., De Herdt, A., Knapen, J., & De Hert, M. (2013). Progressive muscle relaxation in persons with schizophrenia: A systematic review of randomized controlled trials. *Clinical Rehabilitation, 27*(4), 291−298.

van Hout, H.P., Beekman, A.T., de Beurs, E., Comijs, H., van Marwijk, H., de Haan, M., . . . Deeg, D.J. (2005). Anxiety and the risk of death in older men and women. *British Journal of Psychiatry, 185*, 399−404.

* Wang, D.S. (2009). *The impact of yoga intervention on mental well-being and physical functioning in older adults living in community* (Unpublished PhD dissertation in social work). Fordham University, New York.

Wetherell, J.L., Lenze, E.J., & Stanley, M.A. (2005). Evidence-based treatment of geriatric anxiety disorder. *Psychiatric Clinics of North America, 28*(4), 871−896.

Wetherell, J.L., Thorp, S.R., Patterson, T.L., Golshan, S., Jeste, D.V., & Gatz, M. (2004). Quality of life in geriatric generalized anxiety disorder: a preliminary investigation. *Journal of Psychiatric Research, 38*(3), 305−312.

Wittchen, H. U., Kessler, R. C., Beesdo, K., Krause, P., Höfler, M., & Hoyer, J. (2002). Generalized anxiety and depression in primary care: Prevalence, recognition, and management. *Journal of Clinical Psychiatry, 63*(Suppl 8), 24−34.

World Health Organization (2014). *Definition of an older or elderly person*. Retrieved May 5, 2013, from http://www.who.int/healthinfo/survey/ageingdefnolder/en/

Yesavage, J.A., Brink, T.L., Rose, T.L., Lum, O., Huang, V., Adey, M.B., & Leirer, V.O. (1983). Development and validation of a geriatric depression screening scale: A preliminary report. *Journal of Psychiatric Research, 17*, 37−49.

* Yu, D.S.F., Lee, D.T.F., & Woo, J. (2007). Effects of relaxation therapy on psychologic distress and symptom status in older Chinese patients with heart failure. *Journal of Psychosomatic Medicine, 62*(4), 427−437.

* Yu, D.S.F., Lee, D.T.F., Woo, J., & Hui, E. (2007). Non-pharmacological interventions in older people with heart failure: Effects of exercise training and relaxation therapy. *Gerontoloty, 53*, 74−81.