Review

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The effects of Sahaja Yoga meditation on mental health: a systematic review

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Abstract:
Objectives: To determine the efficacy of Sahaja Yoga (SY) meditation on mental health among clinical and healthy populations.
Methods: All publications on SY were eligible. Databases were searched up to November 2017, namely PubMed, MEDLINE (NLM), PsychINFO, and Scopus. An internet search (Google Scholar) was also conducted. The quality of the randomized controlled trails was assessed using the Cochrane Risk Assessment for Bias. The quality of cross-sectional studies, a non-randomized controlled trial and a cohort study was assessed with the Newcastle-Ottawa Quality Assessment Scale.
Results: We included a total of eleven studies; four randomized controlled trials, one non-randomized controlled trial, five cross-sectional studies, and one prospective cohort study. The studies included a total of 910 participants. Significant findings were reported in relation to the following outcomes: anxiety, depression, stress, subjective well-being, and psychological well-being. Two randomized studies were rated as high quality studies, two randomized studies as low quality studies. The quality of the non-randomized trial, the cross-sectional studies and the cohort study was high. Effect sizes could not be calculated in five studies due to unclear or incomplete reporting.
Conclusions: After reviewing the articles and taking the quality of the studies into account, it appears that SY may reduce depression and possibly anxiety. In addition, the practice of SY is also associated with increased subjective wellbeing and psychological well-beng. However, due to the limited number of publications, definite conclusions on the effects of SY cannot be made and more high quality randomized studies are needed to justify any firm conclusions on the beneficial effects of SY on mental health.

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Introduction

Meditation as a useful form of intervention to increase mental health is becoming a focus of scientific attention. Although meditation is a practice that is also part of monotheistic religions such as Christianity, Islam, and Judaism, it is often associated with Eastern traditions, religions, and philosophies such as Yoga, Buddhism, Taoism, and Jainism. There is no clear definition of meditation; meditation is an umbrella term for a range of techniques aimed at calming the mind. Furthermore, what is understood by the term meditation is subjected to trends and hypes. With the coming of the flower power age in the late sixties, Eastern philosophies and meditation became known to the general public, in particular Transcendental Meditation (TM) and Herbert Benson's TM derivative Relaxation Response [1]. Hundreds of studies on the effects of TM were published in the 1970s and 1980s, although there has been much debate on the methodological quality of these studies [2]. The 1980s saw the consolidation of the popularity of yoga. Yoga is comprised of different techniques of which physical postures (*asanas*), breathing exercises (*pranayama*), and meditation (*dhyana*) are the three main ones [3, 4]. It was mostly the practice of postural yoga in combination with breathing exercises, and not meditational yoga, that became popular through forms such as Hatha yoga, Iyengar yoga, Kundalini yoga, Bikram yoga, Kriya yoga, and countless others [5, 6]. What is referred to as "modern postural yoga" [7] has become a synonym for yoga: in the West yoga is now mostly perceived as the practice of physical exercises to improve health and fitness, rather than a meditation form that is aimed at achieving an enlightened state of consciousness, as it was originally intended.

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The past decade saw the breakthrough of mindfulness and a growing interest in Buddhist psychology/philosophy. The acceptance of mindfulness meditation in the scientific and therapeutic community can partially be attributed to a large number of research studies, with a growing amount of randomized controlled trials. This may have had a positive effect on the quality of studies in the field of meditation in general. Several systematic reviews and meta-analyses on the effects of meditation were recently published, but in a number of them meditation forms such as Yoga, Tai Chi, and Qi Gong were excluded [8–10]. In these studies it appears meditation is divided into two categories: meditation focused on mental processes and meditation focused on bodily processes. And while these publications claim to report on the (psychological) effects of meditation in general, they in fact only reported on two forms of meditation: TM and mindfulness. Other forms of meditation were not included.

One form of meditation overlooked by prior reviews is Sahaja Yoga (SY). SY is a form of meditation, developed in the 1970s by Nirmala Srivastava. SY offers a simple way to awaken the *Kundalini*, an inner energy believed to reside in the sacrum bone. By awakening the *Kundalini*, it is believed a yogi can enter into a state of thoughtless awareness, or mental silence [11, 12]. In this state, the attention is in the present moment, with full awareness of the surroundings, but with elimination of unnecessary thought activity [13]. In Hindu philosophy, this state of thoughtless awareness is also known as *thuriya-avastha* [14] and is akin to the awareness state that is being described in open monitoring meditation [15]. Perhaps due to the typical categorization of yoga as a program of physical relaxation, SY has been excluded from most prior reviews of meditation research. This article adds to the conversation by presenting a systematic review of research on the effects of SY on mental health.

Methods

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines for systematic reviews and meta-analyses [16] and the recommendations of the Cochrane Back Review group [17] were followed in the planning and the implementation of the review.

Identification and selection of studies

All publications on SY were eligible. The following databases were searched up through November 2017: PubMed, Medline, Scopus, and PsychINFO. The final data extraction date was 30 November 2017. Since the expected number of publication was low, all fields in the databases were searched using the term "sahaja yoga." Furthermore, the references of the relevant publications were checked for additional eligible papers and an internet search (Google scholar, Researchgate.net, Academia.edu) was executed using the keyword mentioned above. Three authors of publications on SY were also contacted by e-mail. After removal of duplicates, a title-abstract review was done, after which all papers that were identified as publications on the effects of SY were screened. Studies that met the following criteria were fully analyzed: (i) full text available; (ii) randomized controlled trial studies, non-randomized controlled trial studies, cross-sectional studies, and controlled cohort studies; (iii) outcomes were related to mental health; (iv) participants were healthy adults or adults belonging to a clinical population. For each eligible publication, the following information was gathered: (i) name of the main author(s); (ii) year of publication; (iii) location; (iv) study design; (v) participants description; (vi) conditions; (vii) sample size per condition; (viii) mean age; (ix) percentage of female participants; (x) program information; (xi) outcome measures; (xii) instruments.

Quality assessment

Two reviewers independently rated each randomized controlled trial using five items for quality assessment from the Cochrane Risk of Bias Assessment Tool: (i) Selection bias – random sequence allocation; (ii) Selection bias – allocation concealment; (iii) Performance bias – blinding of outcome assessment; (iv) Attrition bias – completeness of outcome data; (v) Reporting bias – selective findings. Random sequence generation refers to the description of the method that was used to generate the allocation sequence. Allocation concealment refers the description of the method used to conceal the allocation sequence. Performance bias refers to the measures used to blind participants and researchers from any knowledge of which intervention participants received. Attrition bias refers to the completeness of the reporting of outcome data for the main outcomes, including attrition and exclusions of participants from the analysis. Reporting bias refers to bias due to selective outcome reporting [18]. One point was appointed for each criterion met. The quality of a study was assessed as "high"

when a minimum of four criteria were met, "medium" when two or three criteria were met, and "low" when less than two criteria were met. Consensus between the two reviewers was reached through discussion. The quality of the non-randomized controlled trial, the cross-sectional studies, and the cohort study was assessed using the Newcastle-Ottawa Quality Assessment Scale (NOS). The NOS employs three main study assessment criteria: (i) selection; (ii) comparability; (iii) exposure. In total, there are nine items and a maximum of nine points can be awarded [19]. The use of the NOS is endorsed by the Cochrane Collaboration to assess the quality of observational studies [17].

Effect size calculation

Where possible, effect sizes (Cohen's *d*) were calculated by subtracting the average score of the experimental group from the average score of the control group, and dividing the outcome by the pooled standard deviations of both groups. This was done using outcome data at post-test level. Effect sizes of 0–0.32 can be considered as small, effect sizes of 0.33–0.55 as moderate, and effect sizes of 0.56–1.20 as large [20].

Results

Study selection

Eleven studies met the selection criteria. Figure 1 outlines the selection process.

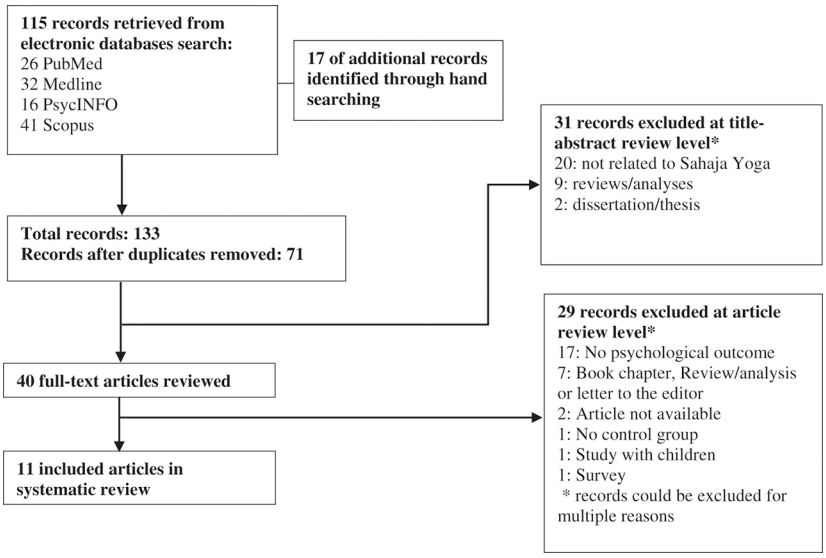

Figure 1: Flowchart of the inclusion of studies.
* records could be excluded for multiple reasons.

Study characteristics

The studies included a total of 910 participants. Four studies (36.4%) were randomized controlled trials and four (36.4%) were cross-sectional studies. Other study designs were a non-randomized controlled trial (9.1%, n=1), a cross-sectional survey (9.1%, n=1), and a prospective cohort study (9.1%, n=1). Seven studies (63.6%) included healthy adults and four studies (35.4%) included adults with health problems (general health problems, asthma, anxiety/depressive symptoms, and major depression). Eight studies (72.7%) had an active control group and three studies (27.3%) had a non-active control group. Five studies (45.5%) examined the effects of a SY intervention compared to another form of intervention. Two studies (18.8%) compared effects between long-term and short-term practitioners of SY. Four studies (36.4%) compared long-term practitioners of SY to a control group of non-meditators. The mean age of the participants was 42.3 (SD=4.1) and the percentage of female participants was 57.6% (excluding three studies that did not report the gender of the participants). The characteristics of the studies can be found in Table 1.

Table 1: Study characteristics

Authors, year country	Design	Participants	Conditions	#	Mean age	Female %	Program	Instruments*	Outcome
Aftanas and Golocheikine, 2001, Soviet Union [25]	Cross-sectional study	Healthy adults	1. Short-term SY meditators 2. Long-term SY meditators	11 16	35.	54.5%	No program, EEG study		Feelings of bliss + (p <.014) Mental activity - (p <.025)
Aftanas and Golocheikine, 2003, Soviet Union [26]	Cross-sectional study	Healthy adults	1. Short-term SY meditators 2. Long-term SY meditators	11 16	35.2	54.5%	No program, EEG study	STAI-t, TAS-20, EPQ, Self-developed questionnaires	Trait anxiety - (p <.022) Neuroticism - (p <.028) Difficulties in identification of feelings - (p <.002) Mental activity - (p <.025) Happiness + (p <.014)
Aftanas and Golocheikine, 2005, Soviet Union [27]	Cross-sectional study	Healthy adults	1. Long-term SY meditators 2. Control group non-meditators	25 25	– –	50%	No program, EEG study	Self-developed questionnaires	Emotional arousal - (p <.01)
Chung et al., 2012, India [28]	Pros. cohort study	Adults with general health problems	1. SY 2. Conventional therapy	67 62	40.53 42.0	49.6%	1. 1-week treatment at SY health center 2. TAU at hospital	WHOQOL-BREF, WHOQOL-SRPB CAS	Quality of Life + (p <.001) Anxiety - (p <.001)
Hernandez et al., 2016, Spain [31]	Cross-sectional study	Healthy adults	1. Long-term SY meditators 2. Control group non-meditators	23 23	46.7 (11.2)	73.9%	No program, FMRI scan	Voxel-based morphometry (VBM) with DARTEL	Increased Grey Matter Volume
Manocha et al. 2002, Australia [21]	RCT	Adults with asthma	1. SY 2. Relaxation/ CBT exercises	21 26	37.0	55.3%	Both: 4 month, 2 h per week + 2 x daily 10-20 min. exercises at home	AQLQ POMS	Mood + (p =.007) Tension + (p =.005) Fatigue - (p =.005)
Manocha et al., 2011, Australia [22]	RCT	Healthy adults	1. SY 2. Relaxation 3. Waitlist	42 40 39	42.5 41.4 42.3	– – –	Both: 8-week: 2 x a week 60 min session, 2 x daily 10-20 min at home	PSQ STAI-t	Stress - (p =.026) Depression - (p =.019)

Manocha et al., 2012, Australia [30]	Cross-sectional survey	Healthy adults	1. Long-term SY meditators 2. General population	343	44 (13.4)	61.4	No program, survey	SF-36 MLS	Bodily pain - (p = 0.002) General health + (p = 0.001) Vitality + (p = 0.001) Social functioning + (p = 0.001) Role limitation emotional - (p =0.001) Mental health (p = 0.001)
Morgan, 2001, England [29]	NRCT	Adults with symptoms of anxiety, depression	1. SY 2. CBT 3. Waitlist	8 6 10	37.1 39.2 37.0	58.3% (total)	Both: 6-week program, once a week 2-hour sessions.	HADs GHQ-12	Anxiety – (p =.006) Depression – (p =.001)
Schneider et al, 2010, Europe [24]	NRCT	Healthy adults	1. SY 2. Waiting list 1. SY 2. Waiting list 1. SY 2. Hatha Yoga 3. Waiting list 1. SY 2. Waiting list	10 – 8 – 44 – – 31 –	– 	– 	6-week program, two 45-minute sessions per week + daily meditation at home (recommended).	PANAS WVS STAI	Positive Affect + – Happiness + (p = .008) – Fearlessness + (p = .016) – Inspired + (p =.10) ns Negative Affect - – Sadness - (p =.001) – Fatigue – (p =.001) – Upset - (p =.003) – Anger - (p =.003) – Nervous - (p =.009) – Lack of authenticity - (p =.09) – Dissatisfaction - (p=.10) ns
Sharma et al., 2005, India [23]	RCT	Adults with major depression	1. SY + medication 2. Non-active control group + medication	15 15	–	42.3% (total)	8-week program: 3 times a week a 30-minute session.	HAM-D HAM-A	Depression - (p <.001) Anxiety - (p <.001)

AQLQ - Asthma Quality of Life Scale; CAS: Clinical Anxiety Scale; EPQ: Eysenck Personality Questionnaire; GHQ-12: General Health Questionnaire; HADs: Hospital Anxiety and Depression scale; HAM-A: Hamilton Rating Scale for Anxiety; HAM-D: Hamilton Rating Scale for Depression; MES: Multidimensional ethics scale; MLS: Meditation Lifestyle Survey; NS: not significant PANAS: Positive and Negative Affect Scale; POMS: Profile of Mood States; PSQ: Psychological Strain Questionnaire; SF-36: Medical Outcomes Study Short Form 36 Questionnaire ; STAI-t: State Trait Anxiety Inventory; TAS-20: Toronto Alexithymia Scale; WHOQOL-BREF: World Health Organization Quality of Life-BREF; WHOQOL-SRPB -Organization Quality of Life Spirituality, Religiousness and Personal Beliefs; WVS: World Values Survey

* EEG studies conducted with 62 channel EEG, Scan 4.1.1. software, 128 channel ESI system, 64-channel QuickCap with imbedded AG/AgC1 electrodes

Self-developed questionnaires

Study measures

We reported on the following outcomes: depression, anxiety, stress, subjective well-being, and psychological well-being. Outcomes that were classified as subjective well-being included positive affect/negative affect, positive emotions, quality of life, general and mental health, mood, emotional functioning, and fatigue. Outcomes that were classified as psychological well-being included mental activity, self-control, compassion, and personal values.

Risk of bias/quality assessment of the studies

Randomized controlled trials

Results of assessment of the randomized controlled trials are shown in Table 2. Two studies had a low risk of bias on all five domains of assessment [21, 22] and were rated as high quality studies. The other study studies were rated as low quality studies. One of them [23] did not provide any information on the randomization process whatsoever, and there was insufficient information to the determine allocation concealment, blinding of subjective outcomes, and selective reporting. The other study [24] did not provide sufficient information to make a clear judgement of the risk of bias on four out of the five dimensions.

Table 2: Outcome Cochrane Risk Assessment for Bias RCTs

	Selection bias		**Performance bias**	**Attrition bias**	**Reporting bias**	**Tally**
	Random sequence allocation	**Allocation concealment**	**Blinding subjective outcomes**	**Completeness of outcome data**	**Selective reporting**	
Manocha, 2002	1	1	1	1	1	5/5
Manocha, 2011	1	1	1	1	1	5/5
Schneider, 2010	0	0	0	0	0	0/5
Sharma, 2005	0	0	0	0	0	0/5

Other study designs

The overall study quality was high. For the cross-sectional studies, the non-randomized controlled trial, and the prospective cohort study, we found that in all seven studies case definition was adequate. The selected cases seemed to be representative and the control groups were comparable to the intervention groups. Comparability and definition of controls was adequate in at least five studies. In all studies, the cases and controls were comparable on the age factor but in only two studies additional factors were reported. There was ascertainment of exposure as well as a complete report of non-response rates in all studies. Six studies also used the same method of ascertainment. Results of the assessment are shown in Table 3.

Table 3: Outcome Newcastle-Ottawa Quality Assessment Scale

	Selection			**Comparability**			**Exposure**			**Tally**
	S1a	**S2**	**S3**	**C1**	**C2**	**C3**	**E1a**	**E2a**	**E3**	
Aftanas, 2001	**1**	**1**	**1**	**0**	**1**	**0**	**1**	**1**	**1**	**7/9**
Aftanas, 2003	**1**	**1**	**1**	**1**	**1**	**0**	**1**	**1**	**1**	**8/9**
Aftanas, 2005	**1**	**1**	**1**	**1**	**1**	**0**	**1**	**1**	**1**	**8/9**
Hernandez, 2015	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**9/9**
Manocha, 2012	**1**	**1**	**0**	**1**	**1**	**0**	**1**	**1**	**1**	**7/9**
Morgan, 2011	**1**	**1**	**1**	**1**	**1**	**0**	**1**	**1**	**0**	**7/9**

	Selection	**Comparability**	**Exposure**

	S1b	S2	S3	S4		C2	C3	E1b	E2b	E3	
Chung, 2012	**1**	**1**	**1**	**0**	**-**	**1**	**1**	**1**	**0**	**1**	**7/9**

S1a = Case definition; S1b = Ascertainment of exposure; S2 = Representativeness; S3 = Selection of controls;
S4 = Outcome not present at start; C1 = Definition of control; C2 = Age comparability; C3 = Other controlled factors; E1a = Ascertainment of exposure; E1b = Assessment of outcome; E2a = Same method of ascertainment; E2b = Adequate follow up time; E3= Non- response rate

Effect size calculation

Effect sizes are shown in Table 4. Effect size calculation was possible in three out of four randomized studies, and in one non-randomized study. The three cross-sectional interventions studies did not provide sufficient statistical information (mean and standard deviation at post-test level) to calculate effect sizes. These studies set out to investigate the differences in brain activity in long-term meditators of SY versus short-term meditators [25, 26] and long-term meditators versus non-meditators [27] and not to measure the effects of a SY intervention. Extended information on the primary outcomes (EEG measures) was reported in all studies, but information on the secondary outcomes (psychological effects) was less clearly presented. For example, two studies by Aftanas and Golocheikine (2001, 2003) only reported the mean outcomes at post-test level, but not the standard deviations, making effect size calculations impossible. One study did report pre–post measures, and though the results were listed in a figure, the exact values were not reported, making it impossible to calculate the effect sizes [27]. This was also the case in the study by Chung (2008) [28]. Finally, in one randomized study [24] that consisted of four different trials, the exact number of the participants in the control groups was not reported. Moreover, the study did not report mean, standard deviations of other outcome data that is necessary to calculate effect sizes. Authors were contacted, but did not provide the information after a second reminder.

Table 4: Effect sizes of included RCTs and NRCT

Main author	Design	Effect size
Manocha, 2002	RCT	– SY vs. Relaxation/CBT on AQLQ Mood: Cohen's d= 0.48 (95%CI –0.04 to 0.10), $p < 0.05$
Manocha, 2011	RCT	– SY vs. no treatment on PSQ (stress): Cohen's d = 0.30 (95%CI –0.19 to 0.70), $p < 0.05$ – Relaxation vs. no treatment on PSQ (stress): Cohen's d = –0.09 (95%CI –0.53 to –0.40), $p < 0.001$ – SY vs. no treatment on DD (depression): Cohen's d= 0.90 (95%CI 0.46 to 1.33), p < 0.001 – Relaxation vs. no treatment on DD (depression): Cohen's d= 0.60 (95%CI 0.13 to 1.01), $p = 0.01$
Morgan, 2001	NRCT	– SY vs. non active control on HADS anxiety: Cohen's d = 0.36 (95%CI –0.57 to 1.30), $p < 0.001$ – SY vs. non active control on HADS depression: Cohen's d = 0.24 (95%CI –0.67 to 1.17), $p < 0.001$
Sharma, 2005	RCT	– SY vs. active control group on HAM-D (depression): Cohen's d=0.75 (95%CI 0.01 to 1.50), p < 0.05 – SY vs. active control group on HAM-A (anxiety): Cohen's d=1.16 (95%CI 0.35 to 1.88), $p < 0.001$

The effects of Sahaja Yoga on mental health

We found results on the following outcomes: anxiety (four studies), depression (three studies), psychological well-being (three studies), stress (one study), and subjective wellbeing (five studies). The effects of SY on mental health are presented in Table 1 and Table 4.

Depression

The available research suggests that SY may have beneficial effects on depressive symptoms in healthy adults. One high quality randomized study [21] showed a significant reduction on depressive feelings. The effect size of SY vs. no treatment was high (d = 0.90, 95%CI 0.46–1.33). There is also an indication that SY may reduce depression in patients with a depressive order. A randomized study [23] reported a decrease of depression compared to the active control group, with an effect size of d = 0.75 (95%CI 0.01–1.50). This study, however, was of lower quality. Finally, a significant reduction of depression was found in a non-randomized study of high quality, which reported a small (d = 0.24, 95%CI −0.67 to 1.17) but significant improvement on depression with patients assessed to be primarily suffering from recognized symptoms of "anxiety," with or without symptoms of depression [29].

Stress

There is evidence that SY reduces stress in healthy adults [22]. A high quality RCT reported a small effect size for SY vs. no treatment (d = 0.30, 95%CI −0.19 to 0.70), and there also was a small negative effect size for the relaxation control group vs. no treatment (d =−0.09, 95%CI −0.53 to −0.40).

Anxiety

There are indications that SY may decrease anxiety. One randomized study reported significant reductions in anxiety in patients suffering from depression, with a large effect size (d = 1.16, 95%CI 0.35–1.88) for SY vs. active control group [23]. A high quality non-randomized study also reported a significant decrease in anxiety, with an effect size of d = 0.36 (95%CI −0.57 to 1.30) [29]. Anxiety reducing effects of SY were also found in a cross-sectional EEG study among healthy adults. In addition to self-reported decreases in anxiety, EEG recordings also showed increased activation of alpha activity, which is associated with reduced levels of anxiety [26]. These findings are not conclusive, however. A randomized study did report a mean difference on state anxiety, but this difference failed to be significant [21].

Subjective well-being

A randomized controlled trial [24] among healthy adults reported a significant increase of positive affect (happiness, fearlessness, feeling inspired, integrity, feelings of bliss) and a decrease in negative affect (sadness, feeling upset, angry, nervous, emotional instability). A cross-sectional EEG study [25, 26] that compared the effects of SY meditation among long-term versus short-term meditators reported significantly more positive emotions in the group of long-term meditators and elevated scores of uneasiness and restlessness among the short-term meditators. These subjective findings correlate positively with measures of increased theta power in anterior frontal and frontal midline brain regions. Another cross-sectional EEG study compared long-term meditators to non-meditators that were exposed to an emotionally disturbing event. Long-term meditators reported less negative emotions (anger, anxiety, disgust, and contempt), and feelings of happiness did also not decrease in this group. The findings in this study also suggests that long-term practitioner of SY contributes to lower emotional reactivity after stressful events [27]. Furthermore, SY may increase mood and reduce tension and fatigue [21]. A RCT among adults with asthma reported a significant increase in mood compared to a relaxation/cognitive behavior therapy group with a strong moderate effect size of (d = 0.48, 95%CI −0.04 to 0.10). Improvements on mood subscales of tension and fatigue were also reported. It should be noted that the effects appear to be short-term; the follow-up two months after the intervention showed no significant differences [21]. Higher levels of quality of life (general health) were also found in a non-randomized controlled trial [29], a prospective cohort study [28], and a cross-sectional survey [30].

Psychological well-being

A randomized controlled trial [24] among 93 healthy adults reported significant increases of personal values (forgiveness, world of beauty, unity with nature, and preserving public image). A cross-sectional survey that compared 343 long-term SY meditators in Australia to the general population reported significant higher scores

on general health, mental health, emotional and social functioning, and vitality [30]. Finally, a study that investigated regional differences in gray matter volume (GMV) using Voxel-Based Morphometry compared 23 experienced practitioners of SY meditation to 23 non-meditators. Larger GMV was found in the meditator group. Larger GMV is associated with more emotional control, feelings of compassion, and introceptive perception [31]. These findings suggest that long-term SY meditation practice may enhance the aforementioned cognitive-emotional functions and thereby may contribute to enhanced psychological well-being.

Discussion

At first glance, SY meditation seems to have positive and significant effects on mental health. After reviewing the articles and taking the methodology and quality of the studies into account, it appears that SY is associated with reduced depression in both healthy adults, and in adults with a depressive disorder. SY is also associated with decreased anxiety and increased subjective and psychology well-being among healthy adults. Only one study found a small effect of SY on stress. Our findings on the effects of SY on depression, anxiety, and stress are in line with previous studies on the effects of yoga on these outcomes. For example, several meta-analyses on the effects of yoga among patients with cancer reported large reductions in distress, anxiety, and depression [32–34]. A meta-analysis on the effects of yoga on patients with depressive disorders and individuals with elevated levels of depression reported moderate short-term improvements on depression and anxiety [35], and another meta-analysis on the effects of yoga for prenatal depression also reported significant decreases in depression [36]. Improvements on subjective and psychological well-being in yoga research are less often reported. Some meta-analyses report increases in indicators of wellbeing, such as quality of life and positive effect [32, 33, 35], while other studies found no significant improvements in wellbeing [37, 38], or only improvements when yoga is compared to no intervention [39].

In regard to the study quality, we found that half of the RCTs in SY had a low risk of bias, and therefore can be qualified as studies of high quality. For the non-randomized controlled trial, the cross-sectional study and the cohort study the quality was also high. These findings are not in line with previous studies that examined the study quality in meditation and yoga research. Our findings suggest that the overall quality of studies on SY is higher than in studies on other forms of meditation and yoga. In general, the majority of randomized trials in the field of meditation suffer from a lack of methodological rigor [40]. A meta-analytic study reported that from the more than 3,000 articles on meditation that were published between 1973 and 2007, only four percent could be classified as randomized controlled trials. Although this study identified 133 randomized studies, after excluding studies that lacked methodological rigor (e.g. trials without an active control group, too few participants, no blinding procedures and not using appropriate methods of statistical analyses) only five high quality studies remained [2]. Although it appears that the growing interest in meditation, in particular mindfulness, has led to the publication of more randomized controlled studies since 2007, the quality of these studies is still not optimal. For example, a meta-analysis on meditation programs for psychological stress and well-being [10] included 47 randomized studies, of which 36 studies were published from 2007 up to 2013. Of these studies only eight were assessed having a good quality, 18 having a fair quality and nine having a poor quality. In summary, we can conclude that although there are limited number of studies on the effects of SY meditation, the large majority of the studies are of high quality, which is an exception to the rule in yoga research.

Strengths and limitations

In addition to the relative high quality of SY studies, another strength was the inclusion of four cross-sectional studies that provided evidence for positive effects on the basis of objective outcome measures (e. g. EEG, MRI scans), rather than subjective outcome measures (self-report questionnaires). The disadvantage of cross-sectional studies is that only association, and not causation can be inferred [41, 42]. A further limitation in our review was the small number of studies on the effects of SY, in particular the number of RCTs. In order to present an overview of the potential benefits of SY, we therefore included a non-randomized controlled trial and a prospective cohort study. With regard to non-randomized and cross-sectional trials, although these may offer weaker evidence for the efficacy of an intervention, it would be unwise to simply discard their findings. The validity of findings of such studies may depend on the quality of the trial. A non-randomized study that has a low risk of bias is comparable to a well-performed randomized trial, whereas trials that have a moderate or high risk of bias cannot be considered comparable [43].

Recommendations

In relation to SY research there are the following recommendations: First, more studies among different populations on the effects of SY are needed to make any firm conclusions on the effects of SY. These studies should maintain a high study quality. In case of controlled studies, we strongly advice that researchers report sufficient statistical data (e.g. means and standard deviations at post-test assessment), so effect sizes can be calculated. Second, the effects of SY on stress and anxiety should be explored further since the current evidence is weak. Third, although several studies report increases in feelings of happiness, fearlessness, bliss, and integrity, more research on the effect of SY in the development of positive qualities is needed to justify any such claims in this matter. In addition, more studies on the development of positive aspects such as resilience, subjective well-being, and personal values such as forgiveness, courage or transcendence are recommended. Finally, the psychological mechanisms that are applicable to SY should be investigated, to offer a rationale how the reported specific effects could be explained. These recommendations also stretch out to all forms of meditation research.

Conclusions

This research summarizes the effects of SY meditation on mental health. Our findings suggest that SY can reduce depression, anxiety, and increase subjective well-being. In addition, long-term practitioner of SY is associated with increased subjective and psychological well-being. However, due to the small number of publications definite conclusions on the effects of SY cannot be made.

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