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Increased Mental Well-Being and Reduced State Anxiety in Teachers After Participation in a Residential Yoga Program

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Statistical Analysis C
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Background: Reducing stress in the workplace improves mental health. Teaching is of social importance, but it may receive inadequate recognition and rewards. The present study compared mental well-being and state anxiety in primary school teachers who practiced 15 days of yoga in a residential setting with those who continued their usual routine.

Material/Methods: We enrolled 236 primary school teachers to participate in the study. We assigned 118 primary school teachers (group mean ±S.D., age 41.5±6.0 years, 74 females) to the experimental group; they underwent 15 days of yoga training for 6 hours/day) in a residential yoga center. The non-yoga control group (group mean ±S.D., age 42.3±6.0 years, 79 females) consisted of 118 teachers who continued with their normal teaching routine.

Results: After 15 days in the residential yoga program, there was an increase in overall mental well-being ($p<.001$) and lower state anxiety ($p<.01$) (repeated-measures ANOVA, followed by *post hoc* multiple comparison tests). At baseline, the non-yoga control group had higher levels of state anxiety, presumably related to their remaining in the workplace.

Conclusions: The study was a 15-day, comparative, controlled trial. The results show that after 15 days of participation in the residential yoga program, primary school teachers increased all aspects of mental well-being and had reduced state anxiety.

MeSH Keywords: Faculty • Occupational Health Services • Yoga

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Background

Prolonged exposure to stress can reduce the sense of well-being [1]. Teachers are known to face high levels of stress across cultures [2]. In India, these stressors often consist of long working hours, inadequate pay, ambiguous roles, poor infrastructure, lack of social recognition, and job dissatisfaction, often associated with workplace conflict [3].

When a person is employed in a particular job, there is a critical link between self-esteem, self-efficacy, and the societal status associated with making the person feel rewarded, esteemed, and belonging to a specific group – their colleagues [4]. However, if there is an imbalance between the effort at work and reward in terms of the monetary benefit, self-esteem, status, and level of work freedom allowed, a person is likely to experience emotional distress, with a specific risk of autonomic arousal, associated stress reactions, and increased insecurity and anxiety [4].

A stressful workplace and anxiety can negatively impact mental health and well-being [5]. There is a close relationship between stress and anxiety. Stress is a response to a stimulus (e.g., a threat) in a particular situation, while anxiety is a reaction to stress [6]. Physiologically, both stress and anxiety stimulate the sympathetic nervous system and the hypothalamic-pituitary-adrenal axis [7]. Earlier studies have shown that anxiety can be detrimental to mental health. Anxiety has been shown to negatively impact well-being [5]. It has been associated with depression [8] and decreased self-esteem [9], psychological well-being [10], and quality of life [11].

It is well recognized that to function optimally, subjective well-being is essential [12]. Subjective well-being has both emotional and cognitive components. The emotional component includes positive and negative affect, while the cognitive component is related to an individual's level of satisfaction with life, including their job, health, and other factors [13].

In the present study this is especially relevant, as teachers' well-being can influence the way in which they deal with factors within the school and with the demands of the teaching profession [12]. Teachers' well-being improves positive patterns of feeling and thinking. Their effectiveness in the classroom positively influences students' well-being, improves productivity, school effectiveness, cognitive self-regulation, job satisfaction, relationships with the parents or guardians of students, and increases chances of approaching teaching with innovation [14].

Physical activity has been reported to reduce stress and increase well-being in school teachers [15]. The effect of moderate exercise in elementary school teachers was assessed after 12 weeks of training [16]. The effect on the autonomic nervous system was based on recordings of the heart rate variability (HRV), and the Beck Anxiety Inventory was used to assess anxiety. Time domain variables of the HRV increased significantly in the exercise group compared to the non-exercise group in a between-groups comparison. The time domain variables of the HRV are associated with parasympathetic activity [17,18]. The anxiety scores were not discussed in detail. The authors describe these results as comparable to those of other studies evaluating exercise for sedentary adults [19].

Mindfulness-based stress reduction (MBSR) has also been shown to reduce depression and stress in school teachers. Eight-week practice of mindfulness-based stress reduction (MBSR) showed a reduction in depression (Cohen's d=1.67) and stress (Cohen's d=1.12) in 9 primary school teachers and 2 teaching assistants with ages ranging from the late 20s to the late 50s [20]. Depression and stress were measured using the Depression Anxiety Stress Scales (DASS21). The intervention included one 2.5-h weekly session for 8 weeks and one day with 5 h of silence between week 5 and 6.

Yoga is a mind-body practice which includes both physical and mental components. The Warwick-Edinburgh Mental Well-Being Scale (WEMWBS) assesses subjective well-being and psychological functioning [21]. This scale was used to assess well-being in 30 physiotherapy trainees who were enrolled in a yoga program for 1 h daily for 5 days a week over a period of 6 weeks [22]. At the end of 6 weeks, the total sense of well-being showed a significant improvement after yoga training, correlating with factors assessed in the scale, such as an enhanced mood, feeling cheerful, and improved confidence.

Given the background that teaching is a socially responsible yet stressful occupation in which mental well-being can be compromised, the present study was designed to assess mental well-being and state anxiety in 118 primary school teachers after 15 days in a residential yoga program compared to before and compared to 118 of their colleagues who formed a non-yoga control group.

Material and Methods

Participants

Our study included 236 primary school teachers, of which 118 adults of both sexes – the experimental (yoga) group – were teachers in primary schools in a state in north-east India. The state government had an agreement with the yoga center carrying out the research to train teachers in yoga. The state government selected all government-funded primary schools within the state. Each school was asked to choose 1 teacher for training. Their selection was not based on specific criteria (e.g., they were not physical education teachers), but on the

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Table 1. Baseline characteristics of participants of yoga group and non-yoga control group.

Groups	Yoga group (15-day residential program)	Non-yoga control group (routine activities)
Total number of participants	118	118
Age (mean ±S.D.)	42.17±6.61 years	42.35±6.01 years
Age range	26 to 55 years	29 to 53 years
Gender (M: F)	44: 74	39: 79

convenience of the teaching schedule. The selected teachers received all benefits during the study and they did not have to pay for their training or their accommodation. The schools had assigned them (1 teacher/school with no specific rationale) to receive training in yoga as a part of an initiative to introduce yoga in schools. The teachers were naïve to yoga. Hence, instructions were given to learn the basics of yoga and then how to impart this to students of primary schools. Their ages were between 26 and 55 years (group mean ±S.D., 41.5±6.0 years). The control group consisted of 118 participants of comparable age (group mean ±S.D., 42.3±6.0 years) who were primary school teachers in government-funded primary schools in the same state, but who were not selected to learn yoga. The sample size was based on a study which reported changes in state anxiety following a single yoga session in army personnel with effect size=0.59 (medium) [23]. The inclusion criteria were: (i) participants of both sexes, teaching in primary schools, (ii) no prior experience of yoga, (iii) willing to follow the study conditions, and (iv) not participating in any other wellness programs (e.g., meditation, physical exercise, or special diet). Exclusion criteria were: (i) any physical or mental illness, or being on medication, based on answers to survey questions, and (ii) using alcohol or any intoxicant. None of the teachers had to be excluded for these reasons. The inclusion criteria for the non-yoga control group were the same. The study was conducted in a residential yoga center located in northern India. Overall, the residential facility can accommodate approximately 5000 persons. The teachers were provided a shared room for 2 persons with an attached bathroom.

Teachers were assigned by their schools to learn yoga but their participation in the study was voluntary. Baseline characteristics of the participants are shown in Table 1. After the initial assessments, the participants in the yoga group started yoga practice. The non-yoga control group continued with their usual teaching routine (approximately 6 h per day). All participants provided signed informed consent. The study was approved by the Institutional Ethics Committee (approval number: PRF/16/0012) of our institution.

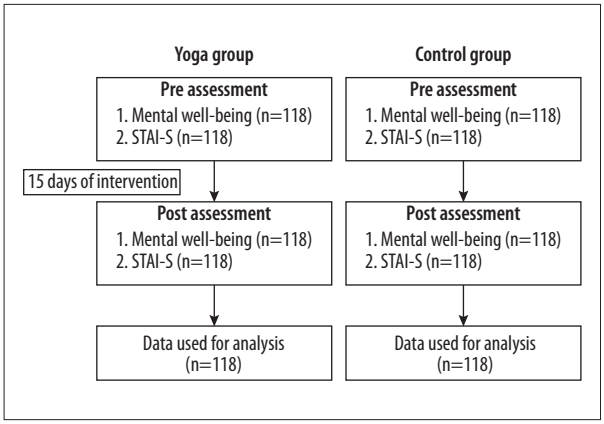

Figure 1. Trial profile (details about the number of participants in both groups).

Design of the study

This study was a matched control study with assessments at the beginning and end of 15 days of a residential yoga program. The non-yoga control group continued with their usual routine of teaching for approximately 6 h per day in their schools for the same duration. In the yoga group, participants were occupied from 04: 00 hours in the morning to 21: 00 hours in the night. The participants were required to stay in the campus during the training except for a 1-day visit to different units of the institution (that is, the residential hospital which is 22 kilometers away or the nutraceutical manufacturing unit also 25 kilometers away from the training center). The campus includes a dining hall, grounds to walk in, and a shop where all basic necessities can be bought.

Figure 1 shows the trial profile, including the number of participants in yoga and non-yoga control groups at different stages.

Assessments

Mental well-being

Mental well-being was estimated using the Warwick-Edinburgh Mental Well-being Scale (WEMWBS) [21]. This is a 14-item scale which asks people to describe their experience of feelings and thoughts over the last 2 weeks, with 5 possible options as their response: “1” for “never”, “2” for “rarely”, “3” for “sometimes”, “4” for “often”, and “5” for “very often”.

State anxiety

State anxiety was measured using a sub-scale of the Spielberger’s State-Trait Anxiety Inventory which has 20 items to assess state anxiety or anxiety at the moment of testing [24]. Participants selected the number that best described the intensity of their feelings at the moment of testing, where “1”

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Table 2. Two-hour yoga practice session as part of the residential yoga program.

Sl. no.	Practice	Duration
1	Meditation on the *Sanskrit* syllable, OM and *Bhajans* (*Bhakti yoga*)	10 min
2	Sun Salutation (*Surya namaskara*)	10 min
3	Loosening exercises (*Sukshma vyayama*)	20 min
4	Guided relaxation (in Shavasana)	10 min
5	Voluntarily regulated breathing (*Pranayamas*)	20 min
6	Yoga postures (*Asanas*)	30 min
7	Relaxation (in Shavasana)	10 min
8	Meditation	10 min
	Total duration	**120 min**

The same practices have been repeated during the evening session. The time for theory sessions was 120 min each day and the topics for this session were yoga and health, diet, stress management, and spirituality.

was "not at all", "2" was "somewhat", "3" was "moderately", and "4" was "very much so".

Intervention

The total duration of the program was 15 days. The participants practiced yoga for 4 h every day (2 sessions in a day, and each session lasted 2 h). In addition to the yoga practice session, they attended theory classes related to yoga for 2 h per day. During the remaining time they were engaged in individual chores, group meetings with their supervisors, and in unsupervised studying or reading. In each session all the participants were taught the following techniques for 15 days: (i) loosening exercises and specific physical postures (*asanas*), (ii) breathing techniques (*pranayamas*), (iii) chanting, and (iv) guided relaxation techniques. The details are given in Table 2.

The teachers were naïve to yoga. Hence, instructions were given to learn the basics of yoga theory and to practice basic yoga postures (*asanas*), yoga breathing (*pranayama*), and meditation. During the theory classes, the participants were also taught what yoga includes, how the concepts of yoga in Sanskrit texts (e.g., Hatha Yoga texts, *circa* 1500 C.E.) applies to present-day life, which practices are included, the directions to be followed when teaching yoga to children, and precautions to be taken while teaching yoga to children to avoid any harm to them.

The teachings were also based on the theory given in *Patanjali's Yoga Sutras* (by the sage Patanjali, *circa* 900 B.C.) [25]. While most of the information about yoga theory and practices was derived from this source, a few details, particularly related to diet and health, were taken from the *Bhagwad Gita* (*circa* 3200 B.C.) [26]. They were instructed to contact yoga instructors of the institute in their state after they returned to their homes so as to get help to introduce yoga in schools. This training would be further supported by observers who would later take yoga classes along with the trained instructors of the institution who have over 10 years of experience in teaching yoga. The institute had already prepared a curriculum, yoga teacher's manual and text books on yoga for primary school children (Classes I–VI). The yoga instructors of the institute are aware of these teaching methods [27]. Yoga instructors were asked to specifically watch for any adverse event during yoga practice, but no such event was reported.

The participants in the non-yoga control group did not receive any such intervention and they followed their usual routine at their workplace. None of them practiced yoga or started any physical activity or stress management routine during the 15-day period.

Data extraction

All questionnaires were blindly scored by 2 evaluators. Data were scored and the group mean values ±SD were calculated before and after the yoga sessions.

Mental well-being

Each item of the scale was given a weighted score of 1 to 5. A standard method was used to score the data [21]. Higher scores are positively correlated with a higher level of well-being.

State anxiety inventory

Each STAI-S item was given a weighted score of 1 to 4. A standard method was used to score the data [24]. Higher scores are positively correlated with a higher anxiety level.

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Table 3. Mental well-being and state anxiety of the 2 groups (n=118 each). Values are group mean (S.D.).

Variables	Yoga group (n=118) (15-day residential program)			Non-yoga control group (n=118) (routine activities)		
	Before	After	Cohen's d	Before	After	Cohen's d
Mental well-being	53.30 (7.55)	55.94 (7.07)***	–0.361	54.33 (6.75)	53.46 (8.10)	0.117
STAI-S	33.44 (7.90)	31.47 (8.10)**	0.246	39.60 (8.78)	40.39 (9.14)	–0.089

STAI-S – state anxiety; ** p<.01, *** p<.001, *post hoc* analysis with Bonferroni adjustment compared with pre.

Table 4. ANOVA for different variables: Mental well-being and state anxiety (STAI-S).

Sl. no.	Factors	Variables	F	df	Huynh-Feldt ε	p
1	Within-subjects (States)	Mental well-being	4.252	1, 234	1	0.040
		STAI-S	1.650	1, 234	1	0.200
2	Between-subjects (Groups)	Mental well-being	0.709	1, 234	–	0.401
		STAI-S	56.293	1, 234	–	<0.001
3	States × Groups	Mental well-being	16.764	1, 234 (States) × 234 (Groups)	–	<0.001
		STAI-S	8.946	1, 234 (States) × 234 (Groups)	–	0.003

<0.001, values are less than .00001.

Statistical analysis

A repeated-measures analysis of variance (RMANOVA) followed by *post hoc* analyses with Bonferroni adjustment were done to compare data after the intervention with data recorded before the intervention, using PASW Version 18.0. Data of 118 subjects of the yoga group were compared with 118 subjects of the control group. There was 1 within-subjects factor (States: pre and post) and 1 between-subjects factor (Groups: yoga and control). Statistical significance (α) was set at 0.05.

Results

Repeated-measures analysis of variance (RMANOVA)

For this assessment, 118 teachers in each group were assessed, and their group mean values ±S.D. are given in Table 3. Values for the factors such as Within-Subjects (States), Between-Subjects (Groups), and interaction between the 2 for (i) mental well-being, which covers hedonic and eudemonic elements of the mental well-being, and (ii) STAI-S (anxiety at the specific moment), are given in Table 4. The significant Groups X States interaction indicated interdependence, suggesting mental well-being and state anxiety are interdependent.

Post hoc analyses

The repeated-measures analysis of variance showed a significant difference in mental well-being scores (p<0.001) and state anxiety scores (p<0.01) within the group who received residential yoga training in a post-pre comparison (the sub-group, n=118). For between-group analysis, in the post comparison between yoga and control groups, there was a significant difference in mental well-being and state anxiety, while in the pre comparison there was a significant difference in state anxiety alone, which was higher in the control group. Comparisons were made with respective 'pre' States within a group. In the between-groups comparisons of the 2 groups, the post data and the pre data were compared separately.

Discussion

One hundred and eighteen primary school teachers showed improvement in their total sense of mental well-being and a decrease in state anxiety after 15 days of a residential yoga program. One hundred and eighteen of their colleagues who continued with their routine as the non-yoga control group showed no significant change.

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The mental well-being scale (WEMWBS) used in this study has been used in an Indian population who practiced yoga and showed improved well-being, but the suitability of the scale was not discussed in that report [22]. A more detailed analysis of Asian adults (22 Chinese and 47 Pakistani adults) using the WEMWB scale examined the suitability of the scale for this population [28], suggesting that WEMWBS was appropriate for English-speaking Pakistani and Chinese adults. While these populations are not the same as an Indian population, there are certain similarities in their attitude towards happiness and family. Based on this and the earlier use of the WEMWBS in an Indian population [22], the scale was considered appropriate to be used in the present study.

Positive mental well-being is an important protective factor against mental health problems [29], including anxiety. It also influences health, social outcomes, and psychological functioning [30]. Positive mental well-being includes both hedonic and eudemonic aspects of well-being [31]. Hedonic aspects include happiness and subjective well-being, while positive functioning is a part of the eudemonic aspect. The 14-item scale used in the present study assesses both aspects of mental well-being. The hedonic elements include happiness, joy, and contentment, while examples of the eudemonic elements are psychological functioning, autonomy, a sense of purpose in life, and a positive relationship with others. The present study did not separate hedonic and eudemonic items, but showed an increase in overall mental well-being following 15 days of residential yoga program.

Regular practice of yoga has been associated with higher levels of psychological well-being [32], psychological functioning [33], happiness [34], and subjective well-being [35]. A cross-sectional study aimed at correlations between dimensions of psychological well-being with yoga practice was conducted on 203 healthy individuals. In particular, body awareness, body image dissatisfaction, and mindfulness were assessed. These 3 aspects of psychological well-being showed a significant correlation with the frequency of yoga practice. Apart from these 3 factors, yoga practice was associated with increased calmness, a state of pleasant enthusiasm, with a decreased rate of anxiety and depression [36].

Apart from better mental well-being, state anxiety was significantly reduced after the 15-day residential yoga program. This reduction in state anxiety following yoga needs to be interpreted with caution since the 2 groups differed in their baseline levels of state anxiety. The control group who continued with their routine teaching had higher levels of baseline state anxiety compared to the yoga group. The yoga group consisted of teachers who were selected to attend the 15-day residential yoga program. This group could have been expected to have lower state anxiety as they were away from their workplace, because people with work anxiety may perceive their workplace more negatively than those without such anxiety [37].

On the other hand, anxiety increases when a person is faced with adapting to new places and novel situations [38]. Since these teachers were naïve to yoga, the change in their schedule, for example waking up at 04: 00 a.m., and learning yoga for the first time, could have increased their state anxiety at baseline. However, in the between-groups comparison, this was not the case, as state anxiety was higher in the non-yoga control group.

Various factors could account for the decrease in state anxiety following yoga, but none of them have been proven. The theory sessions, which are considered an important part of the yoga practice, are based on the ancient yoga texts (*Patanjali's Yoga Sutras, circa* 900 B.C.) [25]. In these texts, the perception of situations as stressful or not stressful is considered to be reinforced by reasoning and thinking patterns [39]. A study showed that state anxiety decreased with yoga theory based on *Patanjali's Yoga Sutras* (*circa* 900 B.C.) [40].

Anxiety has been found to be associated with low parasympathetic nervous system activity [41], increased high-frequency EEG [42], and reduced gamma amino butyric acid (GABA) levels [43]. The residential yoga program in the present study may have influenced physiological factors associated with anxiety. For example, slow, deep breathing increases the parasympathetic tone [44]. The program also included alternate nostril yoga breathing, which has been shown to reduce high frequencies in the electroencephalogram [45]. NMRs imaging demonstrated an increase in levels of GABA in the brain after 60 min of practicing yoga postures [46]. This is of relevance, as the yoga sessions included 120 min of theory and 2 yoga practice sessions. Each practice session was for 2 hours which included slow breathing, high frequency yoga breathing and 30 minutes of yoga postures.

Hence, following yoga, complex mechanisms could be involved in reducing the psychophysiological effects of anxiety. The control group had high levels of baseline state anxiety, which did not change at re-test 15 days later. Hence, the between-group comparison could also be related to the difference in the circumstances of the groups. The control group continued their usual work activities. It is known that teaching is associated with specific stressors, such as tension, frustration, anger, and depression, usually demonstrated by high anxiety and low psychological well-being [1]. This could account for the high state anxiety in the control group.

An informal discussion with the teachers in the yoga group showed that the physical health problems most commonly faced were vocal strain, allergy to chalk, and problems associated

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with standing for long periods. The 15-day residential yoga program did not attempt to address these health problems. However, it is worth noting that yoga can help in public speaking [47] and can reduce allergies [48]. Hence, these areas require further research, especially in countries where teachers manage large classes and use simple teaching aids such as blackboard and chalk.

Our results suggest that yoga is beneficial to teachers, reducing their anxiety and promoting feelings of well-being. The findings are limited by the study design. The participants were not randomly assigned to the 2 groups and the non-yoga control group was in their usual work environment. Baseline data was not collected prior to arrival at the residential yoga center. Also, the duration of the 15-day intervention was relatively short. The findings of the present study are important as they are related to the fact that a teacher's performance in terms of psychological functioning, performance in school, and their interaction with students, varied directly with their feelings of mental well-being.

Conclusions

Our findings suggest that 15 days of a residential yoga program which includes physical postures, regulated breathing, and guided relaxation can improve mental well-being while reducing state anxiety in primary school teachers. Teachers in the control group who continued with their usual routine showed no change in either mental well-being or state anxiety.

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Conflicts of interest

None.

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